Queen Street Municipal Drain 2022

June 28, 2022

Prepared for:

TOWNSHIP OF Wilmot

Headway Engineering
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Kitchener, Ontario
June 28, 2022

To the Mayor and Members of Council:

Re: Queen Street Municipal Drain 2022
Township of Wilmot
Our Reference No. WLMT-003

Headway Engineering is pleased to provide its report for the **Queen Street Municipal Drain 2022** in the Township of Wilmot.

The preparation of this report was authorized by a resolution of the Council of the Township of Wilmot on August 23, 2021, per Section 4(1)(c) of the Drainage Act.

The primary objective of this report is to establish a new Municipal Drain designed to today's standards of drainage for arterial roads, and to accommodate plans for a proposed development. The report recommends the construction of a new closed municipal drain from Queen Street (Regional Road 12) adjacent to Lot 7, Concession 3 Block A, downstream to its outlet into a natural watercourse in Lot 6, Concession 3 Block A.

A summary of the assessments for this project are as follows:

Municipal Lands	$164,254
Privately Owned Non-Agricultural	$144,590
Privately Owned Agricultural – Grantable	$10,856
Total Estimated Assessments	**$319,700**

Yours truly,

[redacted]

Stephen Brickman, P.Eng.
Project Engineer and Manager

[redacted]

Adam Hall
Project Coordinator
HEADWAY ENGINEERING
SB/

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1.0 INTRODUCTION AND LOCATION

The Council of the Township of Wilmot has appointed Headway Engineering to investigate a petition for a new municipal drainage works. The project services parts of Lots 6 and 7 in Concessions 3 Block A in the Township of Wilmot, Region of Waterloo.

The Drainage Area comprises approximately 19.28 hectares, and land uses within the watershed include agriculture, future residential, and roads.

The attached Plans, Profiles and Details; Drawing Numbers 1 to 9, show and describe in detail the location and extent of the work to be completed and the lands which are affected.

2.0 PROJECT AUTHORIZATION

Authority to prepare this report was obtained by a resolution of the Council of the Township of Wilmot at its August 23, 2021 meeting to appoint Headway Engineering to prepare an Engineer's Report under Section 4 of the Drainage Act. The area requiring drainage is a portion of Queen Street (Regional Road 12). The petition is valid in accordance with Section 4(1)(c) of the Drainage Act.

3.0 DRAINAGE HISTORY

The drainage area is currently serviced by a private drainage system, consisting of a surface pipe through Queen Street, and continuing downstream through an open channel approximately bisecting the Apple Home Builders lot (Roll No. 3-079) (hereafter referred to as the Apple Property). Runoff flows split at the northeast corner of the Apple Property where a portion of the flow crosses Cottage Lane via a surface pipe, and the remaining portion flows easterly along Cottage Lane by way of a roadside ditch. The eventual outlet of the system is Alder Lake.

4.0 PUBLIC MEETINGS AND ENGAGEMENTS

4.1 On-Site Meeting

Per Section 9(1) of the Drainage Act, an on-site meeting was held on October 20, 2021 to address the Section 4 Petition. Persons in attendance were:

Stephen Brickman, P.Eng.	Headway Engineering
Adam Hall	Headway Engineering
John Kuntze, P.Eng.	Township of Wilmot Drainage Superintendent
Nate Fach	Township of Wilmot
Josh Graham	Region of Waterloo
Joe Carvalho	Region of Waterloo
Trevor Heywood	Grand River Conservation Authority
Angela Kroetsch, P.Eng..	GM BluePlan Engineering Limited

Landowners included:

Darren Huber	Cortney Huber	Peter Lass
John Day		

A preliminary plan showing the watershed was distributed in advance. The information supplied was based on data made available to the public by the Province of Ontario.

4.2 Petitioner Meeting Number 1

A Petitioner Meeting was held on March 31, 2022. Persons in attendance were:

Stephen Brickman, P.Eng.	Headway Engineering
Adam Hall	Headway Engineering
John Kuntze, P.Eng.	K. Smart and Associates
Josh Graham	Region of Waterloo
Steve VanDeKeere P.Eng	Region of Waterloo
Ken Renner	Region of Waterloo
Angela Kroetsch, P.Eng.	GM BluePlan Engineering Limited

The information supplied included preliminary design details on the proposed pipe drainage system on an alignment approximately parallel to the perimeter of the Apple Property (Roll No. 3-079). This meeting provided a review of the preliminary design of the proposed drainage system.

The primary point of discussion at the meeting related to the proposed drainage system's ability to accommodate larger rainfall events. Subsequent to the meeting, the design standard of the pipe system was increased from a five-year rainfall event to a 25-year event.

4.3 Petitioner Meeting Number 2

A second Petitioner Meeting was held on April 26, 2022. Persons in attendance were:

Stephen Brickman, P.Eng.	Headway Engineering
Adam Hall	Headway Engineering
John Kuntze, P.Eng.	K. Smart and Associates
Josh Graham	Region of Waterloo
Steve VanDeKeere P.Eng	Region of Waterloo
Angela Kroetsch, P.Eng.	GM BluePlan Engineering Limited
John Day	Apple Home Builders

The information supplied included the revised details of the proposed drainage system including a larger design standard, and minor modifications to the alignment. The meeting also included a review of the preliminary cost estimates and approximate assessments for the project.

After the meeting, the design was adjusted by changing the pipe materials for the Queen Street road crossing.

4.4 Public Information Meeting

A Public Information Meeting was held on May 19, 2022. Persons in attendance were:

Stephen Brickman, P.Eng.	Headway Engineering
Nate Fach	Township of Wilmot
Angela Kroetsch, P.Eng.	GM BluePlan Engineering Limited

Landowners included:

Darren Huber	John Day	Peter Lass
Mark Drinkwalter	Ingrid Drinkwalter	

The information supplied included details on the proposed construction of the pipe drainage system on an alignment approximately parallel to the perimeter of the Apple Property (Roll No. 3-

079). This meeting provided a review of the design of the proposed drainage system, the estimated costs of the project, and the proposed assessments.

5.0 FINDINGS

Based on the information collected during field investigations, surveys, public engagements, and review of documentation, the following summarizes Headway Engineering's findings:

5.1 Watershed Condition (Hydrology):

- The watershed was established through the analysis of tile drainage maps, previous engineers' reports for surrounding systems, field investigations, surveys, and data analysis of the Southwestern Ontario Orthophotographic Project (SWOOP). The drainage area comprises of approximately 19.28 hectares.
- Land uses within the watershed are as follows:
    - Agricultural: 17.7 hectares (92%)
    - Future Residential: 1.1 hectares (6%)
    - Cemetery: 0.04 hectares (~)
    - Roads: 0.44 hectares (2%)
- The Ontario Ministry of Agriculture, Food and Rural Affairs' Agricultural Information Atlas describes the soil types within the watershed and along the route of the drain as follows:
    - Loam (approximately 76%)
    - Clay Loam (approximately 24%).

5.2 Existing Drainage System:

- The existing drainage system consists of a 1390 X 970mm corrugated steel pipe arch (CSPA) through Queen Street and continues downstream onto the Apple Property (Roll No. 3-079) as an open channel, where a portion of the runoff crosses Cottage Lane via a 300mm diameter pipe, and excess runoff flows alongside Cottage Lane using the south road ditch.
- The precise age of the existing system is not known.
- The existing drainage system is private.

5.3 Outlet:

- The outlet for the private drain is the natural watercourse and wetland on the Huber property (Roll No. 3-244)
- The ultimate outlet for the system is Alder Lake.

5.4 Other noted issues:

- The existing drainage system is not a municipal drainage system administered and protected under the Drainage Act. Lands and roads within the watershed do not currently have a secured outlet within the context of the Drainage Act.

- The existing drainage system on the Apple Property (Roll No. 3-079) conflicts with development plans for future residential lots.
- The south road ditch, next to Cottage Lane is not of sufficient capacity to convey flows generated by large rainfall events.
- Modelling shows that large rainfall events crest Queen Street next to the property line between the Johnston and Mittleholtz properties (Roll No. 2-040 and Roll No. 2-051-05). Photos provided by affected Landowners confirm the finding.
- The existing farm tile from the west side of Queen Street outlets into the west road ditch, next to the CSPA surface pipe through the regional road.

5.5 Environmental Requirements:

- The Grand River Conservation Authority (GRCA) has indicated that a permit to alter a watercourse is not required, however the GRCA will continue to be included on formal deliverables for the project.

6.0 DESIGN CONSIDERATIONS

The proposed drainage system is sized to convey flows generated by a 1 in 25-Year rainfall event. The selected design standard exceeds typical design standards for agricultural areas (38mm drainage coefficient), and storm sewers (1 in 5-Year rainfall event). The increased design standard was selected to account for the arterial use of Queen Street.

Several alignments were considered through the Apple Property (Roll NO. 3-079); one approximately following the proposed property lines for the development, one approximately straight across the Apple Property from the existing crossing at Queen Street to the proposed crossing at Cottage Lane, and finally the preferred alignment along the perimeter (North and West property lines) of the Apple Property. The preferred alignment was selected because it poses the least amount of land use restrictions on the Apple Property.

Pipe materials were selected based on location and intended land uses adjacent to the drainage system.

Surface water inlets have been placed purposefully to receive surface flow and allow for subsurface connections.

7.0 ENVIRONMENTAL CONSIDERATIONS AND PERMITTING

7.1 Department of Fisheries and Oceans (DFO)

The work proposed under this report primarily consists of the new construction of a closed drainage system. There are no in-water works proposed or required. Therefore, the works do not cause death of fish, permanent alteration, or destruction of fish habitat. Likewise, the participation of DFO is not required.

7.2 Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF)

Headway Engineering completed a review of the Natural Heritage Information Centre mapping for Species at Risk in Ontario. Provincial Species at Risk requiring special consideration were not found in the working area.

7.3 Grand River Conservation Authority (GRCA)

The GRCA provided correspondence dated October 21, 2021, which states the following:

"... our [GRCA] comments on works under the Drainage Act are advisory, and will not require a GRCA permit."

The correspondence also states the following:

"... we [GRCA] wish to stay involved as the study process moves forward."

The GRCA has been included on the circulation list for this report and has been notified of all public engagements. Additionally, Headway Engineering has forwarded design discussions and drawings to the GRCA on April 26, 2022, for comment. The GRCA confirmed receipt of the design information and provided additional advisory comments relating to erosion control in the wetland.

8.0 RECOMMENDATIONS

Headway Engineering recommends the following:

1. A new municipal drainage system be installed from the outlet into the wetland and natural watercourse on the Huber property (Roll No. 3-244), upstream to the West side of Queen Street (Regional Road 12), next to the Johnston property (Roll No. 2-040).
2. The proposed drainage system includes the installation of approximately 213m of 750mm to 900mm diameter pipes and is designed to convey flows generated by a 1 in 25 year rainfall event.
3. The proposed drain alignment shall be approximately parallel to the north and west property lines of the Apple Property (Roll No. 3-079) to accommodate future development plans for the property.
4. A rip-rap armored berm be constructed in the south road ditch of Cottage Lane next to the northeast corner of the Apple Property (Roll NO. 3-079). The purpose of the berm is to direct runoff to the proposed Cottage Lane crossing and reduce stormwater flow in the south road ditch.
5. This new drainage system shall be known as the **Queen Street Municipal Drain 2022**.
6. Although not part of the Queen Street Municipal Drain 2022 project, Headway Engineering recommends that the Region of Waterloo consider improved road ditching on the west side of Queen Street (Regional Road 12) next to the property line between the Mittleholtz and Johnston properties (Roll No. 2-051-05 and 2-040, respectively).

9.0 SUMMARY OF PROPOSED WORKS

The proposed work consists of:

1. The installation of approximately 213m of 750mm to 900mm diameter reinforced concrete and HDPE pipe.
2. The installation of two concrete catch basins, and
3. Five reinforced concrete maintenance holes.

10.0 WORKING AREA AND ACCESS

Access to the working area shall be designated by the Landowners.

10.1 Closed Portion

The working area shall be an average width of 25m for construction purposes, and an average width of 10m for maintenance purposes along the alignment of the proposed drain.

10.2 Open Portion

The working area shall be an average width of 25m for construction purposes, which includes the footprint of the proposed open channel, and the working side. The working area shall be an average width of 10m for maintenance purposes along the working side of the of the proposed drain.

11.0 SCHEDULES

Four schedules are attached and form part of this report.

11.1 Schedule A – Schedule of Allowances

Following Sections 29 and 30 of the Drainage Act, allowances are provided to Landowners for Right-of-Way and Damages to Lands and Crops. Schedule A contains a table of the applicable allowances to Landowners.

11.2 Schedule B – Schedule of Estimated Construction Costs

An itemized cost estimate of the proposed construction work is included in detail in Schedule B.

11.3 Schedule C – Schedule of Assessment for Construction

Schedule C provides details of the distribution of the total estimated costs of the construction of the municipal drain.

11.4 Schedule D – Schedule of Assessment for Maintenance

Schedule D provides details of the distribution of future maintenance costs for the municipal drain. Maintenance assessments are expressed as a percentage of the total maintenance. Lands located upstream of the maintenance shall be determined by the Drainage Superintendent and assessed according to this schedule.

12.0 ALLOWANCES

Per Sections 29 and 30 of the Drainage Act, Allowances payable to Landowners are described below.

12.1 Allowances for Right-of-Way (Section 29)

The Right-of-Way allowance compensates the lands for the right to enter onto the land at various times for the purpose of inspecting the drainage system and conducting maintenance activities. The land value used for the Right-of-Way calculation is adjusted for closed drainage systems to account for the continued use of the land after the construction.

The values used for calculating allowances for Right-of-Way are as follows:

Land Use	Land Value	Adjustment Factor for Drainage Act Right-of-Way	Adjusted Land Value for Drainage Act Right-of-Way Allowance
Future Residential (next to property line)	$120,000/Ha	25%	$30,000/Ha
Bush land	$15,000/Ha	100%	$15,000/Ha

12.2 Allowances for Damages to Lands and Crops (Section 30)

Allowances for Damages to Lands and Crops under Section 30 of the Drainage Act, are primarily calculated to compensate landowners for crop losses, and land damages due to the construction and operation of the drain, including access to the working area.

Area values used for calculating allowances for Damages are as follows:

Land Use	Damage Value
Future Residential	$8,000/Ha.
Bush land	$2,000/Ha

Allowances payable to Landowners are shown in Schedule A.

Total Allowances, under Sections 29 and 30 of the Drainage Act are $28,650.

Allowances will be deducted from the total assessments in accordance with Section 62(3) of the Drainage Act.

13.0 ESTIMATED CONSTRUCTION COSTS

Headway Engineering has made an estimate of the cost of the proposed construction work. A detailed description of the construction costs can be found in Schedule B of this report.

Part A – Open and Closed Portions	$	200,800
Part B – Provisional Items	$	2,000
Total Estimated Construction Costs	**$**	**202,800**

14.0 SUMMARY OF ESTIMATED PROJECT COSTS

The total estimated project costs are as follows:

Allowances under Sections 29 and 30 of the Drainage Act (Refer to Schedule A)	$	28,650
Total Estimated Construction Costs (Refer to Schedule B)	$	202,800

Public engagements, survey, design and drafting, preparation of preliminary cost estimates and assessments, preparation of final drainage report, consideration of report	$	54,200
Agency Consultations and Approvals	$	1,200
Supervision, and inspection of construction, as-recorded drawing preparation	$	19,000
Contingencies, Interest and net H.S.T.	$	13,850
TOTAL ESTIMATED PROJECT COSTS QUEEN STREET MUNICIPAL DRAIN 2022	**$**	**319,700**

The estimated cost of the work in the Township of Wilmot is $319,700.

The above costs are estimates only. The final costs of construction, engineering and administration cannot be determined until the project is completed.

The above cost estimate does not include costs associated with defending the drainage report should appeals be filed with the Court of Revision, Drainage Tribunal and/or Drainage Referee. Should additional costs be incurred, unless otherwise directed, the additional costs would be distributed in a pro-rata fashion over the assessments contained in Schedule C and as may be varied under the Drainage Act.

15.0 ASSESSMENT

Headway Engineering assesses the cost of this work against the Lands and Roads as shown in Schedule C - Assessment for Construction.

Assessments were determined using the principles included in the 'Drainage Assessment Revisited' paper prepared by E.P. Dries and H.H. Todgham. These principals of assessment are recognized to be fair and equitable for determining cost distributions among those affected.

15.1 Benefit (Section 22)

Benefit assessment is applied to those properties receiving a benefit as defined in Section 1 of the Drainage Act which is extracted below:

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

Typically, properties which have direct, or near direct access to the proposed drain receive Benefit as defined above.

15.2 Outlet Liability (Section 23)

Outlet Liability is distributed to all properties within the watershed area on an adjusted area basis. The areas are adjusted to accurately reflect equivalent run-off rates relative to other lands and

roads within the watershed. Due to development, roads have been assessed higher Outlet Liability rates relative to agricultural lands.

15.3 Special Benefit (Section 24)

15.3.1 Assessment of costs which are more than an agricultural design standard

The Special Benefit instrument of assessment was used to assess the costs of the works which are in excess of an agricultural design standard. The below list summarizes some considerations for the Special Benefit assessments to the Apple Property (Roll No. 3-079) and the Region of Waterloo (Queen Street).

- Increased costs for pipe size
- Increased costs for pipe material and installation
- Increased costs for adjusted alignment around the perimeter of the Apple Property (complete assessment to the Apple Property)
- Increased costs for structures
- Increased administration
- Any other cost items greater than an agricultural design standard.

15.3.2 Assessment of Costs due to the presence of a private road

The Special Benefit instrument of assessment was used to assess the increased costs due to the existence and operation of the private road (Cottage Lane). The Special Benefit assessment is calculated based on the estimated costs of the road crossing at an agricultural design standard, plus an allowance for administration, interest and Net HST as described below.

Private Road Name	Estimated Construction Costs (Agricultural Design Standard)	Plus, Administration Costs	Less Equivalent Drain Costs (Fixed)	Plus, Interest, and Net HST	Special Benefit
Cottage Lane	$2,465	$1,035	$660	$120	$2,960

15.4 Special Assessment (Section 26)

Special Assessments apply to public utilities and roads which directly cause increased costs to the construction of a drainage works due to the existence and operation of the public utility or road.

Construction costs which are required solely because of the existence of Queen Street (Regional Road 12) are fully assessed to the road authority having jurisdiction over the road. The Special Assessment is calculated based on the actual costs of the road crossing, plus an allowance for administration, interest and Net HST as described below.

Road Name	Construction Costs	Plus, Administration Costs	Less Equivalent Drain Costs (Fixed)	Plus, Interest, and Net HST	Special Assessment
Queen Street	$64,300	$24,570	$2,250	$2,600	$89,220

Whether or not the Region of Waterloo elects to do the work on their property, Queen Street, they shall be assessed the actual increased costs of the work due to the construction and operation of the road as a Special Assessment.

16.0 GRANT ELIGIBILITY

16.1 Agricultural drainage infrastructure program (ADIP)

A grant may be available for assessments to privately owned parcels of land which are used for agricultural purposes and eligible for the Farm Property Class Tax rate. Section 88 of the Drainage Act directs the Municipality to make application for this grant upon certification of completion. The Municipality will then deduct the grant from the assessments.

17.0 MAINTENANCE

After completion, the Queen Street Municipal Drain shall be maintained by the Township of Wilmot at the expense of all the lands and roads assessed in accordance with the attached Schedule D – Assessment for Maintenance, and in the same relative proportions until such time as the assessment is changed under the Drainage Act, except for the portions of the drainage works on municipal right-of-ways. These portions shall be maintained at the expense of the road authority having jurisdiction over the road.

Schedule A

Allowances

Schedule of Allowances
Queen Street Municipal Drain 2022

Queen Street Drain	Property Details				Draiange Act Allowances		
	Part Lot	Concession	Landowner	Roll Number	Right of Way (Sec. 29)	Damages (Sec. 30)	Total Allowances
	6	3 Block A	2274581 Ontario Inc. (c/o Apple Home Builders)	3-079	$ 23,160.00	$ 3,860.00	$ 27,020.00
	6	3 Block A	Darren & Courtney Huber	3-244	$ 540.00	$ 590.00	$ 1,130.00
	7	3 Block A	James & Francis Johnston	2-040	$ -	$ 500.00	$ 500.00
	Total Allowances Queen Street Drain				**$ 23,700.00**	**$ 4,950.00**	**$ 28,650.00**

Schedule B

Estimated Construction Costs

Schedule of Estimated Construction Costs

Part A - Open and Closed Drain Portions

	Item Description	Estimated Quantity		$/Unit	Total
1)	Clearing brushing and mulching	l.s.			$ 2,500.00
2)	Construct riprap lined swale including geotextile filter material approx, 17m length x 3m width including plunge pool at Sta. -0+003	51	m2	$ 175.00	$ 8,925.00
3)	Supply 900mm diameter HDPE Pipe (CSA B182.8) with watertight jointing system	36	m	$ 338.00	$ 12,168.00
	Installation (Sta. -0+003 to Sta. 0+000, Sta. 0+008 to Sta. 0+041)	36	m	$ 125.00	$ 4,500.00
4)	Supply 750mm diameter HDPE Pipe (CSA B182.8) with watertight jointing system	129	m	$ 238.00	$ 30,702.00
	Installation (Sta. 0+041 to Sta. 0+170)	129	m	$ 110.00	$ 14,190.00
5)	Construct roadside ditch adjacent to Cottage Lane including seed bed preparation and hydroseed	100	m	$ 40.00	$ 4,000.00
6)	Supply and install 1500mm dia. Reinforced concrete manhole at Sta. 0+104, Sta. 0+110 and Sta. 0+170	3	ea.	$ 11,000.00	$ 33,000.00
7)	Supply and install 1800mm dia. reinforced concrete double catch basin manhole at Sta. 0+010 including rip-rap lined berm and grading to CB and a 3m length of 250mm dia. stub	1	ea.	$ 15,000.00	$ 15,000.00

Item Description	Estimated Quantity		$/Unit		Total
8) Supply and install 900mm x 750mm HDPE eccentric reducer at Sta. 0+041	l.s.			$	1,000.00
9) Erosion and sediment control	l.s.			$	2,015.00
Sub-Total - Work on Lands				**$**	**128,000.00**
9) Work to be done on the Private Road Allowance, Cottage Lane (Sta. 0+000 to Sta. 0+008)					
a) Supply 900mm diameter HDPE Pipe (CSA B182.8) with watertight jointing system	8	m	$ 338.00	$	2,704.00
Installation of 900mm diameter HDPE Pipe Sta. 0+000 to Sta. 0+008, including removal of 300mm dia. HDPE pipe	8	m	$ 215.00	$	1,720.00
b) Road Restoration including: Supply and Place 150mm thickness of Granular 'A' (35m2 x 0.15m thickness)	14	t.	$ 75.00	$	1,050.00
c) Traffic control including flagmen and temporary bypass construction and decommissioning	l.s.			$	3,026.00
Sub-Total - Work on Cottage Lane				**$**	**8,500.00**
10) Work to be done on the Region of Waterloo Road Allowance, Queen Street (Sta. 0+175 to Sta. 0+210)					
a) Supply 750mm diameter reinforced concrete pipe	40	m	$ 485.00	$	19,400.00
Installation of 750mm reinforced concrete pipe by open cut (Sta. 0+170 to Sta. 0+210)	40	m	$ 225.00	$	9,000.00

	Item Description	Estimated Quantity		$/Unit		Total
b)	Road Restoration including: Supply and Place 150mm thickness of Granular 'A' (70m2 x 0.15m thickness)	28	t	$60.00	$	1,680.00
	Supply and place 100mm thickness (50mm HL8 and 50mm HL4) asphalt (50m2 x 0.1m thickness)	13	t	$500.00	$	6,500.00
c)	Supply and install 1500mm dia. Reinforced concrete catch basin manhole	1	ea.	$ 11,000.00	$	11,000.00
d)	Supply and install 900mm X 1200mm concrete catchbasin at Sta. 0+210	1	ea.	$ 4,500.00	$	4,500.00
e)	Supply and install 900mm X 1200mm concrete catchbasin offset 4m north of Sta. 0+210 including 300mm diameter HDPE pipe CB lead	1	ea.	$ 5,000.00	$	5,000.00
f)	Remove existing corrugated steel pipe roadway culvert, including offsite disposal		l.s.		$	3,000.00
g)	Construct roadside ditch adjacent to Queen Street including seed bed preparation and hydroseed	50	m	$ 40.00	$	2,000.00
h)	Traffic Control		l.s.		$	2,220.00
Sub-Total - Work on Queen Street (Regional Road 12)					$	64,300.00

Total Estimated Construction Costs
Part A - Open and Closed Drain Portions **$ 200,800.00**

Item Description	Estimated Quantity	$/Unit	Total

Part B - Provisional Items

A Provisional Item is an item that may or may not be required as a part of the Contract. The decision as to whether a Provisional Item will form part of the Contract will be at the discretion of the engineer at time of construction. Payment for Provisional Items will only be made for work authorized in writing (text or email) by the Engineer. Payment for work performed under a Provisional Item shall be based on the Unit Price bid in the Scope of Work below.

1) Additional costs associated with installation of HDPE pipe on 19mm diameter crushed clear stone bedding. This includes the supply and placement of all stone, and additional labour and equipment required for installation in accordance with the Typical Pipe Installation on wrapped Stone Bedding Detail.

Description	Estimated Quantity	$/Unit	Total
750mm diameter pipe	25 m	$ 50.00	$ 1,250.00
900mm diameter pipe	15 m	$ 50.00	$ 750.00

Total Estimated Construction Costs
Part B - Provisional Items **$ 2,000.00**

Summary of Estimated Construction Costs

Part A - Open and Closed Drain Portions	$ 200,800.00
Part B - Provisional Items	$ 2,000.00
Total Estimated Construction Costs	**$ 202,800.00**
Total Estimated Materials	$ 64,974.00
Total Estimated Labour and Equipment	$ 137,826.00

Total Estimated Construction Costs
QUEEN STREET MUNICIPAL DRAIN 2022 **$ 202,800.00**

Schedule C

Assessment for Construction

Schedule of Assessment for Construction
Queen Street Municipal Drain 2022

Queen Street Drain

Property Details					Drainage Act Instruments of Assessment					For Information		
Part Lot	Concession	Landowner	Roll Number	Approx. Affected Area (Ha.)	Benefit (Sec. 22)	Outlet Liability (Sec. 23)	Special Benefit (Sec. 24)	Special Assessment (Sec. 26)	Total Assessment	Less Gov't Grant	Less Allowances	Net Estimated Expense
6	3 Block A	New Dundee Union Cemetery	3-078	0.04	$ -	$ 17			$ 17	*	$ -	$ 17
6	3 Block A	2274581 Ontario Inc. (c/o Apple Home Builders)	3-079	1.10	$ 67,543	$ 55	$ 73,480		$ 141,078	*	$ 27,020	$ 114,058
6	3 Block A	Ingrid Drinkwalter	3-082		$ 266	$ -			$ 266	*	$ -	$ 266
6	3 Block A	Darren & Courtney Huber	3-244		$ -	$ -			$ -	*	$ 1,130	-$ 1,130
7	3 Block A	James & Francis Johnston	2-040	7.00	$ 1,984	$ 3,509			$ 5,493	$ 1,831	$ 500	$ 3,162
7	3 Block A	Roy & Linda Mittleholtz	2-051-05	10.70	$ -	$ 5,363			$ 5,363	$ 1,788	$ -	$ 3,576
7	3 Block A	Cottage Lane (RP 58R13200 Pt. 1-3,5,7,9)		0.04	$ 266	$ 3	$ 2,960		$ 3,229	*	$ -	$ 3,229
Total Assessments on Lands					$ 70,059	$ 8,947	$ 76,440	$ -	$ 155,446	$ 3,619	$ 28,650	$ 123,178
Queen Street (Regional Road 12)		Region of Waterloo		0.40	$ 28,341	$ 1,003	$ 45,690	$ 89,220	$ 164,254			$ 164,254
Total Assessments on Roads					$ 28,341	$ 1,003	$ 45,690	$ 89,220	$ 164,254			$ 164,254
Total Assessments Queen Street Municipal Drain 2022					$ 98,400	$ 9,950	$ 122,130	$ 89,220	$ 319,700	$ 3,619	$ 28,650	$ 287,431

Notes:

1 Benefit and Outlet Liability are assessed based on the estimated costs of an agricultural design standard.

2 '*' Denotes Lands not eligible for ADIP Grants.

3 The Special Assessment (Sec. 26) shall be a non-proratable assessment. All other assessments are proratable.

4 The Net Estimated Expense is the Total Assessment less gov't grants and allowances (if applicable).

Schedule D

Assessment for Future Maintenance

Schedule of Assessment for Future Maintenance
Queen Street Municipal Drain 2022

	Property Details						Total Maintenance Assessment
	Part Lot	Concession	Landowner		Roll Number	Approx. Affected Area (Ha.)	
Queen Street Drain	6	3 Block A	New Dundee Union Cemetery	*	3-078	0.04	0.1%
	6	3 Block A	2274581 Ontario Inc. (c/o Apple Home Builders)	*	3-079	1.10	34.1%
	7	3 Block A	James & Francis Johnston		2-040	7.00	23.2%
	7	3 Block A	Roy & Linda Mittleholtz		2-051-05	10.70	35.5%
	7	3 Block A	Cottage Lane (RP 58R13200 Pt. 1-3,5,7,9)	*		0.04	0.4%
	Total Maintenance Assessments on Lands						93.4%
	Queen Street (Regional Road 12)		Region of Waterloo			0.40	6.6%
	Total Maintenance Assessments on Roads						6.6%
	Total Maintenance Assessments Queen Street Municipal Drain 2022						100.0%

Notes:

1 '*' Denotes Lands not eligible for ADIP Grants.

2 Portions of the drainage works on Municipal Right-of-Ways shall be maintained at the expense of the road authority having jurisdiction over the road.

Specifications for the Construction of Municipal Drainage Works

DIVISION A – General Conditions
DIVISION C – Specifications for Tile Drains
DIVISION F – Specifications for Storm Drains and Appurtenances
DIVISION H – Special Provisions

DIVISION A

General Conditions

CONTENTS

DIVISION A – GENERAL CONDITIONS

A.1. Scope

The work to be done under this contract consists of supplying all labour, equipment and materials to construct the drainage work as outlined in the Scope of Work, Drawings, General Conditions and other Specifications.

A.2. Tenders

Tenders are to be submitted on a lump sum basis for the complete works or a portion thereof, as instructed by the Municipality. The Scope of Work must be completed and submitted with the Form of Tender and Agreement. A certified cheque is required as Tender Security, payable to the Treasurer of the Municipality.

All certified cheques, except that of the bidder to whom the work is awarded will be returned within ten (10) days after the tender closing. The certified cheque of the bidder to whom the work is awarded will be retained as Contract Security and returned when the Municipality receives a Completion Certificate for the work.

A certified cheque is not required if the Contractor provides an alternate form of Contract Security such as a Performance Bond for 100% of the amount of the Tender or other satisfactory security, if required/permitted by the Municipality. A Performance Bond may also be required to insure maintenance of the work for a period of one (1) year after the date of the Completion Certificate.

A.3. Examinations of Site, Drawings, and Specifications

The Tenderer must examine the premises and site to compare them with the Drawings and Specifications in order to satisfy himself of the existing conditions and extent of the work to be done before submission of his Tender. No allowance shall subsequently be made on behalf of the Contractor by reason of any error on his part. Any estimates of quantities shown or indicated on the Drawings, or elsewhere are provided for the convenience of the Tenderer. Any use made of these quantities by the Tenderer in calculating his Tender shall be done at his own risk. The Tenderer for his own protection should check these quantities for accuracy.

The standard specifications (Divisions B through G) shall be considered complementary and where a project is controlled under one of the Divisions, the remaining Divisions will apply for miscellaneous works.

In case of any inconsistency or conflict between the Drawings and Specifications, the following order of precedence shall apply:

- Direction of the Engineer
- Special Provisions (Division H)
- Scope of Work
- Contract Drawings
- Standard Specifications (Divisions B through G)
- General Conditions (Division A)

A.4. Payment

Progress payments equal to 87±% of the value of work completed and materials incorporated in the work will be made to the Contractor monthly. An additional ten per cent (10±%) will be paid 45 days after the final acceptance by the Engineer, and three per cent (3±%) of the Contract price may be reserved by the Municipality as a maintenance holdback for a one (1) year period from the date of the Completion Certificate. A greater percentage of the Contract price may be reserved by the Municipality for the same one (1) year period if in the opinion of the Engineer, particular conditions of the Contract requires such greater holdback.

After the completion of the work, any part of this reserve may be used to correct defects developed within that time from faulty workmanship and materials, provided that notice shall first be given to the Contractor and that he may promptly make good such defects.

A.5. Contractor's Liability Insurance

Prior to commencement of any work, the Contractor shall file with the Municipality evidence of compliance with all Municipality insurance requirements (Liability Insurance, WSIB, etc.) for no less than the minimum amounts as stated in the Purchasing Procedures of the Municipality. All insurance coverage shall remain in force for the entire contract period including the warranty period which expires one year after the date of the Completion Certificate.

The following are to be named as co-insured:

- Successful Contractor
- Sub-Contractor
- Municipality
- Headway Engineering

A.6. Losses Due to Acts of Nature, Etc.

All damage, loss, expense and delay incurred or experienced by the Contractor in the performance of the work, by reason of unanticipated difficulties, bad weather, strikes, acts of nature, or other mischances shall be borne by the Contractor and shall not be the subject of a claim for additional compensation.

A.7. Commencement and Completion of Work

The work must commence as specified in the Form of Tender and Agreement. If conditions are unsuitable due to poor weather, the Contractor may be required, at the discretion of the Engineer to postpone or halt work until conditions become acceptable and shall not be subject of a claim for additional compensation.

The Contractor shall give the Engineer a minimum of 48 hours notice before commencement of work. The Contractor shall then arrange a meeting to be held on the site with Contractor, Engineer, and affected Landowners to review in detail the construction scheduling and other details of the work.

If the Contractor leaves the job site for a period of time after initiation of work, he shall give the Engineer and the Municipality a minimum of 24 hours notice prior to returning to the project. If any work is commenced without notice to the Engineer, the Contractor shall be fully responsible for all such work undertaken prior to such notification.

The work must proceed in such a manner as to ensure its completion at the earliest possible date and within the time limit set out in the Form of Tender and Agreement.

A.8. Working Area and Access

Where any part of the drain is on a road allowance, the road allowance shall be the working area. For all other areas, the working area available to the Contractor to construct the drain is specified in the Special Provisions (Division H).

Should the specified widths become inadequate due to unusual conditions, the Contractor shall notify the Engineer immediately. Where the Contractor exceeds the specified working widths without authorization, he shall be held responsible for the costs of all additional damages.

If access off an adjacent road allowance is not possible, each Landowner on whose property the drainage works is to be constructed, shall designate access to and from the working area. The Contractor shall not enter any other lands without permission of the Landowner and he shall compensate the Landowner for damage caused by such entry.

A.9. Sub-Contractors

The Contractor shall not sublet the whole or part of this Contract without the approval of the Engineer.

A.10. Permits, Notices, Laws and Rules

The Contractor shall obtain and pay for all necessary permits or licenses required for the execution of the work (but this shall not include MTO encroachment permits, County Road permits permanent easement or rights of servitude). The Contractor shall give all necessary notices and pay for all fees required by law and comply with all laws, ordinances, rules and regulations relating to the work and to the preservation of the public's health and safety.

A.11. Railways, Highways, and Utilities

A minimum of 72 hours' notice to the Railway or Highways, exclusive of Saturdays, Sundays, and Statutory Holidays, is required by the Contractor prior to any work activities on or affecting the applicable property. In the case of affected Utilities, a minimum of 48 hours' notice to the utility owner is required.

A.12. Errors and Unusual Conditions

The Contractor shall notify the Engineer immediately of any error or unusual conditions which may be found. Any attempt by the Contractor to correct the error on his own shall be done at his own risk. Any additional cost incurred by the Contractor to remedy the wrong decision on his part shall be borne by the Contractor. The Engineer shall make the alterations necessary to correct errors or to adjust for unusual conditions during which time it will be the Contractor's responsibility to keep his men and equipment gainfully employed elsewhere on the project.

The Contract amount shall be adjusted in accordance with a fair evaluation of the work added or deleted.

A.13. Alterations and Additions

The Engineer shall have the power to make alterations in the work shown or described in the Drawings and Specifications and the Contractor shall proceed to make such changes without causing delay. In

every such case, the price agreed to be paid for the work under the Contract shall be increased or decreased as the case may require according to a fair and reasonable evaluation of the work added or deleted. The valuation shall be determined as a result of negotiations between the Contractor and the Engineer, but in all cases the Engineer shall maintain the final responsibility for the decision. Such alterations and variations shall in no way render the Contract void. No claims for a variation or alteration in the increased or decreased price shall be valid unless done in pursuance of an order from the Engineer and notice of such claims made in writing before commencement of such work. In no such case shall the Contractor commence work which he considers to be extra before receiving the Engineer's approval.

A.14. Supervision

The Contractor shall give the work his constant supervision and shall keep a competent foreman in charge at the site.

A.15. Field Meetings

At the discretion of the Engineer, a field meeting with the Contractor or his representative, the Engineer and with those others that the Engineer deems to be affected, shall be held at the location and time specified by the Engineer.

A.16. Periodic and Final Inspections

Periodic inspections by the Engineer will be made during the performance of the work. If ordered by the Engineer, the Contractor shall expose the drain as needed to facilitate inspection by the Engineer.

Final inspection by the Engineer will be made within twenty (20) days after he has received notice from the Contractor that the work is complete.

A.17. Acceptance By the Municipality

Before any work shall be accepted by the Municipality, the Contractor shall correct all deficiencies identified by the Engineer and the Contractor shall leave the site neat and presentable.

A.18. Warranty

The Contractor shall repair and make good any damages or faults in the drain that may appear within one (1) year after its completion (as dated on the Completion Certificate) as the result of the imperfect or defective work done or materials furnished if certified by the Engineer as being due to one or both of these causes; but nothing herein contained shall be construed as in any way restricting or limiting the liability of the Contractor under the laws of the Country, Province or Locality in which the work is being done. Neither the Completion Certificate nor any payment there under, nor any provision in the Contract Documents shall relieve the Contractor from his responsibility.

A.19. Termination of Contract By The Municipality

If the Contractor should be adjudged bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he should refuse or fail to supply enough properly skilled workmen or proper materials after having received seven (7) days notice in writing from the Engineer to supply additional workmen or materials to commence or complete the works, or if he should fail to make prompt payment to Sub-Contractors, or for material, or labour, or persistently disregards laws, ordinances, or the instruction of the Engineer,

or otherwise be guilty of a substantial violation of the provisions of the Contract, then the Municipality, upon the certificate of the Engineer that sufficient cause exists to justify such action, may without prejudice to any other right or remedy, by giving the Contractor written notice, terminate the employment of the Contractor and take possession of the premises, and of all materials, tools and appliances thereon, and may finish the work by whatever method the Engineer may deem expedient but without delay or expense. In such a case, the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the Contract price will exceed the expense of finishing the work including compensation to the Engineer for his additional services and including the other damages of every name and nature, such excess shall be paid by the Contractor. If such expense will exceed such unpaid balance, the Contractor shall pay the difference to the Municipality. The expense incurred by the Municipality, as herein provided, shall be certified by the Engineer.

If the Contract is terminated by the Municipality due to the Contractor's failure to properly commence the works, the Contractor shall forfeit the certified cheque bid deposit and furthermore shall pay to the Municipality an amount to cover the increased costs, if any, associated with a new Tender for the Contract being terminated.

If any unpaid balance and the certified cheque do not match the monies owed by the Contractor upon termination of the Contract, the Municipality may also charge such expense against any money which may thereafter be due to the Contractor from the Municipality.

A.20. Tests

The cost for the testing of materials supplied to the job by the Contractor shall be borne by the Contractor. The Engineer reserves the right to subject any lengths of any tile or pipe to a competent testing laboratory to ensure the adequacy of the tile or pipe. If any tile supplied by the Contractor is determined to be inadequate to meet the applicable A.S.T.M. standards, the Contractor shall bear full responsibility to remove and/or replace all such inadequate tile in the Contract with tile capable of meeting the A.S.T.M. Standards.

A.21. Pollution

The Contractor shall keep their equipment in good repair. The Contractor shall refuel or repair equipment away from open water.

If polluted material from construction materials or equipment is caused to flow into the drain, the Contractor shall immediately notify the Ministry of the Environment, and proceed with the Ministry's protocols in place to address the situation.

A.22. Species and Risk

If a Contractor encounters a known Species at Risk as designated by the MNR or DFO, the Contractor shall notify the Engineer immediately and follow the Ministry's guidelines to deal with the species.

A.23. Road Crossings

This specification applies to all road crossings (Municipality, County, Regional, or Highway) where no specific detail is provided on the drawings or in the standard specifications. This specification in no way limits the Road Authority's regulations governing the construction of drains on their Road Allowance.

A.23.1. Road Occupancy Permit

Where applicable, the Contractor must submit an application for a road occupancy permit to the Road Authority and allow a minimum of five (5) working days for its review and issuance.

A.23.2. Road Closure Request and Construction Notification

The Contractor shall submit written notification of construction and request for road closure (if applicable) to the Road Authority and the Engineer for review and approval a minimum of five (5) working days prior to proceeding with any work on the road allowance. The Contractor shall be responsible for notifying all applicable emergency services, schools, etc. of the road closure or construction taking place.

A.23.3. Traffic Control

The Contractor shall supply flagmen, and warning signs and ensure that detour routes are adequately signed in accordance with no less than the minimum standards as set out in the Ontario Traffic Manual's Book 7.

A.23.4. Weather

No construction shall take place during inclement weather or periods of poor visibility.

A.23.5. Equipment

No construction material and/or equipment is to be left within three (3) metres of the travelled portion of the road overnight or during periods of inclement weather.

If not stated on the drawings, the road crossing shall be constructed by open cut method. Backfill from the top of the cover material over the subsurface pipe or culvert to the under side of the road base shall be Granular "B". The backfill shall be placed in lifts not exceeding 300mm in thickness and each lift shall be thoroughly compacted to 98% Standard Proctor. Granular "B" road base for County Roads and Highways shall be placed to a 450mm thickness and Granular "A" shall be placed to a thickness of 200mm. Granular road base materials shall be thoroughly compacted to 100% Standard Proctor.

Where the road surface is paved, the Contractor shall be responsible for placing HL-8 Hot Mix Asphalt patch at a thickness of 50mm or of the same thickness as the existing pavement structure. The asphalt patch shall be flush with the existing roadway on each side and without overlap.

Excavated material from the trench beyond 1.25 metres from the travelled portion or beyond the outside edge of the gravel shoulder may be used as backfill in the trench in the case of covered drains. The material shall be compacted in lifts not exceeding 300mm.

A.24. Laneways

All pipes crossing laneways shall be backfilled with material that is clean, free of foreign material or frozen particles and readily tamped or compacted in place unless otherwise specified. Laneway culverts on open ditch projects shall be backfilled with material that is not easily erodible. All backfill material shall be thoroughly compacted as directed by the Engineer.

Culverts shall be bedded with a minimum of 300mm of granular material. Granular material shall be placed simultaneously on each side of the culvert in lifts not exceeding 150mm in thickness and compacted to 95% Standard Proctor Density. Culverts shall be installed a minimum of 10% of the

culvert diameter below design grade with a minimum of 450mm of cover over the pipe unless otherwise noted on the Drawings.

The backfill over culverts and subsurface pipes at all existing laneways that have granular surfaces on open ditch and closed drainage projects shall be surfaced with a minimum of 300mm of Granular "B" material and 150mm of Granular "A" material. All backfill shall be thoroughly compacted as directed by the Engineer. All granular material shall be placed to the full width of the travelled portion.

Any settling of backfilled material shall be repaired by or at the expense of the Contractor during the warranty period of the project and as soon as required.

A.25. Fences

No earth is to be placed against fences and all fences removed by the Contractor shall be replaced by him in as good a condition as found. Where practical the Contractor shall take down existing fences in good condition at the nearest anchor post and roll it back rather than cutting the fence and attempting to patch it. The replacement of the fences shall be done to the satisfaction of the Engineer. Any fences found in such poor condition where the fence is not salvageable, shall be noted and verified with the Engineer prior to commencement of work.

Fences damaged beyond repair by the Contractor's negligence shall be replaced with new materials, similar to those materials of the existing fence, at the Contractor's expense. The replacement of the fences shall be done to the satisfaction of the Landowner and the Engineer.

Any fences paralleling an open ditch that are not line fences that hinder the proper working of the excavating machinery, shall be removed and rebuilt by the Landowner at his own expense.

The Contractor shall not leave fences open when he is not at work in the immediate vicinity.

A.26. Livestock

The Contractor shall provide each landowner with 48 hours notice prior to removing any fences along fields which could possibly contain livestock. Thereafter, the Landowner shall be responsible to keep all livestock clear of the construction areas until further notified. The Contractor shall be held responsible for loss or injury to livestock or damage caused by livestock where the Contractor failed to notify the Landowner, or through negligence or carelessness on the part of the Contractor.

A.27. Standing Crops

The Contractor shall be responsible for damages to standing crops which are ready to be harvested or salvaged along the course of the drain and access routes if the Contractor has failed to notify the Landowners 48 hours prior to commencement of the work on that portion of the drain.

A.28. Surplus Gravel

If as a result of any work, gravel or crushed stone is required and not all the gravel or crushed stone is used, the Contractor shall haul away such surplus material.

A.29. Iron Bars

The Contractor is responsible for the cost of an Ontario Land Surveyor to replace any iron bars that are altered or destroyed during the course of the construction.

A.30. Rip-Rap

Rip-rap shall be quarry stone rip-rap material and shall be the sizes specified in the Special Provisions. Broken concrete shall not be used as rip-rap unless otherwise specified.

A.31. Clearing, Grubbing and Brushing

This specification applies to all brushing where no specific detail is provided on the drawings or in the Special Provisions.

The Contractor shall clear, brush and stump trees from within the working area that interfere with the installation of the drainage system.

All trees, limbs and brush less than 150mm in diameter shall be mulched. Trees greater than 150mm in diameter shall be cut and neatly stacked in piles designated by the Landowners.

A.32. Restoration of Lawns

This specification applies to all lawn restoration where no specific detail is provided on the drawings or in the Special Provisions and no allowance for damages has been provided under Section 30 of the Drainage Act RSO 1990 to the affected property.

The Contractor shall supply “high quality grass seed” and the seed shall be broadcast by means of an approved mechanical spreader. All areas on which seed is to be placed shall be loose at the time of broadcast to a depth of 25mm. Seed and fertilizer shall be spread in accordance with the supplier’s recommendations unless otherwise directed by the Engineer. Thereafter it will be the responsibility of the Landowner to maintain the area in a manner so as to promote growth

END OF DIVISION

DIVISION C

Specifications for Tile Drains

CONTENTS

DIVISION C – SPECIFICATIONS FOR TILE DRAINS

C.1. Pipe Materials

Concrete Tile

Concrete drain tile shall conform to the requirements of the most recent A.S.T.M. specification for Heavy-Duty Extra Quality drain tile. All tile with diameters less than 600mm shall have a pipe strength of 1500D. All tile with diameters 600mm or larger shall have a pipe strength of 2000D.

All tile furnished shall be subject to the approval of the Engineer. All rejected tile are to be immediately removed from the site.

High Density Polyethylene (HDPE) Pipe

All HDPE pipe shall be dual-wall corrugated drainage pipe with a smooth inner wall. HDPE pipe shall have a minimum stiffness of 320 kPa at 5% deflection.

Unless otherwise noted, all sealed HDPE pipe shall have a water tight gasketed bell and spigot joining system meeting the minimum requirements of CSA B182.8. Perforated HDPE pipe shall have a soil tight joining system, and shall be enveloped in non-woven geotextile filter sock.

C.2. Alignment

The Contractor shall contact the Engineer to establish the course of the drain. Where an existing drain is to be removed and replaced by the new drain, or where the new drain is to be installed parallel to an existing drain, the Contractor shall locate the existing drain (including repairing damaged tile caused by locating) at intervals along the course of the drain. The costs of locating shall be included in the tender price.

The drain shall run in as straight a line as possible throughout its length, except that at intersections of other watercourses or at sharp corners, it shall run on a curve of at least 15 metres radius. The new tile drain shall be constructed at an offset from and parallel with any ditch or defined watercourse in order that fresh backfill in the trench will not be eroded by the flow of surface water.

The Contractor shall exercise care not to disturb any existing tile drain or drains which parallel the course of the new drain, particularly where the new and existing tile act together to provide the necessary capacity. Where any such existing drain is disturbed or damaged, the Contractor shall perform the necessary repair at his expense.

C.3. Profile

Benchmarks have been established along the course of the drain which are to govern the elevations of the drain. The location and elevations of the benchmarks are shown on the drawings. Tile is to be installed to the elevation and grade shown on the profiles. Accurate grade control must be maintained by the Contractor at all times.

When installing a drain towards a fixed point such as a bore pipe, the Contractor shall uncover the pipe and confirm the elevation a sufficient distance away from the pipe in order to allow for any necessary minor grade adjustments to be made.

C.4. Excavation

Wheel machine

Unless otherwise specified, all trenching shall be carried out with a wheel machine approved by the Engineer. The wheel machine shall shape the bottom of the trench to conform to the outside diameter of the pipe. The minimum trench width shall be equal to the outside diameter of the pipe plus 100mm on each side of the pipe, unless otherwise specified. The maximum trench width shall be equal to the outside diameter of the pipe plus 300mm on each side of the pipe, unless otherwise specified.

Scalping

Where the depths of cuts in isolated areas along the course of the drain as shown on the profile exceed the capability of the Contractor's wheel machine, he shall lower the surface grade in order that the wheel machine may trench to the correct depth. Topsoil is to be stripped over a sufficient width that no subsoil will be deposited on top of the topsoil. Subsoil will then be removed to the required depth and piled separately. Upon completion, the topsoil will then be replaced to an even depth over the disturbed area. The cost for this work shall be included in his tender price.

Excavator

Where the use of an excavator is used in-lieu of a wheel machine, the topsoil shall be stripped and replaced in accordance with Item C.4.2. All tile shall be installed on 19mm clear crushed stone bedding placed to a minimum depth of 150mm which has been shaped to conform to the bottom of the pipe. The Contractor shall include the costs of this work in his tender price.

C.5. Installation

Concrete Tile

The tile is to be laid with close joints and in regular grade and alignment in accordance with the drawings. The tiles are to be bevelled, if necessary to ensure close joints. The inside of the tile is to be kept clear when laid. The sides of the tile are to be supported by partial filling of the trench (blinding) prior to inspection by the Engineer. No tile shall be backfilled until inspected by the Engineer unless otherwise permitted by the Engineer. The tile shall be backfilled such that a sufficient mound of backfill is placed over the trench to ensure that no depression remains after settling occurs in the backfill.

Where a tile connects to a catch basin or similar structure, the Contractor shall include in his tender price for the supply and placement of compacted Granular 'A' bedding or 19mm clear crushed stone under areas backfilled from the underside of the pipe to undisturbed soil. Where a tile drain passes through a bore pit, the Contractor shall include in his tender price for the supply and placement of compacted Granular 'A' bedding or 19mm clear crushed stone from the underside of the pipe down to undisturbed soil with the limits of the bore pit.

The Contractor shall supply and wrap all concrete tile joints with Mirafi 160N geotextile filter material as part of this contract. The width of the filter material should be:

- 300mm wide for tile sizes 150mm diameter to 350mm diameter.
- 400mm wide for tile sizes 400mm diameter to 750mm diameter.
- 500mm wide for tile sizes larger than 750mm diameter.

The filter material shall completely cover the tile joint and shall have a minimum overlap of 300mm. The type of filter material shall be.

HDPE Pipe

HDPE pipe shall be installed using compacted Granular 'A' bedding or 19mm clear crushed stone bedding from 150mm below the pipe to 300mm above the pipe. All granular material shall be compacted using a suitable mechanical vibratory compactor. Granular bedding and backfill shall be placed in lifts not exceeding 300mm and compacted to at least 95% Standard Proctor Maximum Dry Density (SPMDD).

Where a pipe connects to a catch basin or similar structure, the Contractor shall include in his tender price for the supply and placement of compacted Granular 'A' bedding or 19mm clear crushed stone under areas backfilled from the underside of the pipe to undisturbed soil. Where a pipe passes through a bore pit, the Contractor shall include in his tender price for the supply and placement of compacted Granular 'A' bedding or 19mm clear crushed stone from the underside of the pipe down to undisturbed soil with the limits of the bore pit.

As determined by the Engineer, unsuitable backfill material must be hauled off-site by the Contractor and Granular "B" shall be used as replacement backfill material.

C.6. Trench Crossings

The Contractor shall not cross the backfilled trench with any construction equipment or vehicles, except by one designated crossing location on each property. The Contractor shall ensure that the bedding and backfill material at this designated crossing location is properly placed and compacted so as to adequately support the equipment and vehicles that may cross the trench. The Contractor may undertake any other approved work to ensure the integrity of the tile at the crossing location. The Contractor shall ensure that no equipment or vehicles travel along the length of the trench. The Contractor shall be responsible for any damage to the new tile caused by the construction of the drain.

C.7. Outlet Protection

A tile drain outlet into a ditch shall be either HDPE pipe or corrugated steel pipe and shall include a hinged grate for rodent protection. The maximum spacing between bars on the rodent grate shall be 40mm. All corrugated steel outlet pipes shall be bevelled at the end to generally conform to the slope of the ditch bank.

Quarry stone rock rip-rap protection and geotextile filter material (Mirafi 160N), shall be installed around the outlet pipe and extended downstream a minimum distance of three metres, unless otherwise specified. The protection shall extend to the top of the backfilled trench and below the pipe to 300 mm under the streambed. The protection shall also extend 600mm into undisturbed soil on either side of the backfilled trench. In some locations, rip-rap may be required on the bank opposite the outlet.

Where the outlet occurs at the upper end of an open ditch, the rip-rap protection will extend all around the end of the ditch and to a point 800mm downstream on either side. Where heavy overflow is likely to occur, sufficient additional rip-rap and filter material shall be placed as directed by the Engineer to prevent the water cutting around the protection.

C.8. Catch Basins and Junction Boxes

Unless otherwise noted, catch basins shall be in accordance with OPSD 705.010 and 705.030. The catch basin grate shall be a "Birdcage" type substantial steel grate, removable for cleaning and shall be inset into a recess provided around the top of the structure. The grate shall be fastened to the catch basin with bolts into the concrete. Spacing of bars on grates for use on 600mmX600mm

structures shall be 65mm centre to centre. Spacing of bars on grates for use on structures larger than 600mmX600mm shall be 90mm.

All catch basins shall be backfilled with compacted Granular 'A' or 19mm clear crushed stone placed to a minimum width of 300mm on all sides. If settling occurs after construction, the Contractor shall supply and place sufficient granular material to maintain the backfill level flush with adjacent ground. The riser sections of the catch basin shall be wrapped with filter cloth.

Quarry stone rip-rap protection shall be placed around all catch basins and shall extend a minimum distance of one (1) metre away from the outer edge of each side of the catch basin, and shall be placed so that the finished surface of the rip-rap is flush with the existing ground.

If there are no existing drains to be connected to the catch basin at the top end of the drain, a plugged tile shall be placed in the upstream wall with the same elevations as the outlet tile.

Junction boxes shall have a minimum cover over the lid of 450mm.

The Contractor shall include in his tender price for the construction of a berm behind all ditch inlet structures. The berm shall be constructed of compacted clay keyed 300mm into undisturbed soil. The top of the spill way of the earth berm shall be the same elevation as the high wall of the ditch inlet catch basin. The earth berm shall be covered with 100mm depth of topsoil and seeded with an approved green seed mixture. The Contractor shall also include for regrading, shaping and seeding of road ditches for a maximum of 15 metres each way from all catch basins.

The Contractor shall clean all catch basin sumps after completion of the drain installation. Catch basin markers shall be placed beside each catch basin.

C.9. Tributary Drains

Any tributary tile encountered in the course of the drain is to be carefully taken up by the Contractor and placed clear of the excavated earth. If the tributary drains encountered are clean or reasonably clean, they shall be connected into the new drain in accordance with the typical tile drain connection detail. Tributary tile drain connections into the new drain shall be made using high density polyethylene agricultural drain tubing installed on and backfilled with 19mm clear crushed stone. All tile drain connections into the new drain shall be either a cored hole with an insert coupler or a manufactured tee.

Where the existing drains are full of sediment, the decision to connect the tributary drain to the new drain shall be left to the Engineer. The Contractor shall be paid for each tributary drain connection as outlined in the Form of Tender and Agreement.

The Contractor shall be responsible for all tributary tile connections for a period of one year from the date of the Completion Certificate. After construction, any missed tile connections required to be made into the new drain shall be paid at the same rate as defined in the Form of Tender and Agreement. The Contractor will have the option to make any subsequent tile connections or have the Municipality make the required connections and have the cost of which deducted from the holdback.

Where an open ditch is being replaced by a new tile drain, existing tile outlets entering the ditch from the side opposite the new drain shall be extended to the new drain.

Where the Contractor is required to connect an existing tile which is not encountered in the course of the drain, the cost of such work shall constitute an extra to the contract.

C.10. Clearing, Grubbing and Mulching

The Contractor shall clear, brush and stump trees from within the working area.

All trees or limbs 150mm or larger, that is necessary to remove, shall be cut, trimmed and neatly stacked in the working width for the use or disposal by the Landowner. Brush and limbs less than 150mm in diameter shall be mulched.

Clearing, grubbing and mulching shall be carried out as a separate operation from installing the drain, and shall not be completed simultaneously at the same location.

C.11. Roads and Laneway Sub-Surface Crossings

All roads and laneway crossings may be made with an open cut. The Contractor may use original ground as backfill to within 600mm of finished grade only if adequate compaction and if the use of the original ground backfill has been approved beforehand by the Engineer.

C.12. Filling In Existing Ditches

The Contractor shall backfill the ditch sufficiently for traversing by farm equipment. If sufficient material is available on-site to fill in the existing ditch, the topsoil shall be stripped and the subsoil shall be bulldozed into the ditch and the topsoil shall then be spread over the backfilled waterway. The Contractor shall ensure sufficient compaction of the backfill and if required, repair excess settlement up to the end of the warranty period.

C.13. Construction of Grassed Waterways

Where the Contractor is required to construct a grassed waterway, the existing waterway shall be filled in, regraded, shaped and a seed bed prepared prior to applying the grass seed. The grass seed shall be fresh, clean and new crop seed, meeting the requirements of the MTO.

- 55% Creeping Red Fescue
- 15% Perennial Rye Grass
- 27% Kentucky Bluegrass
- 3% White Clover

Grass seed shall be applied at the rate of 100 kg/ha.

C.14. Unstable Soil

The Contractor shall immediately contact the Engineer if unstable soil is encountered. The Engineer shall, after consultation with the Contractor, determine the action necessary and a price for additions or deletions shall be agreed upon prior to further drain installation.

C.15. Rocks

The Contractor shall immediately contact the Engineer if boulders of sufficient size and number are encountered such that the Contractor cannot continue trenching with a wheel machine. The Engineer shall determine the action necessary and a price for additions or deletions shall be agreed upon prior to further drain installation.

If only scattered large stone or boulders are removed on any project, the Contractor shall either excavate a hole to bury same adjacent to the drain, or he shall haul the stones or boulders to a location designated by the Landowner.

C.16. Broken or Damaged Tile

The Contractor shall remove and dispose of all broken (existing or new), damaged or excess tile off site.

C.17. Recommended Practice For Construction of Sub-Surface Drainage Systems

Drainage Guide for Ontario, Ministry of Agriculture, Food and Rural Affairs, Publication 29 and its amendments, dealing with the construction of Subsurface Drainage Systems, shall be the guide to all methods and materials to be used in the construction of tile drains except where superseded by other Specifications of the Contract.

END OF DIVISION

Headway Engineering

DIVISION F

Specifications for Strom Drains and Appurtenances

CONTENTS

DIVISION F – SPECIFICATIONS FOR STORM DRAINS AND APPURTENANCES

F.1. WORK INCLUDED

The Contractor shall provide all labour, materials and equipment necessary to complete the work of this section, as shown or described by or reasonably inferable from the drawings or specifications, including the following:

- Excavation
- Laying sewers
- Construction of appurtenances
- Installation of stubs where required

Specifications for construction of municipal drainage works shall form part of this specification and shall be observed at all times.

F.2. EXCAVATION

The Contractor shall do all excavation of whatever substances encountered to line and depth as shown on drawings. Excavated materials not required for fill or backfill shall be removed from site as directed by the Engineer and disposed of by the Contractor. At the bottom, the trench shall be shaped so as to conform, as near as possible, to the outside diameter of the pipe. Particular care is to be taken to recess the bottom of the trench to relieve the bell of the pipe of all load.

Excavation shall not be carried below the required level. Excess excavation below the required level shall be backfilled at the Contractor's expense with earth, sand, gravel or concrete, as directed by the Engineer, and thoroughly tamped.

Unstable soil shall be removed and replaced with gravel, crushed stone or crushed slag, which shall be thoroughly tamped. The Engineer shall determine the depth of removal of unstable soil. The Contractor will be paid extra for removing unstable soil and replacing it with gravel.

Ground adjacent to all excavations shall be graded to prevent surface flows from entering the excavation.

The Contractor shall remove, by pumping or other means approved by the Engineer, any water accumulated in the excavation at his own expense.

F.2.1. Trench Excavation

The trench shall be excavated in strict accordance with the Trench Excavation Protection Act.

F.2.2. Rock Excavation

Shall include removal of boulders larger than ¼ cubic metre in volume and ledge rock, concrete or masonry structures that required drilling or blasting. Payment for this will be additional to the contract amount.

F.2.3. Bracing and Shoring

The Contractor shall do all bracing, sheathing and shoring necessary to perform and protect all excavations as indicated on the plans, as required for safety, as directed by the Engineer or to conform to governing laws at his own expense.

F.2.4. Temporary Bridges

Temporary bridges or crossings shall be built by the Contractor, where required, to maintain traffic.

F.3. BACKFILLING

After pipes have been tested and approved, backfilling shall be done with approved material free from large clods or stones.

F.3.1. Roadway Crossings

Where the drain crosses roadways or laneways, the Contractor is to supply and place 600 mm of approved granular material in the top of the trench for the full width of the travelled portions. The bottom 300 mm shall be of clean pit run gravel meeting M.T.O. Granular "B" or suitable sand cushion specifications and shall be thoroughly mechanically compacted. The top 300 mm shall be thoroughly mechanically compacted. The top 300 mm shall be clean crushed gravel meeting M.T.O. Granular "A" specifications (maximum size 20 mm) and be thoroughly mechanically compacted in lifts not exceeding 150 mm in depth. All roadway crossings shall be constructed using extra strength concrete pipe.

Where the drain crosses under a pavement surface, the Contractor is to repave the trench to the satisfaction of the Engineer. This shall apply to both roadways and laneways.

F.3.2. Trenches

Approved on-site backfill material shall be placed evenly and carefully around and over the pipe and shall be thoroughly tamped. Care must be taken that connections will not be injured or thrown out of line. The remaining backfill shall consist of approved excavated material and shall be satisfactorily compacted in 300 mm layers by means of backhoe bucket or similar means.

F.3.3. Manholes and Other Structures

All forms, trash and debris shall be removed and cleared away. Approved backfill material may be from excavation or borrow; it shall be free from rock, lumber or debris. Backfill material shall be placed symmetrically on all sides in 200 mm maximum layers. Each layer shall be moistened and compacted with mechanical or hand tampers.

F.3.4. Maintenance

The Contractor shall refill any settlement occurring in all backfilled areas.

F.4. PIPE

Bell and spigot concrete sewer pipe shall be used unless otherwise specified on the drawings.

All concrete pipe, 450 mm in diameter or less, shall conform to A.S.T.M. Specification C14 for standard strength pipe and extra strength pipe.

All concrete pipe, greater than 450 mm in diameter, shall conform to A.S.T.M. Specification C76 for all classes specified.

F.5. JOINTS

All concrete sewer pipe shall be laid with open joints unless tight joints are specified on the drawings.

F.5.1. Tight Joints

The sewer shall have rubber gasket joints. These gaskets shall be "Tylox or Rexon K" as manufactured by the Hamilton-Kent Manufacturing Co., Kent, Ohio or Best Seal Rubber Joint as manufactured by the Best Pipe Co. or approved equal. The gaskets shall be cemented according to the manufacturer's instructions.

F.5.2. Open Joints

The sewer pipe shall be laid without rubber gaskets, grout, caulk or other materials commonly used for tight pipe joints.

F.6. LAYING PIPE

All sewers shall be laid true to line and grade with bells upgrade. The sections of the pipe shall be so laid and fitted together that when complete, the sewer will have a smooth and uniform invert. The pipe shall be kept thoroughly clean. Each pipe shall be inspected for defects before lowered into the trench.

Before the pipe is laid, the Contractor shall establish and maintain all lines and grades for construction. Substantial batter boards, lines and secondary benchmarks shall be constructed and maintained.

The Engineer may check all grades and levels; however, this in no way relieves the Contractor of his responsibility of constructing the drain to the correct elevation.

F.6.1. Water in Trenches

Water shall not be allowed in the trenches while the pipes are being laid.

F.6.2. Limit of Trench Opened

Not more than 30 metres of trench shall be opened in advance of pipe laying unless permitted by the Engineer.

F.6.3. Exposed Ends Protected

The excavation of trenches shall be fully completed a sufficient distance in advance of the laying of the sewer and the exposed end of all pipes shall be fully protected with a board or other approved stopper to prevent earth or other substances from entering the pipe.

F.6.4. Pipes Kept Clean

The interior of the sewer shall be carefully free from all dirt, cement or superfluous material of every description as the work progresses. Pipes shall be thoroughly flushed at the completion of the work of laying and jointing.

F.7. CONNECTIONS

All connections, which are for future use, shall be properly capped. No pipe shall be cut for connections except when permitted by the Engineer.

F.8. INSPECTION OF JOINTS

Joints shall not be covered until approved by the Engineer.

F.9. APPROVAL OF MATERIALS

Manufacturer's Certificate

Materials may be used if accompanied by the manufacturer's certificate of compliance, pending any test which may be made by the Engineer in accordance with A.27 in Division A "General Conditions".

F.10. MANHOLES AND CATCH BASINS

Concrete manholes shall be constructed to the dimensions shown on the drawings and in the locations designated on the plans and profiles or as directed by the Engineer. The Ministry of Transportation of Ontario Specifications for concrete shall apply to all concrete for manholes, catch basins and appurtenances. The concrete shall attain a minimum compressive strength at 28 days of 20 MPa. The M.T.O. Specifications for reinforcing steel shall apply to all reinforcing used in the construction.

F.10.1. Benching or Channels

Channels shall be smooth and true to line and grade and may be Constructed of concrete formed to the dimensions shown on the drawings or of sewer pipe neatly cut off as shown. A shoulder or bench of concrete shall be formed from the channel to the manhole walls as shown. Where the pipe size increases at a manhole, the channel shall be so formed as to form a straight line and grade between the inside of the inlet and outlet pipes. Where indicated or directed, a drop structure shall be constructed by the Contractor in accordance with the details shown on the drawings.

F.10.2. Frames and Covers

All manholes and catch basins shall be supplied with cast iron frames and covers, DD-704 and DD-706 M.T.O. Standards. See copy of the standard in this specification.

Ditch inlet catch basins shall be supplied with M.T.O. type DD-710 frames and covers or approved equals.

All brick used in the construction of manholes shall conform to the current A.S.T.M. C-32 Grade S.A. Specifications. "Hard Common Everhard Sewer Brick" manufactured by Cooksville-LaPrairie Brick Limited, is an example of a brick conforming to these specifications. A minimum of 150 mm of brick work shall be required at each manhole and catch basin.

F.10.3. Location

Locations of all manholes and catch basins shall be verified in the field by the Engineer or Commissioner.

F.10.4. Steps

Manhole steps shall be supplied and installed by the Contractor. All steps shall be approved by the Engineer prior to use and may be steel galvanized safety type steps or cast iron steps, weighing at least 3.5 kg each, provided that approval for their use is obtained.

F.10.5. Catch basins

Standard 600 mm x 600 mm and 1200 mm catch basins shall be M.T.O. Type DD-702 and DD-701-A respectively. Standard 600 mm x 600 mm and 600 mm x 1200 mm ditch inlet catch basins shall be M.T.O. type DD-716-A and DD-716-B respectively. Standard 600 mm x 600 mm precast catch basin shall be M.T.O. type DD-711.

F.10.6. Manholes

Shall be M.T.O. Standard DD-701-A or approved precast concrete manhole.

F.10.7. Catch basin Leads

Shall be 200 mm diameter concrete pipe C14-65 extra strength and shall have a one (1) percent minimum grade.

F.10.8. Backfill

All catch basins and manholes shall have porous backfill placed to a minimum thickness of 300 mm on all sides as per above M.T.O. Standards. The backfill shall be satisfactorily compacted.

F.11. PRIVATE SERVICE CONNECTIONS

F.11.1. Materials

Asbestos cement pipe, 100 mm diameter shall be used. The pipe and couplings shall be manufactured in accordance with current A.S.T.M. Specification C-428. Couplings shall be of the sleeve type with rubber rings (A.S.T.M. Spec. D-1869).

Connections to concrete pipe shall be by means of a shop fabricated tee in the sewer line. Ends of private drain connections (P.D.C.) shall be plugged with expanding plastic flange plugs as supplied by Johns-Manville or equal.

F.11.2. Construction

The instruction for the installation of sewers shall generally apply to the installation of P.D.C.'s. P.D.C.'s shall terminate at the lot line and shall be plugged as specified. Joints shall be made in accordance with the manufacturer's instruction.

F.11.3. Location of P.D.C.

The locations of P.D.C.'s shall be determined from the property owner at the time of construction by the Contractor.

F.11.4. Marker Stakes

A 50 mm x 50 mm wooden stake shall be placed above the end of each P.D.C. The top of the marker stake shall be 300 mm below finished grade.

It is essential that complete records be kept of the exact location of all house connections. The Contractor is to co-operate in every way possible with the Engineer to secure this information.

F.12. MAINTENANCE OF TRAFFIC

The Contractor shall maintain a minimum one lane of traffic during construction. Restoration of the roadway shall be completed as soon as practical after installation of the sewer.

F.13. EXISTING SERVICES

The Contractor shall take all necessary precautions to protect buildings or other structures, pavements, sidewalks, existing sewers, drains, watermains, and private water connections, gas mains and private gas connections, poles, wires, lawns, trees, ornamental bushes, gardens, etc. and shall be responsible for any damages to same. In case of injury, it shall be made good by the Contractor immediately without additional compensation unless directed otherwise by the Engineer.

All underground services shall be field located by the Contractor before construction begins.

In case any sewer, drain or watermain should be encountered whose present grade should require changing on account of the new sewer, the work necessary for this shall be performed by the Contractor according to the directions of the Engineer and shall be paid for as extra work. Should the Contractor fail to connect up any house or field drain without advance approval of the Engineer such work shall be made good at the Contractor's expense.

F.14. RESTORATION

Roads, lawns, driveways, and other surfaces shall be restored to the original conditions, with the exception that the lawns may either be covered with 50 mm topsoil and sod, or 100 mm topsoil and be seeded with a high quality grass seed. The Contractor's tender price shall include the cost of this work.

F.15. ROADSIDE DITCHES

All roadside ditches shall be properly graded to the new catch basins. All laneway culverts shall also be adjusted, where necessary, to the grade of the roadside ditch.

END OF DIVISION

SPECIAL PROVISIONS

Queen Street Municipal Drain 2022

CONTENTS

Special Provisions means special directions containing requirements particular to the work not adequately provided for by the standard or supplemental specifications. Special provisions shall take precedence and govern over any standard or supplemental specification.

1.0 GENERAL

The Contractor shall notify the Landowners and the Engineer 48 hours prior to construction.

The Contractor shall arrange a pre-construction meeting and shall invite the Landowners on whose property work will take place, and the Engineer.

The Contractor shall verify the location of the new drainage system with the Engineer and Landowners prior to construction.

The Contractor shall check and verify all dimensions and elevations and report any discrepancies to the Engineer prior to proceeding with the work.

The Contractor must maintain access to all driveways along the route of the drain as well as always maintain access for all emergency vehicles during the construction.

The Contractor shall be responsible for settlement within the warranty period.

2.0 UTILITIES

All utilities shall be located and uncovered in the affected areas by the Contractor prior to construction.

The locations and elevations of all utilities shown on the drawings are approximate locations. Actual locations and elevations of all utilities must be verified by the Contractor prior to construction.

The Contractor shall arrange to have a representative of the utility owner on site during construction if it is a requirement by the utility owner.

3.0 WORKING AREA AND ACCESS

Access to the working area shall be designated by the Landowner.

3.1 Closed Portion

The average working width for construction purposes shall be 25 metres along the alignment of the proposed drain.

3.2 Open Portion

The working area shall be an average width of 25m for construction purposes, which includes the footprint of the constructed open channel, and the working side.

4.0 CLEARING BRUSHING AND MULCHING

The Contractor shall clear, brush and mulch trees from within the working area that interfere with the construction of the drainage system. The Contractor shall not clear all trees within the working area unless the full working width in a specific section is required for the installation of the drain and unless the Engineer has authorized the full clearing of the trees.

All trees, limbs, and brush less than 150mm in diameter shall be mulched/chipped. Clearing and brushing shall be done prior to the construction of the drain. Trees and branches greater than 150mm in diameter shall be cut into lengths no greater than four metres and placed in nearby stacks designated by the Landowner. Trees removed from road right-of-ways shall be mulched or disposed of offsite by the Contractor.

5.0 OUTLET STRUCTURE

5.1 Plunge Pool

The Contractor shall construct a plunge pool at the outlet of the pipe system. The plunge pool shall be lined with quarry stone rip-rap protection 300mm to 450mm in diameter, and placed 450mm deep. The rip-rap shall be placed on an approved geotextile filter material.

The plunge pool shall be constructed in accordance with the Plunge Pool Detail included in the drawing set.

5.2 Swale

The Contractor shall construct the swale in accordance with the plans and profiles included in the attached drawing set.

5.3 Disposal of Excavated Material

The excavated material from the swale excavation shall be levelled to a maximum depth of 200mm within the working corridor.

5.4 Seeding

The Contractor shall supply and spread an approved seed mixture (OPS 803 – Lowland Mix) over the disturbed spoil material, and other disturbed areas within the wetland.

6.0 PIPE AND INSTALLATION

6.1 High Density Polyethylene Pipe (HDPE)

All HDPE pipe shall be CSA B182.8 with gasketed watertight jointing systems.

All HDPE pipe shall be installed using 19mm crushed stone bedding (or approved equivalent) from a minimum of 150mm below the pipe to 150mm above the pipe. Suitable native material shall be used as backfill from 150mm above the pipe to the underside of the topsoil.

The Contractor shall construct clay plugs at intervals no greater than 50m.

The Contractor shall be responsible for all trench settlement within the warranty period.

6.2 Reinforced Concrete Pipe

All reinforced concrete pipe shall be CSA A257.2 65D.

All reinforced concrete pipe shall be installed per OPSD 802.030 – Rigid pipe bedding, cover and backfill using Class B bedding.

The Contractor shall construct clay plugs at intervals no greater than 50m.

The Contractor shall be responsible for all trench settlement within the warranty period.

6.3 Poor Soil Conditions

The Contractor shall submit a unit price for installation of the pipe per the detail on wrapped crushed stone bedding as a provisional item. The provisional amount for installation on wrapped crushed stone bedding shall include the supply and installation of all additional labour, equipment and materials required for the installation of the pipe by this method.

If poor soil conditions are encountered, the Contractor shall install the pipe in accordance with the detail for wrapped crushed stone bedding and shall be entitled to the provisional tender amount, in addition to the tendered standard installation price. The Contractor shall be paid for the actual lengths installed in this condition.

6.4 Excess Material

Excess soil material from the pipe installation may be disposed of on the Apple Home Builders property (Roll No. 3-079) at a nearby location as specified by the Landowner.

7.0 TOPSOIL AND FINE GRADING

The Contractor shall strip the topsoil along the alignment of the tile drain to a width of four metres or equal to the width of the trench. The Contractor shall stockpile the topsoil and later spread it over the backfilled trench.

8.0 STRUCTURES

All holes for manholes and catch basin pipe connections to be cored by the manufacturer.

The Contractor shall be responsible to repair or reapply grout for all grouted connections into any catch basin or manhole for a period of one year after the completion certificate has been issued.

The Contractor shall be responsible for all settlement around the catch basins and manholes. Should the area around the catch basins or manholes settle after construction, the Contractor shall be responsible for providing the additional fill material and rip-rap required so that the top of the rip-rap is flush with the surrounding existing ground.

All pipes entering or exiting a catch basin, ditch inlet catch basin or junction box shall be installed such that the face of the pipe is flush with the inside wall of the structure.

8.1 Catchbasins

All catchbasins shall be precast concrete catchbasins and shall have a 300mm sump.

All catchbasin grates shall be fastened to the new catchbasin and shall be hot dipped galvanized bird cage grates. Catchbasin marker signs shall be erected at all catchbasins.

The catchbasin grate elevations shall be set to the satisfaction of the Engineer. Lifts shall be placed by the Contractor on all catchbasins if necessary to achieve the desired elevation when field setting the structures.

All catchbasins shall be installed using 19mm crushed stone bedding from 150mm below the structure to 150mm above the top of the highest pipe entering or exiting the structure. Structures

within the road allowances shall have 300mm minimum of Granular 'B' backfill around all sides up to the underside of the topsoil layer. Structures on private property shall be backfilled using approved native material up to the underside of the topsoil layer. All backfill material shall be placed and thoroughly compacted evenly around each structure in lifts not exceeding 300mm to minimize settlement around the structures. The Contractor shall be responsible for all settlement around catchbasins.

The Contractor shall place quarry stone rip-rap material around all sides of the catchbasin for a width of one metre and shall be placed on geotextile filter material.

8.2 Manholes

All manholes to be OPSD compliant with 1200mm diameter taper cones per OPSD 701.03 where applicable.

All manholes to come with hollow aluminum steps per OPSD 405.010.

All manholes to have closed cast iron grate covers per OPSD 401.010-A.

All manholes to be benched.

Catchbasin manholes to have cast iron, square frame with square V grates per OPSD 400.030.

The double catchbasin manhole at Sta. 0+010 shall include a precast concrete twin inlet flat cap per OPSD 703.022.

9.0 ROAD WORKS

9.1 Notice

The Contractor shall notify the Engineer and local road authority having jurisdiction over the road a minimum of 48 hours prior to the scheduled road crossing. The Contractor shall provide all appropriate insurance information to the Region of Waterloo in the form of a work permit.

9.2 Traffic Control

The Contractor shall be responsible to arrange all traffic control signals, signs and devices that are required for safe and proper traffic management during the installation of the drainage system. The Contractor shall contact the Township of Wilmot and Region of Waterloo for specific local procedures, guidelines, and timelines. Traffic control shall meet the standards of Book 7 of the Ontario Traffic Manual.

For Queen Street, the Contractor shall prepare a traffic detour plan and shall contact the relevant road authorities sufficiently before construction commences to allow enough time to plan and provide all necessary details of the proposed detour.

For Cottage Lane, the Contractor shall construct temporary access lanes and maintain one lane of traffic for the duration of construction. A suggested conceptual traffic control staging plan is included in the drawing set. Adjustments to the suggested traffic control staging plan shall be submitted to the Engineer prior to construction on Cottage Lane.

9.3 Removals

The existing 300mm diameter HDPE pipe through Cottage Lane, and the existing 1390x970mm CSPA through Queen Street shall be removed and disposed of offsite by the Contractor.

Any excavated material not suitable for the backfill of the travelled portion of the road shall be removed and disposed of offsite by the Contractor and replaced with suitable fill material.

9.4 New Installations

The Contractor shall install the new HDPE pipe (Cottage Lane), and the reinforced concrete pipe (Queen Street) in accordance with the applicable OPS specifications. All granular materials shall be placed in lifts not exceeding 300mm and compacted to at least 95% Standard Proctor Maximum Dry Density (SPMDD).

9.5 Road Restoration

All asphalt cuts shall be saw cut square with the road by the Contractor, and for the full depth of the asphalt. Skewed saw cuts will not be permitted.

The Contractor shall place 150mm of Granular 'A' road base, and one course of HL8 asphalt binder course, and one course of HL4 surface course for Queen Street (Regional Road 12). The Contractor shall place 150mm of Granular 'A' surface course for Cottage Lane.

The Contractor shall restore the gravel road shoulders of Queen Street (Regional Road 12) to their original condition.

The Contractor shall shape road ditches where applicable in accordance with the typical road side ditch cross section included in the drawing set.

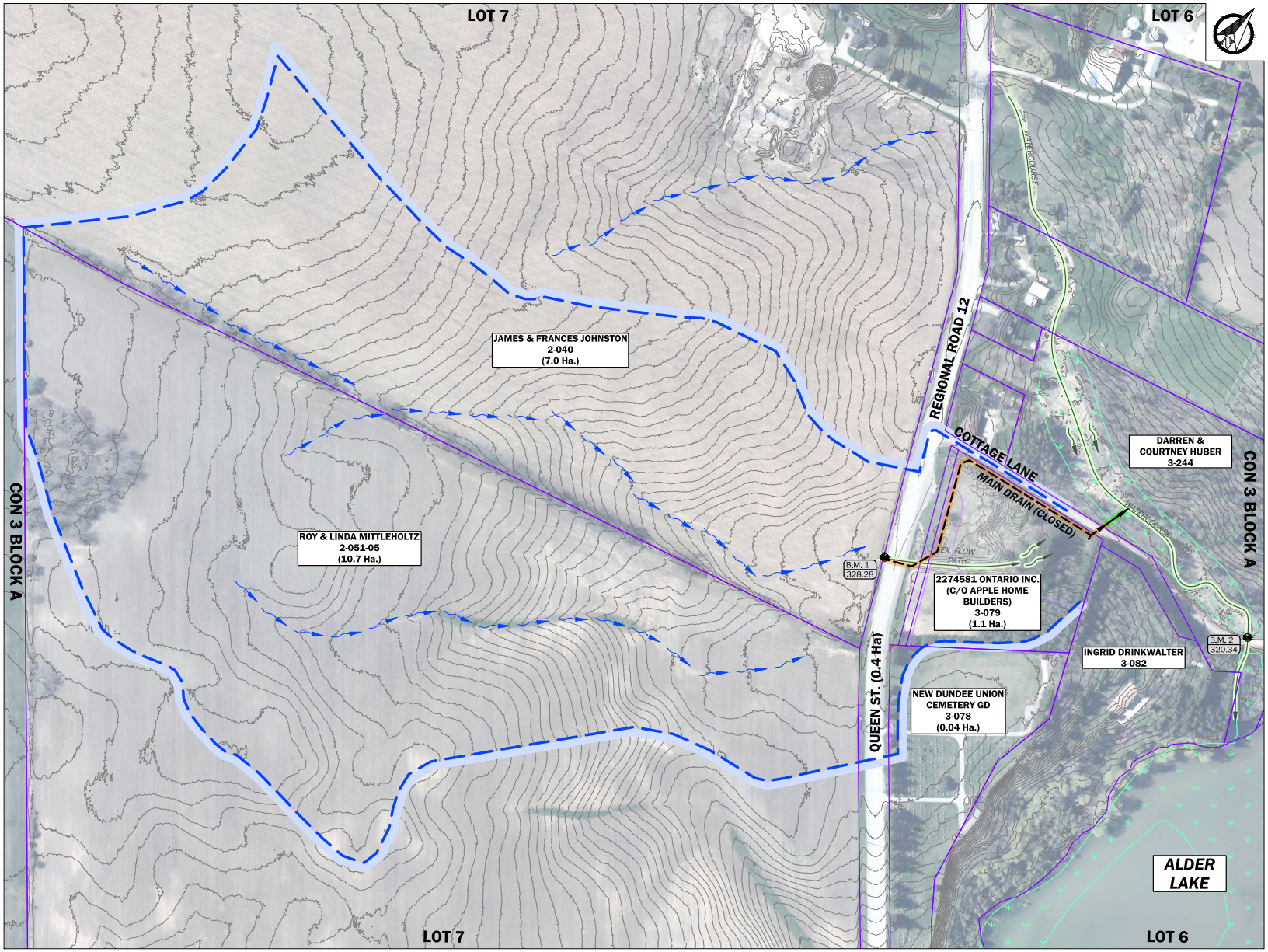
Any areas disturbed within the Municipal Right-of-Way shall be topsoiled and hydroseeded with an approved grass seed mixture (OPS 803 – Standard Roadside Mix), and a bonded fibre matrix hydromulch (both Queen Street and Cottage Lane).

10.0 RIP-RAP

All stone rip-rap material shall be quarry stone 150mm to 300mm diameter and placed to a depth of 300mm, unless otherwise noted. All rip-rap material shall be placed on geo-textile filter material.

11.0 EROSION AND SEDIMENT CONTROL

The Contractor shall provide adequate erosion and sediment control for the duration of construction including monitoring and maintenance of the control measures put in place. The Contractor shall inspect the erosion and sediment control measures regularly, and specifically before predicted rainfall events, and after rainfall events.



PLAN SCALE

0 50 100 150

TOWNSHIP OF Wilmot

WARD 1

QUEEN STREET MUNICIPAL DRAIN

Watershed Plan

NOTES:

1. 2018 AERIAL PHOTOGRAPHY PROVIDED BY WILMOT TOWNSHIP.
2. CONTOURS GENERATED USING THE 2018 LIDAR DERIVED DATA SET REPRESENTING BARE-EARTH TERRAIN FROM LAND INFORMATION ONTARIO.

BENCHMARK DESCRIPTIONS

BENCHMARK No. 1 **ELEV.=328.28**
TOP UPSTREAM END OF EX. 1200mmØ C.S.P. SURFACE CULVERT AT STA. 0+208 (CLOSED)

BENCHMARK No. 2 **ELEV.=320.34**
TOP CENTRE OF HEADWALL ON UPSTREAM END OF EX. CONC. BOX CULVERT AT STA. 0+158 (OPEN).

LEGEND:

- PROPERTY LINE
- FUTURE PROPERTY LINE
- MAJOR WATERSHED BOUNDARY
- MINOR WATERSHED BOUNDARY
- BENCHMARK LOCATION
- B.M. 1 / 123.45 — BENCHMARK No. / BENCHMARK ELEVATION
- JOHN & JANE SMITH / 12-345 / (12.3 Ha.) — LANDOWNER NAME(S) / ASSESSMENT ROLL No. (ABBREVIATED) / AREA WITHIN WATERSHED
- EXISTING FEATURES:
- DRAIN NAME — OPEN DRAIN WITH CROSSING AND FLOW DIRECTION
- OVERLAND FLOW PATH
- GRCA WETLAND FEATURE
- PROPOSED FEATURES:
- DRAIN NAME — OPEN DRAIN WITH CROSSING AND FLOW DIRECTION
- DRAIN NAME — CLOSED DRAIN WITH CATCH BASIN, MANHOLE AND FLOW DIRECTION (C.B., M.H.)

LICENSED PROFESSIONAL ENGINEER — S.G.R. BROOKMAN 100150920 — PROVINCE OF ONTARIO

No.	REVISION	DATE (YY-MM-DD)
5	REPORT SUBMISSION	22-06-28
4	INFORMATION MEETING	22-05-19
3	PETITIONER MTG. NO. 2	22-04-26
2	PETITIONER MTG. NO. 1	22-03-31
1	ON-SITE MEETING	21-10-20

Headway Engineering

DRAWN BY:	DESIGNED BY:	CHECKED BY:
R.U.	A.H.	S.B.
DATE:	REFERENCE No.	DRAWING No.
2022-06-28	WLMT-003	1 OF 9

PLAN SCALE

0 20 40 60

Wilmot Township of

WARD 1

QUEEN STREET MUNICIPAL DRAIN

Working Area Plan

NOTES:

1. 2018 AERIAL PHOTOGRAPHY PROVIDED BY WILMOT TOWNSHIP.
2. CONTOURS GENERATED USING THE 2018 LIDAR DERIVED DATA SET REPRESENTING BARE-EARTH TERRAIN FROM LAND INFORMATION ONTARIO.

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- DRAIN NAME — OPEN DRAIN WITH CROSSING AND FLOW DIRECTION
- OVERLAND FLOW PATH
- GRCA WETLAND FEATURE

PROPOSED FEATURES:

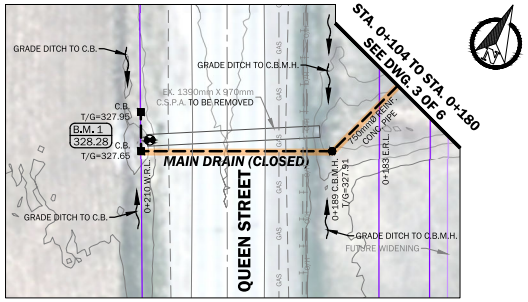
- DRAIN NAME — OPEN DRAIN WITH CROSSING AND FLOW DIRECTION
- DRAIN NAME — C.B. / M.H. — CLOSED DRAIN WITH CATCH BASIN, MANHOLE AND FLOW DIRECTION

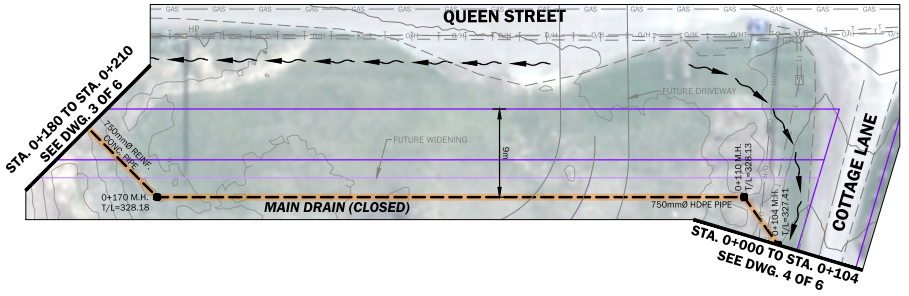
LICENSED PROFESSIONAL ENGINEER — S.G.R. BROOKMAN — 100150920 — PROVINCE OF ONTARIO

No.	REVISION	DATE (YY-MM-DD)
5	REPORT SUBMISSION	22-06-28
4	INFORMATION MEETING	22-05-19
3	PETITIONER MTG. NO. 2	22-04-26
2	PETITIONER MTG. NO. 1	22-03-31
1	ON-SITE MEETING	21-10-20

Headway Engineering

DRAWN BY:	DESIGNED BY:	CHECKED BY:
R.U.	A.H.	S.B.
DATE:	REFERENCE No.	DRAWING No.
2022-06-28	WLMT-003	2 OF 9





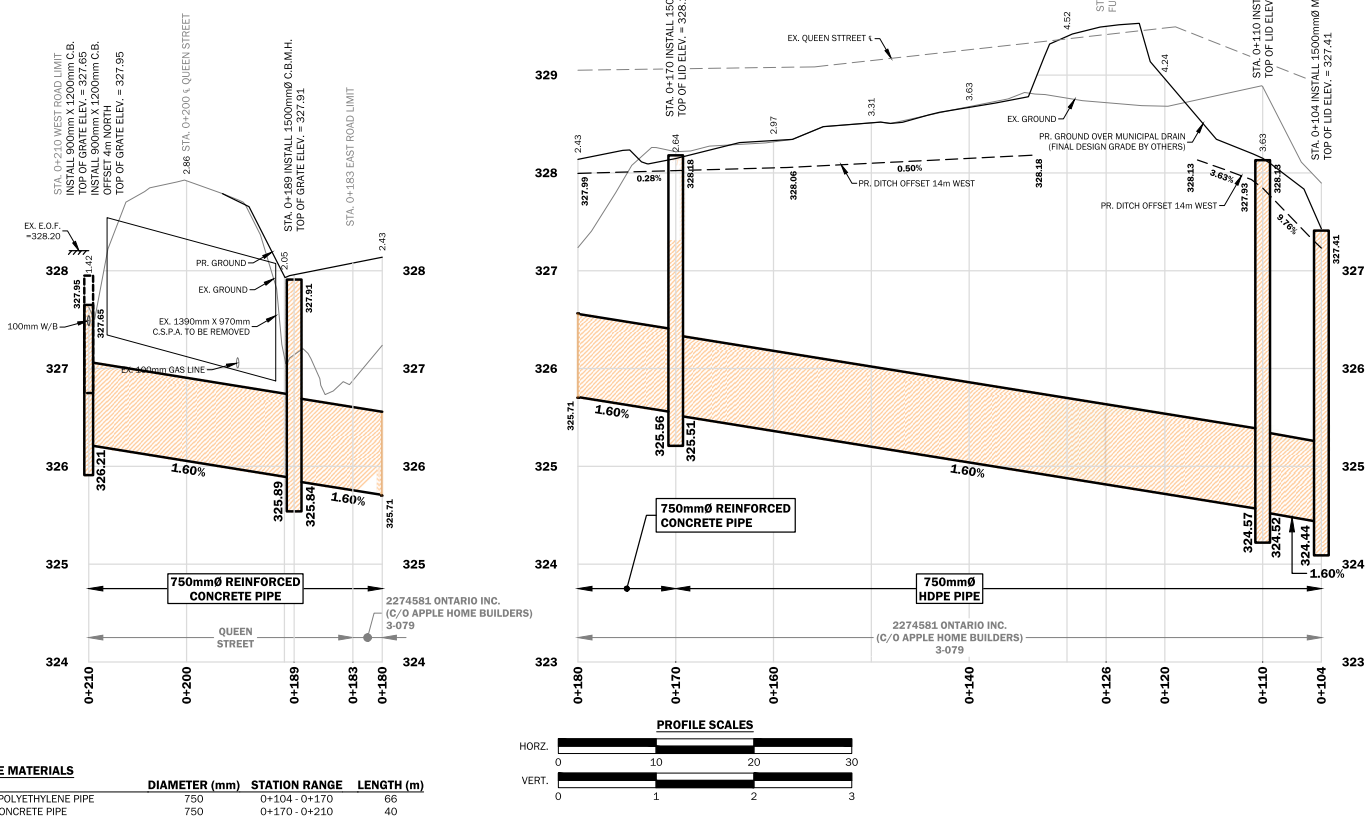
BENCHMARK DESCRIPTIONS

BENCHMARK No. 1 **ELEV.=328.28**
TOP UPSTREAM END OF EX. 1200mmØ C.S.P. SURFACE CULVERT AT STA. 0+208 (CLOSED)

BENCHMARK No. 2 **ELEV.=320.34**
TOP CENTRE OF HEADWALL ON UPSTREAM END OF EX. CONC. BOX CULVERT AT STA. 0+158 (OPEN).

PLAN SCALE

0 10 20 30



PROFILE SCALES

HORZ. 0 10 20 30
VERT. 0 1 2 3

SCHEDULE OF PIPE MATERIALS

	MATERIAL	DIAMETER (mm)	STATION RANGE	LENGTH (m)
1.	HIGH DENSITY POLYETHYLENE PIPE	750	0+104 - 0+170	66
2.	REINFORCED CONCRETE PIPE	750	0+170 - 0+210	40

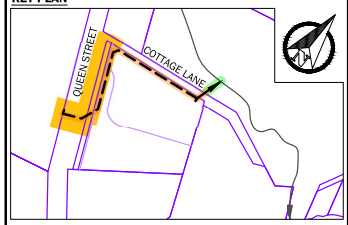
Township of Wilmot

WARD 1

QUEEN STREET MUNICIPAL DRAIN

Main Drain (Closed) Plan & Profile (Sta. 0+104 to Sta. 0+210)

KEY PLAN



NOTES:
1. 2018 AERIAL PHOTOGRAPHY PROVIDED BY WILMOT TOWNSHIP.
2. CONTOURS GENERATED USING THE 2018 LIDAR DERIVED DATA SET REPRESENTING BARE-EARTH TERRAIN FROM LAND INFORMATION ONTARIO.

LEGEND:

PROPERTY LINE
FUTURE PROPERTY LINE
BENCHMARK LOCATION
B.M. 1 / 123.45 — BENCHMARK No. / BENCHMARK ELEVATION
JOHN & JANE SMITH — LANDOWNER NAME(S)
12-345 — ASSESSMENT ROLL No. (ABBREVIATED)
(12.3 Ha.) — AREA WITHIN WATERSHED

EXISTING FEATURES:
GAS LINE
TELEPHONE LINE
OVERHEAD UTILITY LINE
HYDRO POLE WITH GUY WIRE
TELEPHONE PEDESTALS

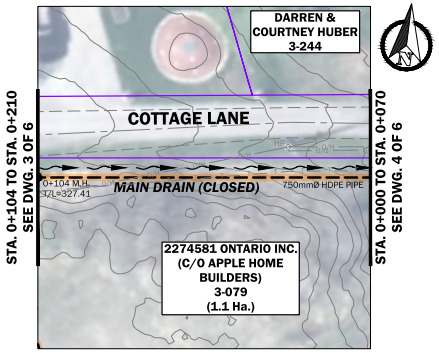
PROPOSED FEATURES:
DRAIN NAME — C.B. — M.H.
CLOSED DRAIN WITH CATCH BASIN, MANHOLE AND FLOW DIRECTION

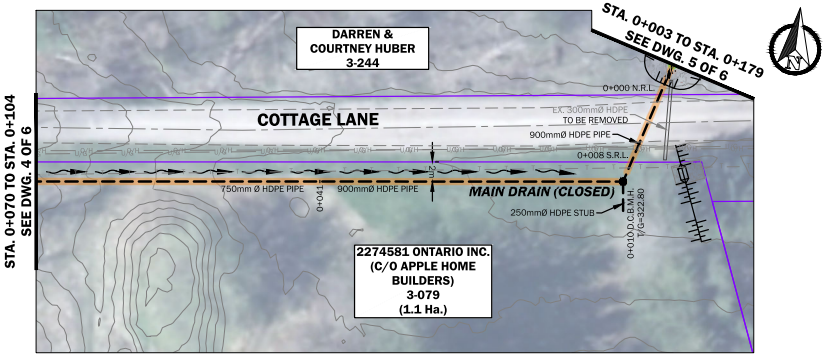
LICENSED PROFESSIONAL ENGINEER — S.G.R. BRIDGMAN 100150920 — PROVINCE OF ONTARIO

No.	REVISION	DATE (YY-MM-DD)
5	REPORT SUBMISSION	22-06-28
4	INFORMATION MEETING	22-05-19
3	PETITIONER MTG. NO. 2	22-04-26
2	PETITIONER MTG. NO. 1	22-03-31
1	ON-SITE MEETING	21-10-20

Headway Engineering

DRAWN BY:	DESIGNED BY:	CHECKED BY:
R.U.	A.H.	S.B.
DATE: 2022-06-28	REFERENCE No. WLMT-003	DRAWING No. 3 OF 9





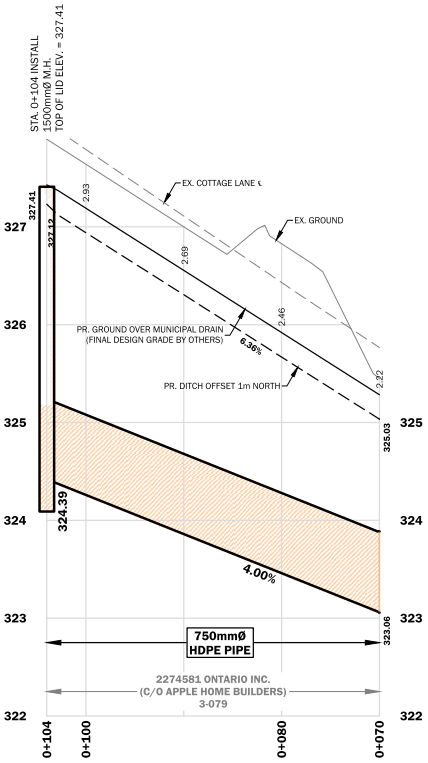
PLAN SCALE

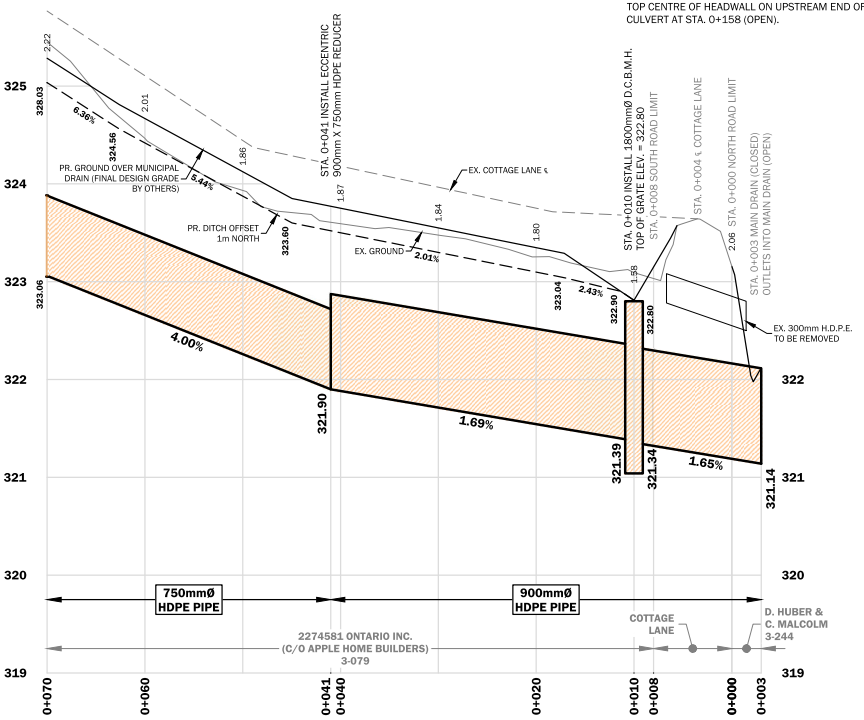
0 10 20 30

BENCHMARK DESCRIPTIONS

BENCHMARK No. 1 **ELEV.=328.28**
TOP UPSTREAM END OF EX. 1200mmØ C.S.P. SURFACE CULVERT AT STA. 0+208 (CLOSED)

BENCHMARK No. 2 **ELEV.=320.34**
TOP CENTRE OF HEADWALL ON UPSTREAM END OF EX. CONC. BOX CULVERT AT STA. 0+158 (OPEN).





PROFILE SCALES

HORZ. 0 10 20 30

VERT. 0 1 2 3

SCHEDULE OF PIPE MATERIALS

	MATERIAL	DIAMETER (mm)	STATION RANGE	LENGTH (m)
1.	HIGH DENSITY POLYETHYLENE PIPE	900	-0+003 - 0+041	44
2.	HIGH DENSITY POLYETHYLENE PIPE	750	0+041 - 0+104	63

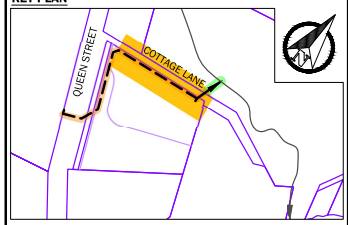
TOWNSHIP OF Wilmot

WARD 1

QUEEN STREET MUNICIPAL DRAIN

Main Drain (Closed) Plan & Profile (Sta. -0+003 to Sta. 0+104)

KEY PLAN



NOTES:
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2. CONTOURS GENERATED USING THE 2018 LIDAR DERIVED DATA SET REPRESENTING BARE-EARTH TERRAIN FROM LAND INFORMATION ONTARIO.

LEGEND:

PROPERTY LINE
FUTURE PROPERTY LINE
BENCHMARK LOCATION
B.M. 1 / 123.45 — BENCHMARK No. / BENCHMARK ELEVATION
JOHN & JANE SMITH / 12-345 / (12.3 Ha.) — LANDOWNER NAME(S) / ASSESSMENT ROLL No. (ABBREVIATED) / AREA WITHIN WATERSHED
EXISTING FEATURES:
U/G — UNDERGROUND COAXIAL CABLE
T — TELEPHONE LINE
O/H — OVERHEAD UTILITY LINE
H.P. — HYDRO POLE WITH GUY WIRE
PROPOSED FEATURES:
DRAIN NAME — C.B. — M.H. — CLOSED DRAIN WITH CATCH BASIN, MANHOLE AND FLOW DIRECTION

No.	REVISION	DATE (YY-MM-DD)
5	REPORT SUBMISSION	22-06-28
4	INFORMATION MEETING	22-05-19
3	PETITIONER MTG. NO. 2	22-04-26
2	PETITIONER MTG. NO. 1	22-03-31
1	ON-SITE MEETING	21-10-20

LICENSED PROFESSIONAL ENGINEER — S.G.R. BRICKMAN 100150920 — PROVINCE OF ONTARIO

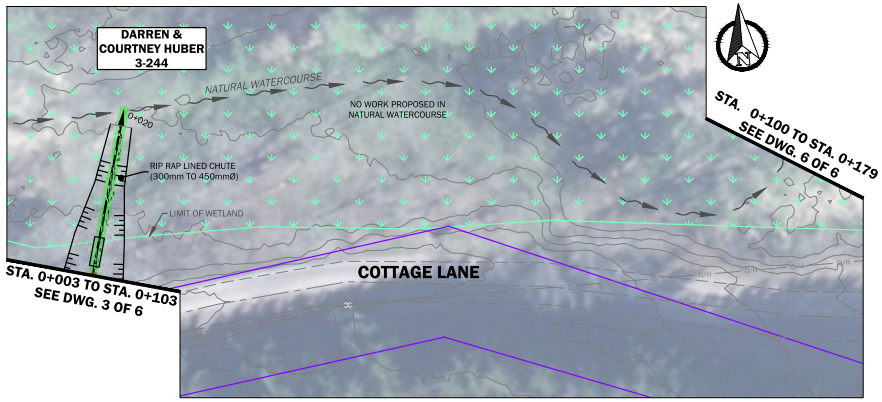
Headway Engineering

DRAWN BY:	DESIGNED BY:	CHECKED BY:
R.U.	A.H.	S.B.
DATE: 2022-06-28	REFERENCE No. WLMT-003	DRAWING No. 4 OF 9

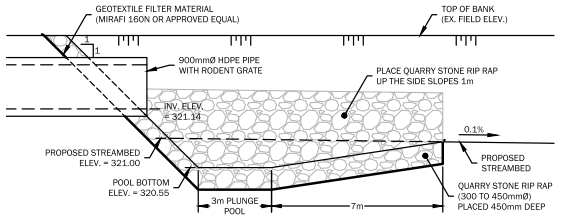
BENCHMARK DESCRIPTIONS

BENCHMARK No. 1 **ELEV.=328.28**
TOP UPSTREAM END OF EX. 1200mmØ C.S.P. SURFACE CULVERT AT STA. 0+208 (CLOSED)

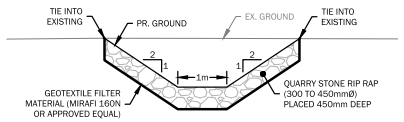
BENCHMARK No. 2 **ELEV.=320.34**
TOP CENTRE OF HEADWALL ON UPSTREAM END OF EX. CONC. BOX CULVERT AT STA. 0+158 (OPEN).



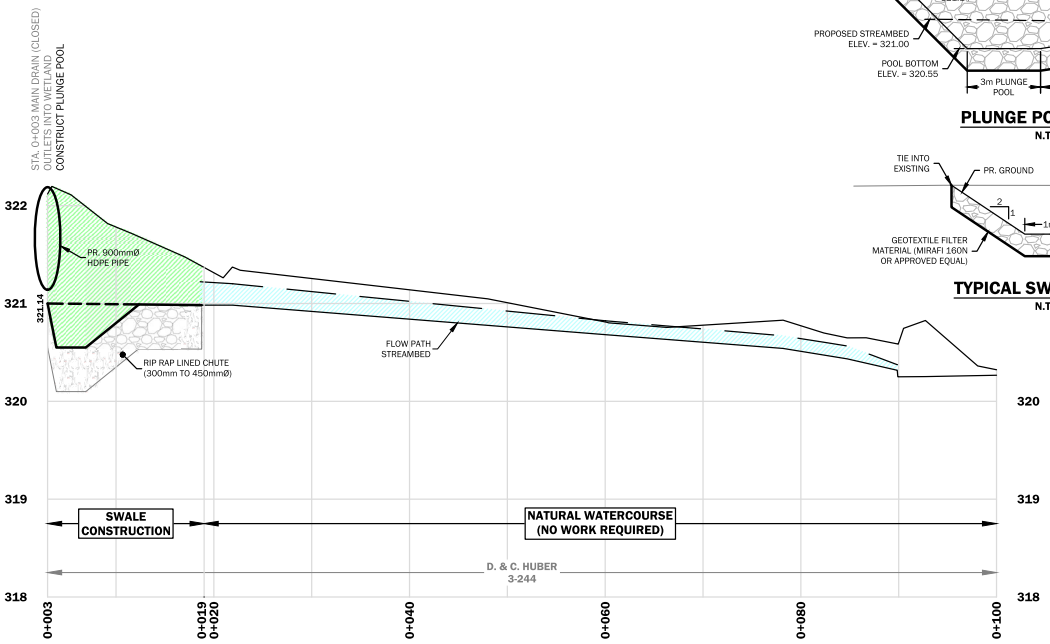
PLAN SCALE
0 10 20 30



PLUNGE POOL DETAIL
N.T.S.



TYPICAL SWALE DETAIL
N.T.S.



PROFILE SCALES
HORZ. 0 10 20 30
VERT. 0 1 2 3

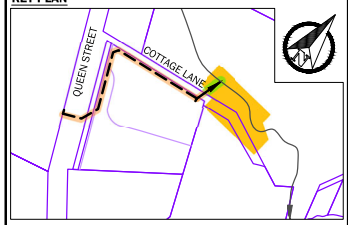
Township of Wilmot

WARD 1

QUEEN STREET MUNICIPAL DRAIN

Wetland Flow Path Plan & Profile
(Sta. 0+003 to Sta. 0+100)

KEY PLAN



NOTES:
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LEGEND:
- PROPERTY LINE
- FUTURE PROPERTY LINE
- BENCHMARK LOCATION
- B.M. 1 / 123.45 — BENCHMARK No. / BENCHMARK ELEVATION
- JOHN & JANE SMITH — LANDOWNER NAME(S)
- 12-345 — ASSESSMENT ROLL No. (ABBREVIATED)
- (12.3 Ha.) — AREA WITHIN WATERSHED

EXISTING FEATURES:
- U/G — UNDERGROUND COAXIAL CABLE
- T — TELEPHONE LINE
- O/H — OVERHEAD UTILITY LINE
- H.P. — HYDRO POLE WITH GUY WIRE
- GRCA WETLAND FEATURE

PROPOSED FEATURES:
- DRAIN NAME — OPEN DRAIN WITH CROSSING AND FLOW DIRECTION

No.	REVISION	DATE (YY-MM-DD)
5	REPORT SUBMISSION	22-06-28
4	INFORMATION MEETING	22-05-19
3	PETITIONER MTG. NO. 2	22-04-26
2	PETITIONER MTG. NO. 1	22-03-31
1	ON-SITE MEETING	21-10-20

LICENSED PROFESSIONAL ENGINEER — S.G.R. BRICKMAN 100150920 — PROVINCE OF ONTARIO

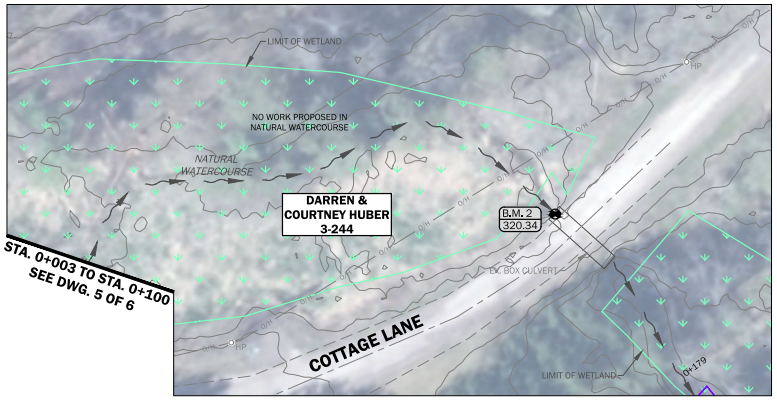
Headway Engineering

DRAWN BY:	DESIGNED BY:	CHECKED BY:
R.U.	A.H.	S.B.
DATE:	REFERENCE No.	DRAWING No.
2022-06-28	WLMT-003	5 OF 9

BENCHMARK DESCRIPTIONS

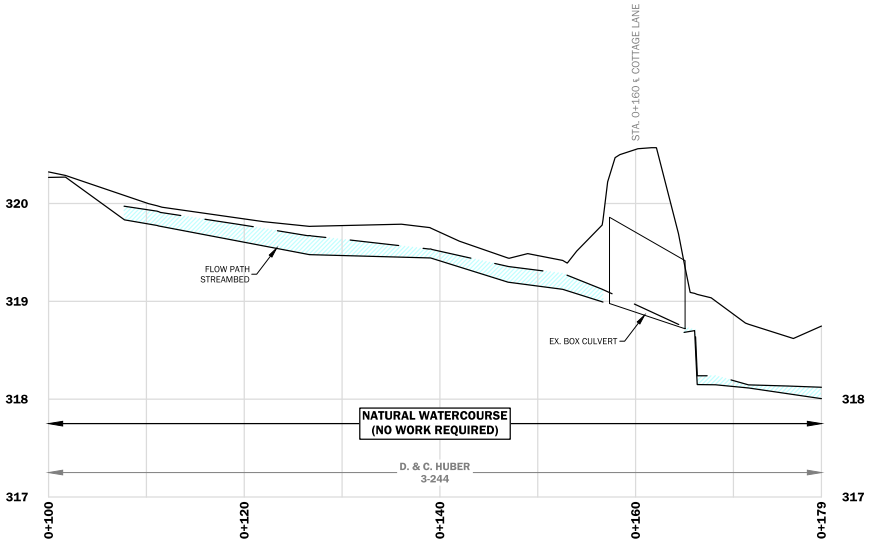
BENCHMARK No. 1 **ELEV.=328.28**
TOP UPSTREAM END OF EX. 1200mmØ C.S.P. SURFACE CULVERT AT STA. 0+208 (CLOSED)

BENCHMARK No. 2 **ELEV.=320.34**
TOP CENTRE OF HEADWALL ON UPSTREAM END OF EX. CONC. BOX CULVERT AT STA. 0+158 (OPEN).



PLAN SCALE

0 10 20 30



PROFILE SCALES

HORZ. 0 10 20 30

VERT. 0 1 2 3

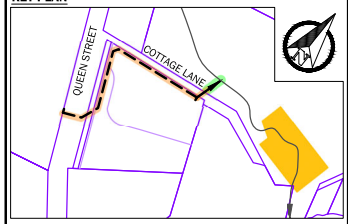
Township of Wilmot

WARD 1

QUEEN STREET MUNICIPAL DRAIN

Wetland Flow Path Plan & Profile (Sta. 0+100 to Sta. 0+179)

KEY PLAN



NOTES:
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LEGEND:

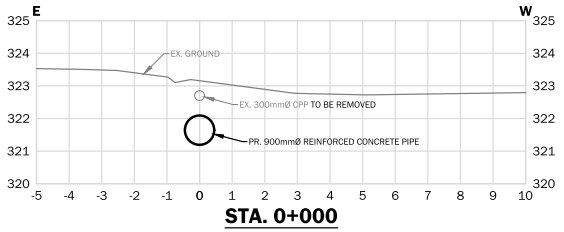
PROPERTY LINE
FUTURE PROPERTY LINE
BENCHMARK LOCATION
B.M. 1 / 123.45 — BENCHMARK No. / BENCHMARK ELEVATION
JOHN & JANE SMITH / 12-345 / (12.3 Ha.) — LANDOWNER NAME(S) / ASSESSMENT ROLL No. (ABBREVIATED) / AREA WITHIN WATERSHED
EXISTING FEATURES:
O/H — O/H — OVERHEAD UTILITY LINE
H.P. — HYDRO POLE WITH GUY WIRE
GRCA WETLAND FEATURE

No.	REVISION	DATE (YY-MM-DD)
5	REPORT SUBMISSION	22-06-28
4	INFORMATION MEETING	22-05-19
3	PETITIONER MTG. NO. 2	22-04-26
2	PETITIONER MTG. NO. 1	22-03-31
1	ON-SITE MEETING	21-10-20

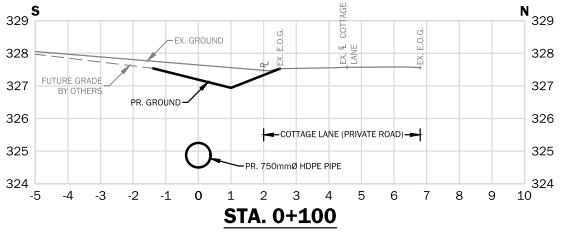
LICENSED PROFESSIONAL ENGINEER — S.G.R. BROWMAN 100150920 — PROVINCE OF ONTARIO

Headway Engineering

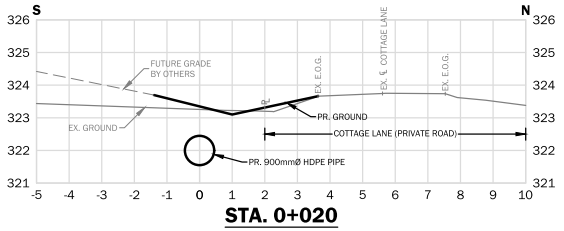
DRAWN BY:	DESIGNED BY:	CHECKED BY:
R.U.	A.H.	S.B.
DATE: 2022-06-28	REFERENCE No. WLMT-003	DRAWING No. **6 OF 9**



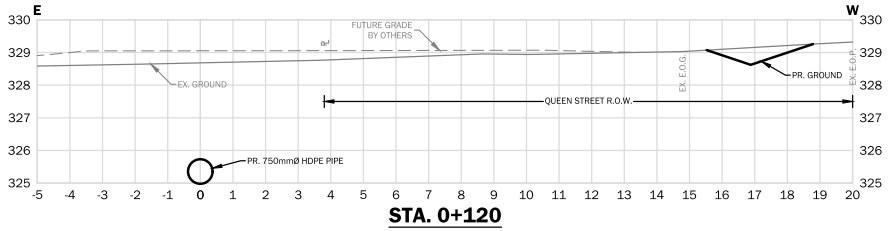
STA. 0+000



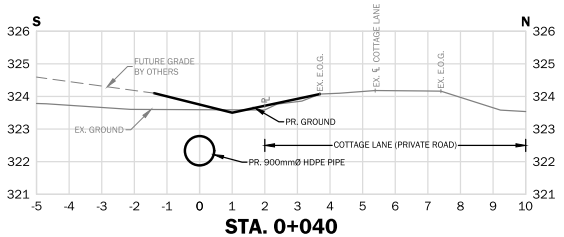
STA. 0+100



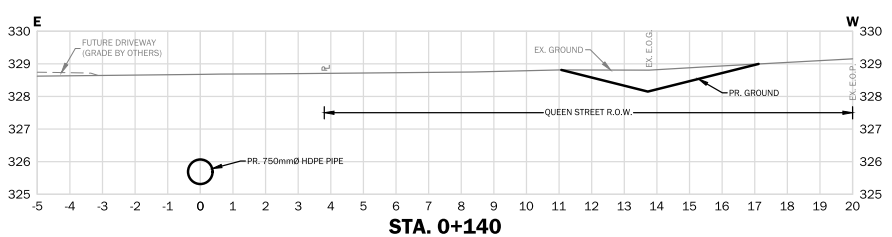
STA. 0+020



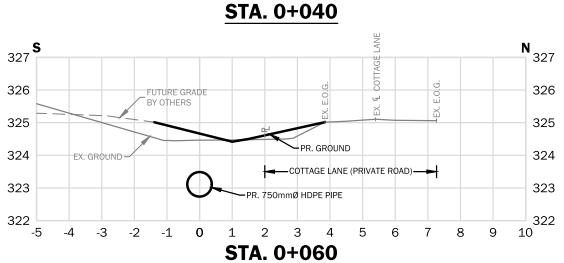
STA. 0+120



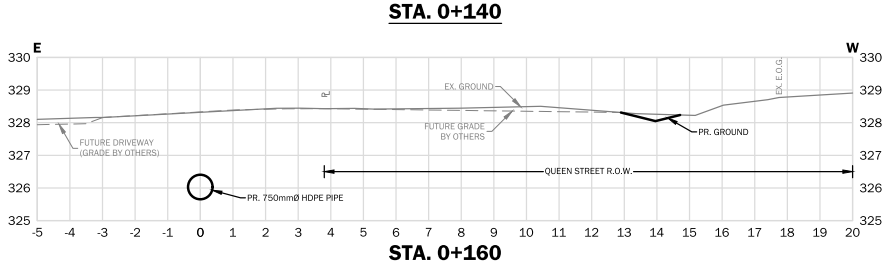
STA. 0+040



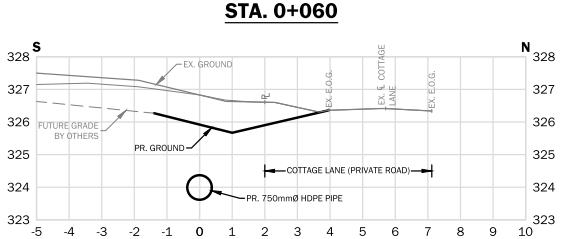
STA. 0+140



STA. 0+060

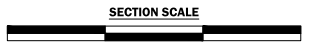


STA. 0+160



STA. 0+080

SECTION SCALE



Township of Wilmot

WARD 1

QUEEN STREET MUNICIPAL DRAIN

Sections

BENCHMARK DESCRIPTIONS

BENCHMARK No. 1 **ELEV.=328.28**
TOP UPSTREAM END OF EX. 1200mmØ C.S.P. SURFACE CULVERT AT STA. 0+208 (CLOSED)

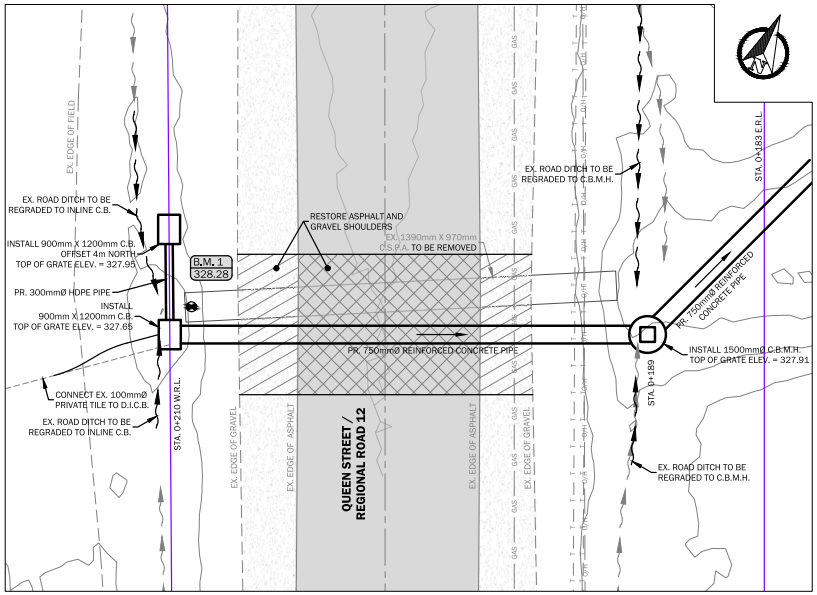
BENCHMARK No. 2 **ELEV.=320.34**
TOP CENTRE OF HEADWALL ON UPSTREAM END OF EX. CONC. BOX CULVERT AT STA. 0+158 (OPEN).

No.	REVISION	DATE (YY-MM-DD)
5	REPORT SUBMISSION	22-06-28
4	INFORMATION MEETING	22-05-19
3	PETITIONER MTG. NO. 2	22-04-26
2	PETITIONER MTG. NO. 1	22-03-31
1	ON-SITE MEETING	21-10-20

LICENSED PROFESSIONAL ENGINEER S.G.R. BROWMAN 100150920 PROVINCE OF ONTARIO

Headway Engineering

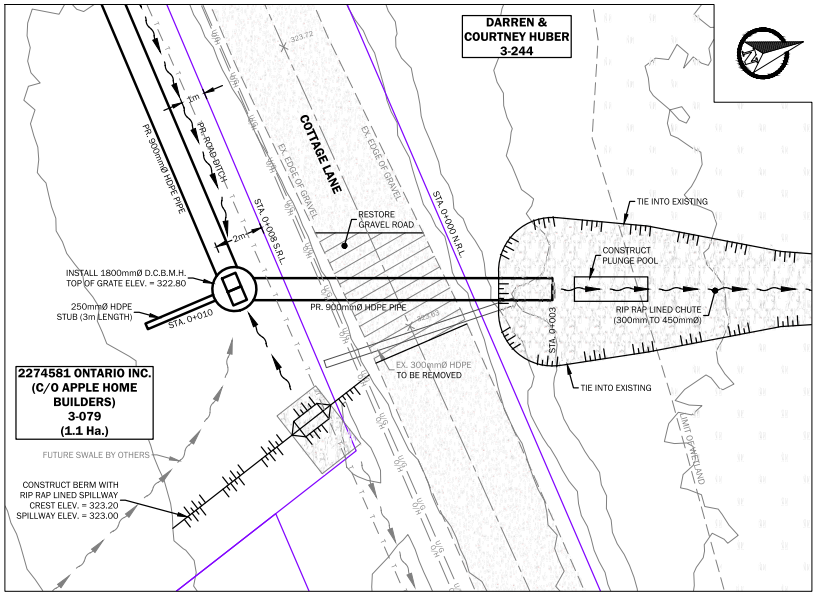
DRAWN BY:	DESIGNED BY:	CHECKED BY:
R.U.	A.H.	S.B.
DATE:	REFERENCE No.	DRAWING No.
2022-06-28	WLMT-003	**7 OF 9**



QUEEN STREET CROSSING DETAIL

DETAIL SCALE

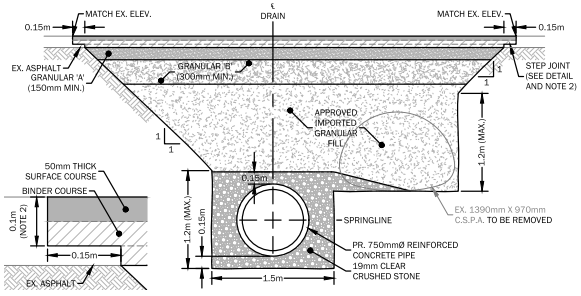
0 4 8 12



COTTAGE LANE CROSSING DETAIL

DETAIL SCALE

0 4 8 12



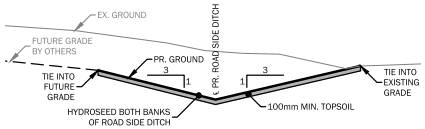
STEP JOINT DETAIL

NOTES:

1. THE HOT MIX ASPHALT SURFACE COURSE TO BE PLACED IN A 50mm LIFT, OTHER BINDER COURSE LIFT THICKNESS NOT TO EXCEED 80mm.
2. WHERE EXISTING HOT MIX ASPHALT DEPTH IS BETWEEN 80mm AND 120mm, A 40mm STEP JOINT IS REQUIRED. A STEP JOINT IS NOT REQUIRED FOR ASPHALT DEPTHS LESS THAN 80mm.

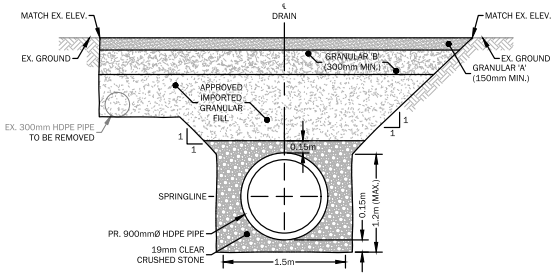
QUEEN STREET CROSSING SECTION

N.T.S.



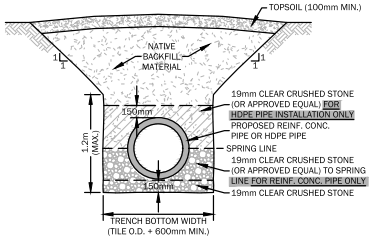
TYPICAL ROAD SIDE DITCH DETAIL

N.T.S.



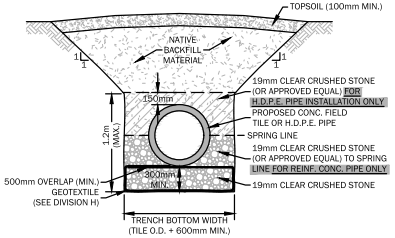
COTTAGE LANE CROSSING SECTION

N.T.S.



TYPICAL PIPE INSTALLATION ON STONE BEDDING DETAIL

N.T.S.



TYPICAL PIPE INSTALLATION ON WRAPPED STONE BEDDING DETAIL (PROVISIONAL ITEM)

N.T.S.

Township of Wilmot

WARD 1

QUEEN STREET MUNICIPAL DRAIN

Details

NOTES:

1. CONTOURS GENERATED USING THE 2018 LIDAR DERIVED DATA SET REPRESENTING BARE-EARTH TERRAIN FROM LAND INFORMATION ONTARIO.
2. THE CONTRACTOR SHALL BE RESPONSIBLE TO ARRANGE ALL TRAFFIC CONTROL SIGNALS, SIGNS AND DEVICES THAT ARE REQUIRED FOR SAFE AND PROPER TRAFFIC MANAGEMENT DURING THE INSTALLATION OF THE DRAINAGE SYSTEM. THE CONTRACTOR SHALL CONTACT THE TOWNSHIP OF WILMOT AND REGION OF WATERLOO FOR SPECIFIC LOCAL PROCEDURES, GUIDELINES, AND TIMELINES. TRAFFIC CONTROL SHALL MEET THE STANDARDS OF BOOK 7 OF THE ONTARIO TRAFFIC MANUAL.

BENCHMARK DESCRIPTIONS

BENCHMARK No. 1 **ELEV.=328.28**
TOP UPSTREAM END OF EX. 1200mmØ C.S.P. SURFACE CULVERT AT STA. 0+208 (CLOSED)

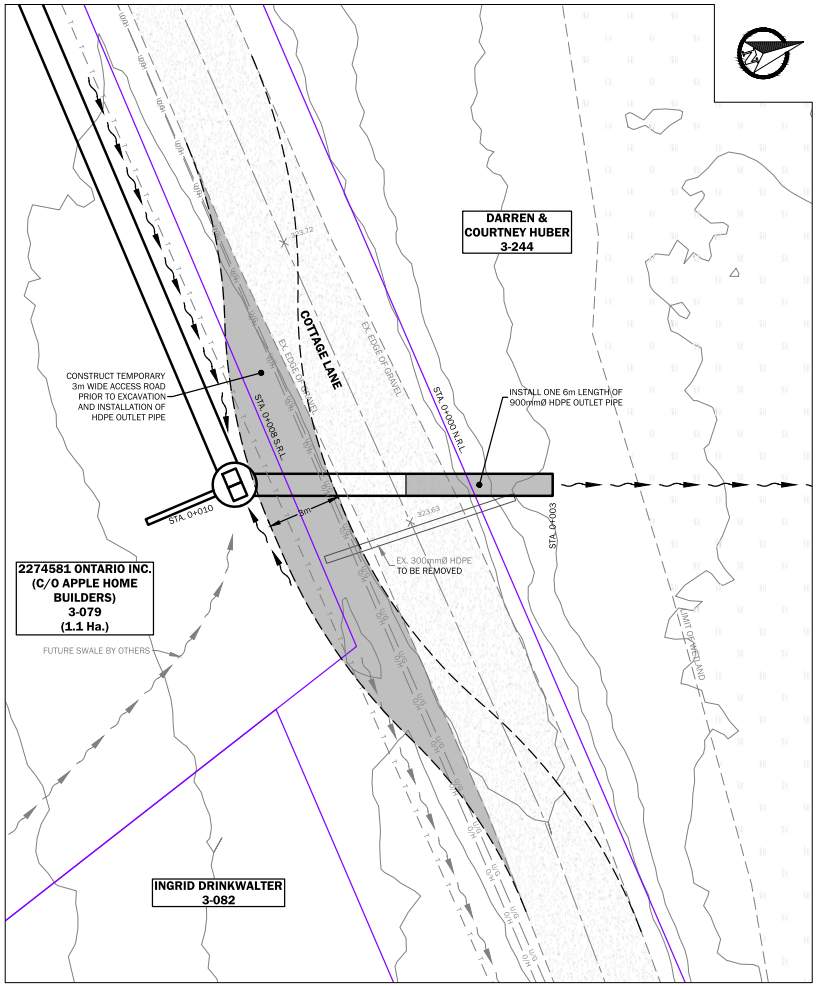
BENCHMARK No. 2 **ELEV.=320.34**
TOP CENTRE OF HEADWALL ON UPSTREAM END OF EX. CONC. BOX CULVERT AT STA. 0+158 (OPEN).

No.	REVISION	DATE (YY-MM-DD)
5	REPORT SUBMISSION	22-06-28
4	INFORMATION MEETING	22-05-19
3	PETITIONER MTG. NO. 2	22-04-26
2	PETITIONER MTG. NO. 1	22-03-31
1	ON-SITE MEETING	21-10-20

LICENSED PROFESSIONAL ENGINEER S.G.R. BRICKMAN 100150920 PROVINCE OF ONTARIO

Headway Engineering

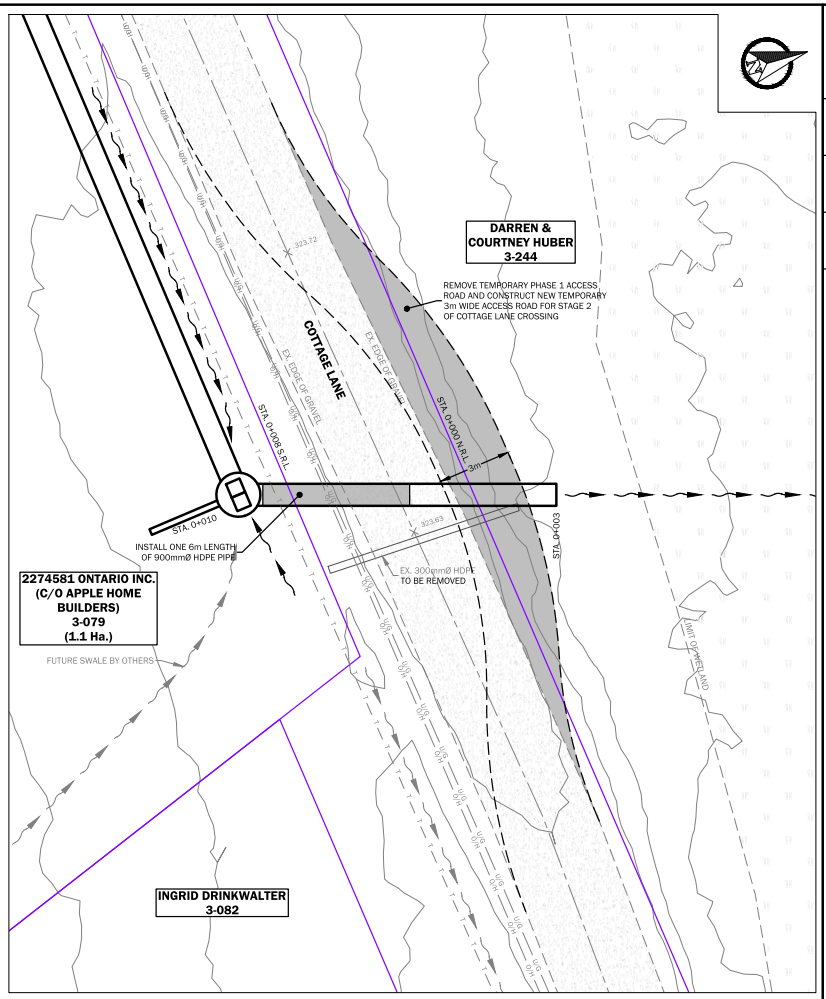
DRAWN BY:	DESIGNED BY:	CHECKED BY:
R.U.	A.H.	S.B.
DATE: 2022-06-28	REFERENCE No. WLMT-003	DRAWING No. **8 OF 9**



COTTAGE LANE CONCEPTUAL TRAFFIC CONTROL DETAIL (STAGE 1)

DETAIL SCALE

0 4 8 12



COTTAGE LANE CONCEPTUAL TRAFFIC CONTROL DETAIL (STAGE 2)

DETAIL SCALE

0 4 8 12

SUGGESTED TRAFFIC CONTROL STAGING

1. CONSTRUCT TEMPORARY 3m WIDE ACCESS ROAD FOR STAGE 1 INCLUDING ALL TRAFFIC CONTROL DEVICES THAT ARE REQUIRED PER BOOK 7 OF THE ONTARIO TRAFFIC MANUAL.
2. INSTALL 6m LENGTH OF 900mmØ HDPE OUTLET PIPE.
3. CONSTRUCT TEMPORARY 3m WIDE ACCESS ROAD FOR STAGE 2 INCLUDING ALL TRAFFIC CONTROL DEVICES THAT ARE REQUIRED PER BOOK 7 OF THE ONTARIO TRAFFIC MANUAL.
4. INSTALL 6m LENGTH OF 900mmØ HDPE PIPE.
5. RESTORE COTTAGE LANE TO ORIGINAL CROSS SECTION.
6. DECOMMISSION TEMPORARY ACCESS ROADS.

TOWNSHIP OF Wilmot

WARD 1

QUEEN STREET MUNICIPAL DRAIN

Cottage Lane Suggested Traffic Contrtol Staging

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3. ONE LANE OF TRAFFIC TO BE MAINTAINED FOR DURATION OF CONSTRUCTION.
4. ADJUSTMENTS TO SUGGESTED TRAFFIC CONTROL STAGING PLAN SHALL BE SUBMITTED TO ENGINEER PRIOR TO CONSTRUCTION.

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