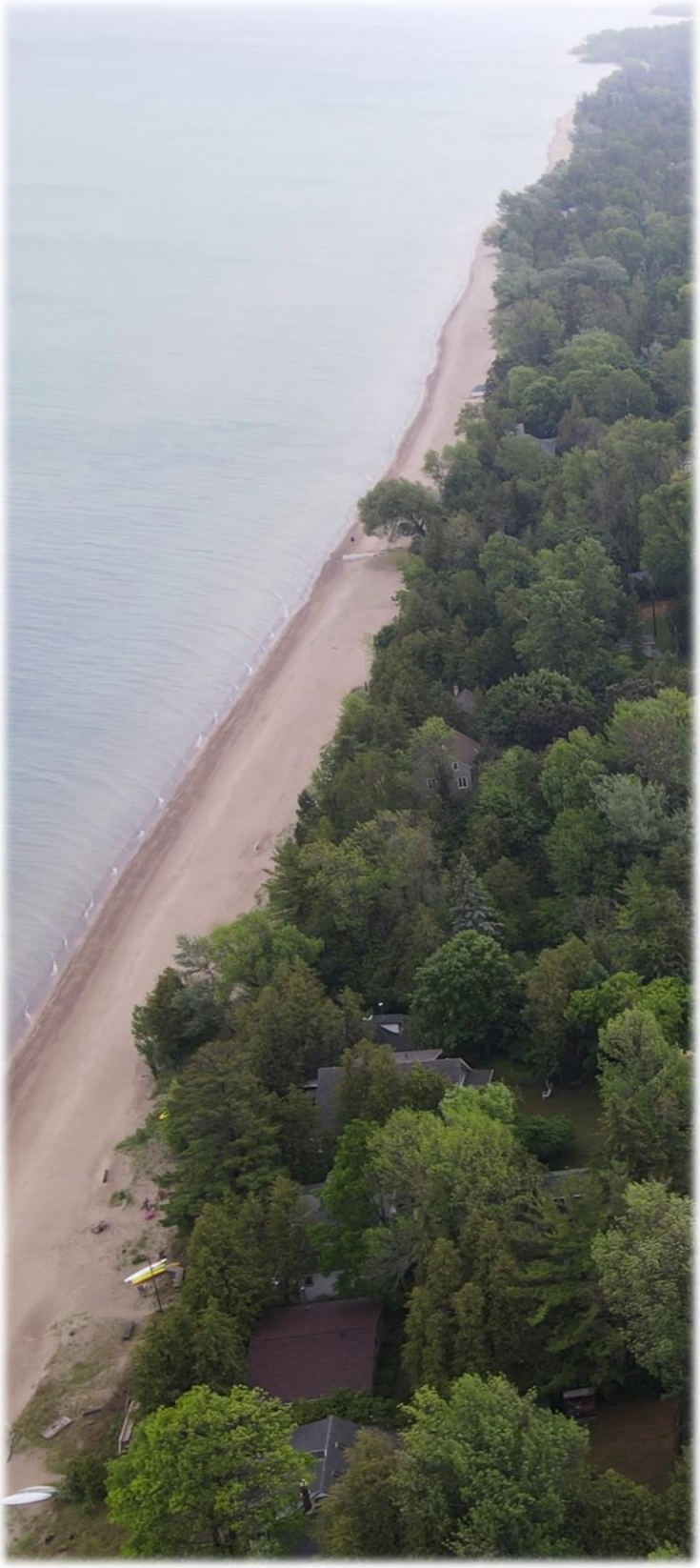


BRUCE BEACH MUNICIPAL DRAIN PHASE I

July 8, 2021

Prepared for:

Township of Huron – Kinloss

Prepared by:

Headway Engineering
23-500 Fairway Road South
Suite 308
Kitchener, Ontario N2C 1X3
226 243 6614
www.headwayeng.ca

23-500 Fairway Road South
Suite 308
Kitchener, Ontario N2C 1X3
226 243 6614
www.headwayeng.ca

Kitchener, Ontario
July 8, 2021

To the Mayor and Members of Council:

Re: Bruce Beach Municipal Drain – Phase I
Township of Huron-Kinloss
Our Reference No. HK-001

Headway Engineering is pleased to provide its report for the Bruce Beach Municipal Drain – Phase I in Huron-Kinloss (Former Township of Huron).

The preparation of this report was authorized through a resolution of the Council of the Township of Huron-Kinloss on May 3, 2021, per Section 4 of the Drainage Act.

The objective of this report is to provide a defined legal outlet and drainage system under the Drainage Act to increase the safety of the public and protect private and public property in the Bruce Beach area.

Yours truly,

Stephen Brickman, P.Eng.
Project Engineer and Manager
HEADWAY ENGINEERING
SB/

CONTENTS

1.0 INTRODUCTION 1
2.0 AUTHORIZATION 1
3.0 PUBLIC MEETINGS AND ENGAGEMENTS 1
4.0 COUNCIL MEETING DELEGATIONS 4
5.0 FINDINGS 5
6.0 RECOMMENDATIONS 5
7.0 ENVIRONMENTAL CONSIDERATIONS 6
8.0 DESIGN CONSIDERATIONS 6
9.0 SUMMARY OF PROPOSED WORKS 8
10.0 SUFFICIENT OUTLET 8
11.0 WORKING AREA AND ACCESS 9
12.0 WATERSHED AND SOILS CHARACTERISTICS 9
13.0 ALLOWANCES 9
14.0 ESTIMATED CONSTRUCTION COSTS 11
15.0 SUMMARY OF ESTIMATED PROJECT COSTS 11
16.0 ASSESSMENT 12
17.0 MAINTENANCE 12

SCHEDULES

SCHEDULE A - ALLOWANCES

SCHEDULE B - ESTIMATED CONSTRUCTION COSTS

SCHEDULE C - ASSESSMENT OF CONSTRUCTION

SCHEDULE D - ASSESSMENT FOR MAINTENANCE – Not included in DRAFT REPORT

23-500 Fairway Road South
Suite 308
Kitchener, Ontario N2C 1X3
226 243 6614
www.headwayeng.ca

1.0 INTRODUCTION

Headway Engineering is pleased to present this report on the "Bruce Beach Municipal Drain – Phase I", serving parts of Lots 41 to 48, Lake Range Concession in the Township of Huron-Kinloss, Former Township of Huron, County of Bruce.

The attached Plans, Profiles, and Details; Drawing Numbers 1 to 8, Reference No. HK-001, and Specifications form part of this report. They show and describe in detail the location and extent of the work to be completed and the lands which are affected.

2.0 AUTHORIZATION

Authority to prepare this report was obtained by a resolution of the Township of Huron-Kinloss Council at its November 19, 2018 meeting to appoint Dietrich Engineering Limited to prepare an Engineer's Report.

In accordance with your instructions pursuant to a petition received by Council under Section 4 of the Drainage Act, signed by the Director of Public Works from the Township of Huron-Kinloss, the Engineer has made an examination and survey of the affected area and submits herewith this Report which includes Plan, Profile and Specifications for this work.

On May 3, 2021, the Council of the Township of Huron-Kinloss adjusted its appointment of the Engineer to reflect Headway Engineering as the new appointee per Section 8(2) of the Drainage Act.

The area requiring drainage is portions of Bruce Beach Road, and Lake Range Drive. The petition is valid in compliance with Section 4(1)(c) of the Drainage Act, R.S.O. 1990.

3.0 PUBLIC MEETINGS AND ENGAGEMENTS

3.1 HaveYourSayHK website open for public input – April 5 to May 4, 2019

The Township of Huron-Kinloss used their online public engagement website for the Bruce Beach drainage project beginning in March 2019. Information posted included background discussion of the Drainage Petition, discussion and images of several design concepts, and a high-level plan for moving forward to solve the drainage problems.

The Township initiated public participation using the website from April 5 to May 4, 2019. Over that period, the website received:

- 234 page visits/views
- 11 'stories' submitted using the 'Story Telling Tool' – an online tool for members of the public to post their thoughts, and
- 13 questions

3.2 Public Open House Number 1 (On-Site Meeting) – May 25, 2019

In accordance with Section 9(1) of the Drainage Act, an on-site meeting was held on May 25, 2019. The place of meeting was at the Point Clark Community Centre. Persons in attendance were:

Stephen Brickman, P.Eng.	Dietrich Engineering Limited
Greg Nancekivell, C.E.T.	Dietrich Engineering Limited
Shannon Tweedle, B.A., G. Cert., EPt	Dietrich Engineering Limited
Grant Collins	Township of Huron-Kinloss, Drainage Superintendent
John Yungblut, C.E.T.	Township of Huron-Kinloss, Director of Public Works
Emily Dance, CMO	Township of Huron-Kinloss, Clerk
Kelly Lush	Township of Huron-Kinloss, Deputy Clerk
5 Township Councillors	
53 Landowners	

The primary purpose of this meeting was for the Engineer to obtain as much information as possible from the public to begin preparing a practical design solution. In addition to receiving public input, the meeting provided a review of design concepts, and input received through the *HaveYourSayHK* website.

3.3 HaveYourSayHK website open for Public Input – September to November 22, 2019

The Township of Huron-Kinloss updated their online engagement website for the Bruce Beach drainage project by posting additional information in October 2019. The information included a review of design concepts and public input, additional detailed discussion of design recommendations, and preliminary cost estimates and assessments.

As of November 24, 2019, the cumulative website activity (from commencement) was as follows:

- Approximately 1,400 page visits/views
- 36 'stories' submitted using the 'Story Telling Tool', and
- 13 questions (no change from the previous website report)

3.4 Public Open House Number 2 (Information Meeting) – November 30, 2019

An information meeting was held on November 30, 2019, at the Point Clark Community Centre. Persons in attendance were:

Stephen Brickman, P.Eng.	Dietrich Engineering Limited
Greg Nancekivell, C.E.T.	Dietrich Engineering Limited
Shannon Tweedle, B.A., G. Cert., EPt	Dietrich Engineering Limited
Grant Collins	Township of Huron-Kinloss, Drainage Superintendent
John Yungblut, C.E.T.	Township of Huron-Kinloss, Director of Public Works
Emily Dance, CMO	Township of Huron-Kinloss, Clerk
Kelly Lush	Township of Huron-Kinloss, Deputy Clerk
Alyssa Gowing	Saugeen Valley Conservation Authority
5 Township Councillors	
35 Landowners	

The information provided proposed constructing two separate drainage systems. The first system would mitigate the drainage problems affecting the southern portion of the Bruce Beach area where the ravine crosses Bruce Beach Road, and the second system would address the northern portion near Highland Drive. This meeting provided a review of the design of the proposed

drainage system, the estimated costs of the project and proposed assessments. General details of each portion are discussed below.

3.4.1 Southern Portion

The recommended drainage system for the Southern portion included the construction of a detention facility located on private property east of Lake Range Drive. The outlet for the detention facility was proposed to be the existing ravine in its current state, then through a culvert across Bruce Beach Road, and finally through an existing open ditch and existing pipe system ending on 98 Bruce Beach Road. The outlet for the system is Lake Huron. No work was proposed downstream of Lake Range Drive.

3.4.2 Northern Portion

The Northern drainage system included a discussion and comparison of two options. Option 1 proposed the construction of storm chambers situated entirely within the road limits of Bruce Beach Road. Option 2 proposed improvements to the existing ditch on the east side of Bruce Beach Road. Both design options relied on infiltration into the sand layer as an outlet. Option 1 provided for underground storage and a larger contact area with the sandy soils which serve as an outlet, while Option 2 relied on surface storage, with a significantly smaller contact area with the sandy soils (relative to Option 1).

3.5 Meeting with Landowners Affected by Detention Facility Construction – November 11, 2020

A meeting was held on November 11, 2020, at the Ripley Huron Community Centre. Persons in attendance were:

Stephen Brickman, P.Eng.	Dietrich Engineering Limited
Michel Terzian, B.Eng.	Dietrich Engineering Limited
Grant Collins	Township of Huron-Kinloss, Drainage Superintendent
John Yungblut, C.E.T.	Township of Huron-Kinloss, Director of Public Works
Emily Dance, CMO	Township of Huron-Kinloss, Clerk
One Landowner	

The information provided proposed constructing a drainage system to mitigate the drainage problems affecting the area where the ravine crosses Bruce Beach Road. This meeting provided a review of the design of the proposed drainage system, the estimated costs of the project and proposed assessments.

The recommended drainage system included the construction of a detention area located on private property east of Lake Range Drive. The outlet for the detention area was proposed to be the ravine, however, in an improved state, then through a culvert across Bruce Beach Road, and finally through an existing open ditch and existing pipe system ending on 98 Bruce Beach Road. The outlet for the system is Lake Huron. No work was proposed downstream of Bruce Beach Road.

3.6 Meetings with Landowners Affected by Downstream works – May 20th, and 21st, 2021

Meetings were held on May 20th and 21st, 2021 at a private residence (May 20) and virtually (May 21). Persons in attendance were:

Stephen Brickman, P.Eng.	Headway Engineering

Grant Collins	Township of Huron-Kinloss, Drainage Superintendent
Three Landowners	

The information provided proposed constructing a drainage system to mitigate the drainage problems affecting the area where the ravine crosses Bruce Beach Road. This meeting provided a review of the design of the proposed drainage system, the estimated costs of the project and proposed assessments.

The recommended drainage system included the same description of works presented at the November 11, 2020 meeting.

4.0 COUNCIL MEETING DELEGATIONS

4.1 Kick-off and Conceptual Design Discussion - February 11, 2019

Dietrich Engineering Limited attended the February 11, 2019 Council Meeting to present information on the hydrologic construction of the Bruce Beach area. The discussion included a brief introduction to the existing outlets into Lake Huron, and the approximate watersheds using these outlets. Dietrich Engineering Limited also presented a high-level plan on advancing the project forward, and for discussion purposes, developed several conceptual design solutions.

4.2 Preliminary Design Recommendations and Discussion - October 21, 2019

Dietrich Engineering Limited attended the October 21, 2019 Council Meeting to provide a review of the findings, and the previously presented concepts, and a summary of the public input received so far. Dietrich Engineering Limited went on to present design recommendations, preliminary cost estimates and assessments.

4.3 Project Phasing Discussions - October 14, 2020

4.3.1 Southern Portion

Dietrich Engineering Limited attended the October 14, 2020 Council Meeting to provide Council with an update on the project, and to discuss potential phasing options which will allow for the construction of the most critical components of the design as soon as possible to increase the safety of the public. A description of the possible phasing of the south portion of the project is as follows:

1) Phase I

   Phase I includes the construction of the detention facility east of Lake Range Drive; the Lake Range Drive road crossing; and improvements to the ravine downstream of Lake Range Drive to Bruce Beach Road.

2) Phase II

   Phase II includes the construction of a drainage system directly affecting properties on the east side of Bruce Beach Road between Concession 8 Road and the ravine, and an outlet to Lake Huron.

4.3.2 Northern Portion

Discussion also included the administration of the North Portion of the drainage system, located on Bruce Beach Road near Highland Drive. Given that the proposed drainage system does not require the use of private property; there are not any properties within the watershed which would qualify for grants under the Agriculture Drainage Infrastructure Program; and recognizing that the proposed assessments are heavily weighted toward the Township, using the Drainage Act to implement a drainage solution was questioned.

5.0 FINDINGS

The Engineers have made an examination of the drainage area and have found the following:

1. Nearly 200 acres of land east of Lake Range Drive drains through the ravine at 726 Lake Range Drive.
2. The existing drainage system consists of an open ditch and field tiles on Lot 43, Concession Lake Range, which outlets into the top of a ravine formation just east of the Lake Range Drive road crossing. The road crossing consists of an 1800mm diameter corrugated steel pipe (CSP), which outlets into a natural ravine on 726 Lake Range Drive. At the downstream end of the ravine, runoff flows across Bruce Beach Road through a 900mm diameter high density polyethylene (HDPE) pipe, and then flows into an existing 1200mm diameter CSP on the 98 Bruce Beach Road property. The outlet for the system is Lake Huron.
3. The elevation difference between the ravine at Lake Range Drive, and the beach at Lake Huron is approximately 23 metres, with close to 20 metres of the elevation change occurring between Lake Range Drive and Bruce Beach Road. The approximate distance from the road crossing at Lake Range Drive to the road crossing at Bruce Beach Road is 270 metres.
4. The ravine is experiencing high levels of erosion and is prone to blockages from fallen trees.
5. The overland slopes of the catchment area are relatively steep and tend to produce fast and large peak flows followed by a somewhat quick recession to no flow.
6. The area on Lot 43, Concession Lake Range between Lake Range Drive and the existing private drainage ditch is an irregularly shaped field that is of a relatively small size and is not being used for the same crop production as the remaining portion of the property.
7. This watershed has experienced significant storm events in the last several years which have caused considerable damage to both private and public property, including road infrastructure.
8. The south Bruce Beach area requires modifications to its existing drainage system to increase the safety of the public, and the public's property.
9. The existing drainage system on the 98 Bruce Beach Road property (Roll No. 8-113) is currently a private drainage system and is constructed in extremely close proximity to a house, making the system difficult to maintain, should maintenance be required.

6.0 RECOMMENDATIONS

Headway Engineering recommends that:

1. A detention facility be constructed east of the existing Lake Range Drive road crossing. The detention facility's primary purpose is to temporarily detain stormwater runoff and gradually

release stormwater at a reduced rate which is manageable and safe for downstream infrastructure.

2. The proposed design of the detention facility allows for multiple uses of the land including stormwater detention and crop production.
3. Improvements be made to the ravine to allow for better accessibility for future maintenance and increase its resistance to channel shear which in turn reduces erosion.
4. The design standard used for the detention facility is a 100-year rainfall event before engaging an overflow bypass to the outlet through Lake Range Drive. The detention facility provides for mitigation of stormwater flows for all rainfall events including events larger than the design standard.
5. The existing drainage system on the M. Clark property (Roll No. 8-111-01) and the S. Gancevich property (Roll No. 8-113) temporarily serve as an outlet into Lake Huron until the Bruce Beach Municipal Drain – Phase II report proposes a permanent outlet.
6. This new drainage system shall be known as the Bruce Beach Municipal Drain – Phase I.

7.0 ENVIRONMENTAL CONSIDERATIONS

The Department of Fisheries and Oceans (DFO) has reviewed the proposed design and has completed a site visit. DFO provided correspondence to the Township dated April 2, 2020, which states the following:

"... the Program is of the view that your proposal will not require an authorization under the Fisheries Act."

The Saugeen Valley Conservation Authority (SVCA) has been invited to all public meetings and has been contacted directly on several occasions. The SVCA has indicated that a permit to Alter a Watercourse is required for the proposed ravine works. The SVCA has also provided correspondence to the Township dated March 7, 2021, which states the following:

"... the proposed design is generally acceptable to SVCA staff."

The work proposed under this report includes the attenuation of stormwater flows and improvements to downstream infrastructure for the primary purpose of improving the safety of the public. Consequently, the attenuation of peak stormwater flows tends to improve water quality.

8.0 DESIGN CONSIDERATIONS

8.1 Detention Facility

The watershed east of Lake Range Drive naturally drains toward the upper end of the ravine where the existing crossing is under Lake Range Drive. Constructed features exist that improve conveyance toward the ravine, but also toward the Pollock Municipal Drain which flows south. Runoff flows into the ravine in an uncontrolled manner. Large rainfall events are conveyed downstream with haste, into a ravine with approximately 20 metres of fall, where the topography then levels (relative to the ravine). Bruce Beach Road and several residences are in this area at the lower end of the ravine. The existing hydraulic condition from Bruce Beach Road to Lake Huron is not capable of safely conveying flows generated from large rainfall events.

The proposed detention facility is situated just east of Lake Range Drive which takes advantage of the natural 'confluenceing' properties of the watershed. Runoff continues to flow overland into the detention facility in the same uncontrolled manner that currently exists and is then released downstream to the Ravine at a flow rate significantly less than the peak overland inflow rate. The reduced flow rate is controlled by the detention facility's outlet structure. The balance of runoff is stored in the detention facility.

Hydrologic modelling was carried out to represent the detailed drainage characteristics of the watershed. A 'proposed conditions' model was prepared to design the detention facility and assess the impacts the changes would have on downstream lands. The detention facility was modeled for the 2, 5, 10, 25, 50, and 100-year rainfall events.

Specific design considerations include:

- Outflow rates from the detention facility that can safely be conveyed by downstream infrastructure
- Storage capacity in the detention facility to temporarily contain flows generated by the 100-year rainfall event
- Topographic and construction constraints to ultimately allow for improved land use during normal conditions.

8.2 Ravine

The ravine is experiencing large amounts of erosion for both large and small rainfall events. A hydraulic model was prepared to determine the depth of flow which would produce channel shear causing particle movement in the ravine. The hydraulic model was then used to compute the expected existing condition results from observed rainfall data for a two-year period. The model was duplicated and modified to compute the expected proposed condition (with a detention facility) results from the same observed rainfall data for the two-year period. The results are summarized as follows:

- Cumulative channel shear is marginally reduced by the construction of a detention facility
- Cumulative channel shear in excess of threshold shear is marginally increased by the construction of a detention facility
- Cumulative duration of channel shear in excess of the threshold shear is marginally increased by the construction of a detention facility

In conclusion, although the detention facility greatly increases the safety factor against flooding for downstream portions of the drainage system, the safety factor against erosion in the ravine is essentially unaffected. In other words, the ravine is expected to erode at the same long-term pace, which is currently observed. This is attributed to the inherently low shear resistance of the soil in the ravine, coupled with extreme grades.

Design solutions include reducing the amount of flow travelling on the streambed of the ravine, increasing the shear resistance of the soil in the ravine, or a combination thereof. In this case, a hybridization of both principles is recommended.

A pipe system is proposed to convey most flow, while small flows will use the proposed rip-rap lined swale in the ravine.

9.0 SUMMARY OF PROPOSED WORKS

The proposed work consists of:

1. The construction of a detention facility of approximately 1.6 hectares in area.
2. Earthworks including the excavation and placement of approximately 10,500m3 of material.
3. The installation of one perforated CSP riser for the detention facility's outlet structure.
4. The construction of one emergency spillway complete with cable concrete matting.
5. The construction of four rip rap lined rock chutes or swales.
6. The installation of approximately 260 metres of 525 to 600mm diameter HDPE pipe, including installation of an end cap with 350mm diameter orifice opening.
7. Approximately 199 metres of ravine improvements including filling, seeding, and rip-rap lined swale construction.
8. The installation of two concrete catch basins and two reinforced concrete manholes; and
9. The construction of a rip-rap lined plunge pool.

10.0 SUFFICIENT OUTLET

Section 15 of the Drainage Act states the following:

"… every drainage works constructed under this Act shall be continued to a sufficient outlet."

And Section 1 of the Drainage Act defines 'sufficient outlet' to mean

"… a point at which water can be discharged safely so that it will do no damage to lands or roads"

The existing drainage system west of Bruce Beach Road consists of a 1200mm diameter CSP, where the upper portion (eastern portion) was recently installed in the fall of 2020. The construction date of the lower portion is believed to be in the late 1990's or early 2000's, perhaps under two different installations.

Closed circuit television (CCTV) video inspection of the existing pipe indicates that the condition of the existing pipe is satisfactory.

The alignment of the existing pipe adjacent to the house on 98 Bruce Beach Road places the pipe at less than one metre from the foundation of the house. The elevation of the pipe at its outlet onto the beach is low to the point where the pipe was nearly filled with sand under the record high water levels of Lake Huron in the summer of 2020.

This report proposes the continued use of the existing drainage system downstream of Bruce Beach Road as a temporary outlet to Lake Huron.

In the opinion of the Engineer, the existing outlet is a sufficient outlet on a temporary basis until such time as a permanent outlet can be established under the Drainage Act. The proximity of the house at 98 Bruce Beach Road, and the pipe's low invert elevation do not qualify the existing drainage system as a long-term sufficient outlet. Given the severity of the flooding that has occurred over the last several years, it is imperative that the detention facility and the ravine be constructed/rehabilitated to

protect the Bruce Beach area. That said, the existing outlet is sufficient in the short term, where it can be reasonably expected that maintenance will not be required.

Furthermore, it is critical that the Phase II report for the Bruce Beach Drain establish a permanent outlet under the Drainage Act, as promptly as is reasonably possible.

11.0 WORKING AREA AND ACCESS

Access to the working areas for both the detention facility and the ravine shall be from Lake Range Drive and Bruce Beach Road.

11.1 Detention Facility

The working area for construction purposes shall be as shown in the attached drawing set.

For maintenance purposes, the limits of the working areas are as follows:

- On the north, east and south sides of the facility, the maximum working area limits shall be a 10-metre outward offset from the bottom of the detention facility.
- The rock chutes from the northwest and northeast shall have maintenance working widths based on a 10-metre outward offset from the centre line of the rock chutes.
- The spillway to the southwest shall have a maintenance working area based on five metres from the south side of the cable concrete matting.
- The working width to the west extends to the Lake Range Drive east road limit.

The working area for maintenance purposes are noted in the attached drawing set.

11.2 Ravine

The working area shall be an average width of 20 metres for construction purposes, and an average width of ten metres for maintenance purposes along the alignment of the proposed drain.

12.0 WATERSHED AND SOILS CHARACTERISTICS

The watershed was established through analysis of tile drainage maps, previous engineer's reports, field investigations, surveys, and data analysis of the Southwestern Ontario Orthophotographic Project (SWOOP).

The Drainage Area comprises of approximately 84.3 hectares. Land uses within the watershed include agricultural, residential, and roads.

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 clay loam.

13.0 ALLOWANCES

In accordance with Sections 29 and 30 of the Drainage Act, Allowances payable to Landowners are calculated using the following methodology.

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

Dietrich Engineering Limited obtained a Letter of Opinion of market value, prepared by a licensed real estate appraiser. Headway Engineering received an updated version of the report to reflect

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

Dietrich Engineering Limited obtained a Letter of Opinion of market value, prepared by a licensed real estate appraiser. Headway Engineering received an updated version of the report to reflect the large changes observed in the real estate market. The values used for calculating allowances for Right-of-Way were extracted from the Letter of Opinion, and 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
Residential gully lot (bushed)	$575,200/Ha	10%	$57,500/Ha
Agricultural workable land (to be removed from production)	$33,600/Ha	100%	$33,600/Ha
Agricultural workable land (to remain workable)	$33,600/Ha	40%	$13,400/Ha
Agricultural gully area	$33,600/Ha	10%	$3,400/Ha

13.1.1 Detention Facility

The allowances for Right-of-Way under Section 29 of the Drainage Act were calculated using the Adjusted Land Value from the table above for the area utilized by the detention facility, plus the additional area required to maintain the facility.

13.1.2 Ravine

The allowances for Right-of-Way under Section 29 of the Drainage Act were calculated using the Adjusted Land Value from the table above for the area required for maintaining the drainage system through the ravine.

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

Allowances for Damages to Lands and Crops under Section 30 of the Drainage Act, were primarily calculated to compensate landowners for crop losses, bush 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
Residential gully lot (bushed)	$2,000/Ha
Agricultural workable land	$6,000/Ha.
Agricultural gully area	$2,000/Ha

Agricultural workable areas were also provided allowances for damages to the existing farm tile systems.

Allowances payable to Landowners entitled thereto are as shown in Schedule A.

Total Allowances, under Sections 29 and 30 of the Drainage Act;

Bruce Beach Municipal Drain – Phase I:	**$79,390**

14.0 ESTIMATED CONSTRUCTION COSTS

Headway Engineering has made an estimate of the cost of the proposed work based on labour, equipment, and materials. A detailed description of the costs involved can be found in Schedule B of this report.

A) Total Estimated Construction Costs – Detention Facility	$ 201,700
B) Total Estimated Construction Costs – Lake Range Drive	$ 133,560
C) Total Estimated Construction Costs – Ravine Improvements	$ 208,620
D) Total Estimated Construction Costs – Contingencies (10%)	$ 54,400
Total Estimated Construction Costs	**$ 598,280**

15.0 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)	$ 79,390
Total Estimated Construction Costs (Refer to Schedule B)	$ 598,280
Meetings, survey, design, preparation of preliminary cost estimates, preparation of final drainage report, consideration of report	$ 191,100
Legal Surveys, Appraisal Reports and GeoTechnical Review	$ 10,000
Consultation with Environmental Agencies and Permitting Fees	$ 5,000
Preparation of contract documents, contract administration, supervision, and inspection of construction	$ 90,000
Interest and net H.S.T.	$ 41,230
TOTAL ESTIMATED PROJECT COSTS –BRUCE BEACH MUNICIPAL DRAIN – Phase I	**$ 1,015,000**

The estimated cost of the work in the Township of Huron-Kinloss is $1,015,000.

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

16.0 ASSESSMENT

We assess the cost of this work against the lands and roads liable for assessment for benefit and outlet as shown in the annexed Schedule C - Assessment for Construction. We have determined that there is no injuring liability assessment involved.

16.1 Special Assessment (Section 26)

Whether or not the Township of Huron-Kinloss elects to do the work on their property, Sta. 0+354 to Sta. 0+404 (Lake Range Drive), they shall be assessed the actual increased costs to the drainage works due to the construction and operation of the road as a Special Assessment in addition to any benefit and outlet liability assessments. The Special Assessment shall be made up of the actual construction costs, less normal costs based on a per metre cost of the ravine work, plus an allowance for administration costs.

17.0 MAINTENANCE

After completion, this drain shall be maintained by the Township of Huron-Kinloss at the expense of all the lands and roads assessed in 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 those portions of the drain constructed within road right-of-ways. These portions of the drain shall be maintained at the expense of the road authority having jurisdiction over said road.

The existing pipe drainage system on the M. Clark property (Roll No. 8-111-01) and the S. Gancevich property (Roll No. 8-113) is to be temporarily used until the outlet to Lake Huron is altered. It is anticipated that the Phase II report for the Bruce Beach Municipal Drain will alter or abandon this existing drain.

Schedule A

Allowances

Schedule A - Allowances
Bruce Beach Municipal Drain - Phase I

Property Details				Drainage Act Allowances		
Lot or St. No.	Con. or Street Name	Landowner	Roll No.	Right of Way (Sec. 29)	Damages (Sec. 30)	Total Allowances
726	LRD	G. Pollock	8-236	$11,160	$1,000	$12,160
Pt. 42	CLR	Brucelea Poultry Farms Ltd.	8-240	$10,380	$9,630	$20,010
Pt. 43	CLR	P. Schlegel	8-253	$27,030	$19,220	$46,250
Pt. 43	CLR	A. Pollock	8-253-02	$770	$200	$970
Total Allowances Bruce Beach Municipal Drain - Phase I				**$49,340**	**$30,050**	**$79,390**

Schedule B

Estimated Construction Costs

Schedule of Estimated Construction Costs

Headway Engineering has made an estimate of the cost of the proposed work which is outlined in detail as follows:

Part A - Detention Facility

	Description	Estimated Quantity		$/Unit		Total
1)	Clearing, brushing and mulching	1	l.s.	$ 10,000.00	$	10,000.00
2)	Topsoil:					
	Stripping & Stockpiling (0.25m avg. depth)	3,900	m3	$6.00	$	23,400.00
	Placing (0.20m depth)	3,600	m3	$2.00	$	7,200.00
3)	Earth works:					
	Total Cut (excluding Top Soil)	6600	m3	$ 6.00	$	39,600.00
	Total Fill (excluding Top Soil)	3100	m3	$ 2.00	$	6,200.00
4)	Supply and install CC35 cable concrete on emergency overflow spillway (approx. 50 m2), including filling in area between blocks with topsoil	50	m2	$120.00	$	6,000.00
5)	Supply 1-2400mm diameter fully perforated C.S.P. riser outlet structure (4.55m length) with 50mm diameter perforations complete with a galvanized steel half grated lid with hinged lockable access door and access ladder	1	l.s.	$6,000.00	$	6,000.00
	Installation of 2400mm diameter fully perforated C.S.P. riser outlet structure complete with 100-200mm dia. quarry stone rip-rap jacket (approx. 15m3) placed on 200mm granular base pad, embedded in 150mm of concrete and filled with 300mm of low strength concrete	1	l.s.	$6,000.00	$	6,000.00
6)	Supply 525mm diameter H.D.P.E. pipe	20	m	$ 110.00	$	2,200.00
	Installation (Sta. 0+404 to Sta. 0+424)	20	m	$ 100.00	$	2,000.00

	Description	Estimated Quantity		$/Unit	Total
7)	Supply and install 525mm diameter H.D.P.E. end cap with 350mm diameter opening at Sta. 0+446	1	l.s.	$ 600.00	$ 600.00
8)	Construction of rock chute including supply and place 100mm to 200mm dia. Quarry stone rip-rap material 300mm deep on geo-textile filter material (approx. 150m2, Northeast rock chute)	150	m2	$ 50.00	$ 7,500.00
9)	Hydroseeding all disturbed areas of the working area, excluding the bottom of the detention centre (approx. 17,000 m2)	17000	m2	$ 5.00	$ 85,000.00
Sub-Total					$ 201,700.00

Part B - Lake Range Drive

	Description	Estimated Quantity		$/Unit	Total
1)	Remove existing 1800mm diameter corrugated steel pipe roadway culvert,	1	l.s.	$ 5,000.00	$ 5,000.00
2)	Supply 525mm diameter H.D.P.E. pipe	50	m	$ 110.00	$ 5,500.00
	Installation of 525mm HDPE pipe by open cut (approximately 6m max cut)	50	m	$500.00	$ 25,000.00
3)	Supply and install 900mm x 1500mm concrete catch basin at Sta. 0+354 and Sta. 0+404 (inline type)	2	ea.	$6,000.00	$ 12,000.00
4)	Supply 600mm diameter H.D.P.E. pipe (Surface Pipe)	48	m	$ 135.00	$ 6,480.00
	Installation (Sta. 0+356 to Sta. 0+404)	48	m	$ 150.00	$ 7,200.00

	Description	Estimated Quantity		$/Unit		Total
5)	Construction of rock chute including the supply and placement of 100mm to 200mm dia. Quarry stone rip-rap material 300mm deep on geo-textile filter material (approx. 75m2, Northwest rock chute)	75	m2	$50.00	$	3,750.00
6)	Construction of new pond access off Lake Range Drive including the supply and placement of 250mm compacted granular 'A' material (approx. 150m2)	1	l.s.	$2,680.00	$	2,680.00
7)	Construction of temporary ravine access off Lake Range Drive (approx. 500m3)	1	l.s.	$12,500.00	$	12,500.00
8)	Traffic control	1	l.s.	$ 5,000.00	$	5,000.00
9)	Road Restoration including:					
	Supply and Place 150mm thickness of Granular 'A' (115m2 x 0.15m thickness)	45	t.	$ 60.00	$	2,700.00
	Supply and place 100mm thickness (50mm HL8 and 50mm HL4) asphalt (115m2 x 0.1m thickness)	30	t.	$ 500.00	$	15,000.00
10)	Supply and install guardrail (including removal and offsite disposal of existing guardrail)	73	m	$ 250.00	$	18,250.00
11)	Hydroseeding all disturbed areas within road right-of-way (approx. 2,500 m2)	2500	m2	$ 5.00	$	12,500.00
Sub-Total					$	133,560.00

Part C - Ravine Improvements

	Description	Estimated Quantity		$/Unit	Total
1)	Clearing, brushing and mulching	1	l.s.	$ 50,020.00	$ 50,020.00
2)	Earth Works Place fill including compaction, topsoil and fine grading (supplied from detention facility)	3,800	m3	$15.00	$ 57,000.00
3)	Supply 600mm diameter HDPE pipe (Smooth Wall with Gasketed Joints)	190	m	$ 135.00	$ 25,650.00
	Installation (Sta. 0+164 to Sta. 0+354)	190	m	$ 200.00	$ 38,000.00
4)	Supply and install 1500mm dia. reinforced concrete manhole at Sta. 0+201 and Sta. 0+257	2	ea.	$ 8,000.00	$ 16,000.00
5)	Construct rip-rap lined swale approx. 190m length x 1m width x 0.2m	190	m2	$55.00	$ 10,450.00
6)	Hydroseed disturbed areas	2,300	m2	$5.00	$ 11,500.00
Sub-Total					$ 208,620.00

Part E - Contingencies (10%)

	Description	Estimated Quantity		$/Unit	Total
1)	Contingency	1	l.s.	$ 54,400.00	$ 54,400.00
Sub-Total					$ 54,400.00

Summary of Estimated Construction Costs

Part A - Detention Facility	$ 201,700.00
Part B - Lake Range Drive	$ 133,560.00
Part C - Ravine Improvements	$ 208,620.00
Part E - Contingencies (10%)	$ 54,400.00
Total Estimated Construction Costs	**$ 598,280.00**

Schedule C

Assessment of Construction

Schedule C - Total Assessment For Construction
Bruce Beach Municipal Drain - Phase I

	Property Details					Drainage Act Instruments of Assessment				For Information		
	Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Benefit (Sec. 22)	Outlet Liability (Sec. 23)	Special Assessment (Sec. 26)	Total Assessment	Less Gov't Grant	Less Allowances	Net Estimated Expense
*	94	BBR	C. Woolford	8-109		$1,946			$1,946			$1,946
*	94-2	BBR	H. Moore	8-237-01	0.18	$8,184			$8,184			$8,184
*	95	BBR	R. Wright	8-110		$1,980			$1,980			$1,980
*	95-2	BBR	A. Pollock	8-109-01		$6,024			$6,024			$6,024
*	96	BBR	M. Clark	8-111		$1,993			$1,993			$1,993
*		BBR	M. Clark	8-111-01		$6,024			$6,024			$6,024
*	97	BBR	T. Clark	8-112		$15,242			$15,242			$15,242
*	98	BBR	S. Gancevich	8-113		$24,242			$24,242			$24,242
*		BBR	Huron-Kinloss	8-254		$356			$356			$356
*		BBR	Huron-Kinloss	8-261		$356			$356			$356
*	330	Highland	S. Billing	8-265.20		$22			$22			$22
*	332	Highland	S. Billing	8-265-02		$22			$22			$22
*	726	LRD	G. Pollock	8-236	1.25	$75,000	$533		$75,533		$12,160	$63,373
	Pt. 42	CLR	Brucelea Poultry Farms Ltd.	8-240	8.50	$27,000	$36,111		$63,111	$21,037	$20,010	$22,064
*	Pt. 42	CLR	T. Devos	8-240-01	0.46		$2,135		$2,135			$2,135
	Pt. 43	CLR	P. Schlegel	8-253	9.37	$75,100	$38,949		$114,049	$38,016	$46,250	$29,783
*	Pt. 43	CLR	A. Pollock	8-253-02	0.70		$2,975		$2,975		$970	$2,005
	44	CLR	P. Schlegel	8-263	10.68		$43,798		$43,798	$14,599		$29,199
	Pt. 45 & 46	CLR	P. Schlegel	8-265	17.46		$60,426		$60,426	$20,142		$40,284
	Pt. 46 & 47	CLR	P. Schlegel	8-284	21.04		$47,770		$47,770	$15,923		$31,847
	48	CLR	McLarty Farms Ltd.	8-330	8.98		$19,070		$19,070	$6,357		$12,713
Total Assessment on above Lands						**$243,491**	**$251,767**		**$495,258**	**$116,074**	**$79,390**	**$299,794**
	Bruce Beach Road		Township of Huron Kinloss		0.34	$124,400			$124,400			$124,400
	Lake Range Drive		Township of Huron Kinloss		4.35	$104,400	$52,189	$170,440	$327,029			$327,029
Total Assessment on above Roads						**$228,800**	**$52,189**	**$170,440**	**$451,429**			**$451,429**

Schedule C - Total Assessment For Construction
Bruce Beach Municipal Drain - Phase I

		Property Details					Drainage Act Instruments of Assessment				For Information		
		Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Benefit (Sec. 22)	Outlet Liability (Sec. 23)	Special Assessment (Sec. 26)	Total Assessment	Less Gov't Grant	Less Allowances	Net Estimated Expense
West of Bruce Beach Road (Green Group)	*	298	Con. 8	D. Willoughby	8-098		$330			$330			$330
	*	-	Con. 8	D. Willoughby	8-098-01		$33			$33			$33
	*	-	Con. 8	D. Willoughby	8-098-02		$33			$33			$33
	*	85	Martyn Lane	D. Post	8-099		$516			$516			$516
	*	-	Martyn Lane	D. Post	8-099-01		$52			$52			$52
	*	86	Martyn Lane	S. Harper	8-100		$600			$600			$600
	*	-	Martyn Lane	S. Harper	8-102-02		$60			$60			$60
	*	87	Martyn Lane	T. Alton	8-101		$679			$679			$679
	*	88	Martyn Lane	M. Beveridge	8-102		$728			$728			$728
	*	89	Martyn Lane	R. Outerbridge	8-103		$794			$794			$794
	*	88-2	BBR	L. Benham	8-101-01		$545			$545			$545
	*	89	BBR	B. Pollock	8-102-01		$596			$596			$596
	*	90	BBR	E. Myrick	8-104		$839			$839			$839
	*	90-2	BBR	T. Gardner	8-103-01		$630			$630			$630
	*	-	BBR	E. Myrick	8-105-01		$84			$84			$84
	*	91	BBR	B. Maclennan	8-105		$885			$885			$885
	*	92	BBR	J. Jeffreys	8-106		$909			$909			$909
	*	93	BBR	G. Ingham	8-107		$925			$925			$925
	*	93-2	BBR	H. Moore	8-108		$693			$693			$693
	*	93-3	BBR	J. Paynter	8-108-02		$693			$693			$693
	*	94 to 98	BBR	Not included in Green Group									
	*	99	BBR	L. Farrell	8-114		$993			$993			$993
	*	100	BBR	B. Clark	8-115		$960			$960			$960
	*	-	BBR	B. Clark	8-115-01		$96			$96			$96
	*	101	BBR	R. Mac Gregor	8-116		$954			$954			$954
	*	102	BBR	A. Moffatt	8-117		$948			$948			$948
	*	103	BBR	M. Mac Gregor	8-118		$935			$935			$935
	*	104	BBR	L. Newson	8-119		$931			$931			$931
	*	105	BBR	P. Holton	8-120		$917			$917			$917
	*	106	BBR	M. Bennett	8-121		$914			$914			$914

Schedule C - Total Assessment For Construction
Bruce Beach Municipal Drain - Phase I

		Property Details					Drainage Act Instruments of Assessment				For Information		
		Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Benefit (Sec. 22)	Outlet Liability (Sec. 23)	Special Assessment (Sec. 26)	Total Assessment	Less Gov't Grant	Less Allowances	Net Estimated Expense
West of Bruce Beach Road (Green Group)	*	106-2	BBR	B. Ekblad	8-121-01		$685			$685			$685
	*	107	BBR	J. Roche	8-122		$899			$899			$899
	*	108	BBR	N. Gabriele	8-123		$897			$897			$897
	*	108-2	BBR	A. Barnard	8-123-01		$672			$672			$672
	*	109	BBR	A. Cunningham	8-124		$897			$897			$897
	*	110	BBR	T. Jeffries	8-125		$872			$872			$872
	*	111	BBR	V. Brisbin	8-126		$864			$864			$864
	*	111-2	BBR	J. Brisbin	8-126-01		$648			$648			$648
	*	112	BBR	R. Macdonald	8-127		$830			$830			$830
	*	112-2	BBR	R. Macdonald	8-127-01		$622			$622			$622
	*	113	BBR	S. Maccuaig	8-128		$835			$835			$835
	*	114	BBR	D. Ceolin	8-129		$820			$820			$820
	*	-	BBR	D. Ceolin	8-129-01		$82			$82			$82
	*	115	BBR	D. Ceolin	8-130		$798			$798			$798
	*	116	BBR	A. Hepburn	8-131		$781			$781			$781
	*	117	BBR	J. Tovell	8-132		$762			$762			$762
	*	-	BBR	W. Sargant	8-132-01		$77			$77			$77
	*	118	BBR	W. Sargant	8-133		$763			$763			$763
	*	119	BBR	J. Gauch	8-134		$719			$719			$719
	*	120	BBR	D. Clark	8-135		$709			$709			$709
	*	121	BBR	J. Mccarter	8-136		$700			$700			$700
	*	122	BBR	B. Mcpherson	8-137		$683			$683			$683
	*	-	BBR	Cameron Grove Cottagers	8-137-01		$72			$72			$72
	*	123	BBR	B. Mclaughlin	8-138		$647			$647			$647
	*	124	BBR	L. Currie	8-139		$614			$614			$614
	*	125	BBR	E. Stewart	8-140		$589			$589			$589
	*	126	BBR	H. Currie	8-141		$555			$555			$555
	*	127	BBR	W. Cunningham	8-142		$543			$543			$543
	*	128	BBR	V. Scholfield	8-143		$491			$491			$491
	*	129	BBR	S. Langille	8-144		$465			$465			$465
	*	130	BBR	R. Lane	8-145		$445			$445			$445
	*	131	BBR	B. McCuaig	8-146		$403			$403			$403

Schedule C - Total Assessment For Construction
Bruce Beach Municipal Drain - Phase I

Green Group

	Property Details					Drainage Act Instruments of Assessment				For Information		
	Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Benefit (Sec. 22)	Outlet Liability (Sec. 23)	Special Assessment (Sec. 26)	Total Assessment	Less Gov't Grant	Less Allowances	Net Estimated Expense
*	132	BBR	R. Wyatt	8-147		$363			$363			$363
*	133	BBR	E. Mac Dougall	8-148		$320			$320			$320
*	134	BBR	R. Roth	8-149		$267			$267			$267
*	135	BBR	J. Lalonde	8-150		$206			$206			$206
*	136	BBR	J. Brezina	8-151		$113			$113			$113
*	Right-of-Ways		Township of Huron-Kinloss			$4,047			$4,047			$4,047

Yellow Group

East of Bruce Beach Road with Frontage onto Bruce Beach Road (Yellow Group)

	Property Details					Drainage Act Instruments of Assessment				For Information		
	Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Benefit (Sec. 22)	Outlet Liability (Sec. 23)	Special Assessment (Sec. 26)	Total Assessment	Less Gov't Grant	Less Allowances	Net Estimated Expense
*	84	BBR	M. Riekenbrauck	8-236-01	0.36	$337			$337			$337
*	86	BBR	D. Edwards	8-236-02	0.35	$443			$443			$443
*	88	BBR	G. Halar	8-236-03	0.20	$519			$519			$519
*	90-3	BBR	R. Black	8-236-04	0.20	$578			$578			$578
*	92-2	BBR	L. Fischer	8-237	0.18	$618			$618			$618

Orange Group

West of Lake Range Drive with Frontage onto Lake Range Drive (Orange Group)

	Property Details					Drainage Act Instruments of Assessment				For Information		
	Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Benefit (Sec. 22)	Outlet Liability (Sec. 23)	Special Assessment (Sec. 26)	Total Assessment	Less Gov't Grant	Less Allowances	Net Estimated Expense
*	702	LRD	M. Finos	8-238	0.11	$218			$218			$218
*	704	LRD	M. Finos	8-238-01	0.13	$253			$253			$253
*	706	LRD	A. Mcewen	8-239	0.18	$286			$286			$286
*	710	LRD	T. Brown	8-236-10	0.48	$335			$335			$335
*	712	LRD	P. Mcdonald	8-236-14	0.33	$354			$354			$354
*	714	LRD	C. Botden	8-236-18	0.31	$383			$383			$383
*	716	LRD	K. Botden	8-236-22	0.36	$389	$171		$560			$560
*	718	LRD	G. Johannes	8-236-26	0.40	$399	$362		$761			$761
*	720	LRD	J. Carbone	8-236-30	0.39	$413	$294		$707			$707

Schedule C - Total Assessment For Construction
Bruce Beach Municipal Drain - Phase I

		Property Details				Drainage Act Instruments of Assessment				For Information		
		Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Benefit (Sec. 22)	Outlet Liability (Sec. 23)	Special Assessment (Sec. 26)	Total Assessment	Less Gov't Grant	Less Allowances	Net Estimated Expense
Orange Group	*	722	LRD	J. Elliot	8-236-34	0.34	$419	$561		$980			$980
	*	724	LRD	J. Elliot	8-236-38	0.23	$420	$978		$1,398			$1,398
	*	726	LRD	Not included in Orange Group									
	*	728	LRD	N. Morris	8-253-01	0.32	$420	$1,367		$1,787			$1,787
	*	730	LRD	D. Bell	8-254-09	0.12	$385	$499		$884			$884
	*	732	LRD	P. Smith	8-254-08	0.12	$379	$513		$892			$892
	*	734	LRD	A. Pollock	8-254-07	0.10	$378	$431		$809			$809
	*	736	LRD	L. Casciano	8-254-06	0.11	$367	$465		$832			$832
	*	738	LRD	M. Walden	8-254-03	0.13	$364	$568		$932			$932
	*	740	LRD	D. Dahmer	8-262-07	0.12	$350	$499		$849			$849
	*	742	LRD	G. Mcdonald	8-262-06	0.11	$346	$444		$790			$790
	*	744	LRD	K. Meldrum	8-262-05	0.09	$329	$397		$726			$726
	*	746	LRD	M. Sapiro	8-262-04	0.09	$322	$376		$698			$698
	*	748	LRD	W. Landeck	8-262-03	0.09	$303	$397		$700			$700
	*	750	LRD	G. Rutledge	8-262-02	0.10	$299	$410		$709			$709
	*	752	LRD	D. Jewett	8-262-01	0.10	$288	$410		$698			$698
	*	754	LRD	J. Morton	8-264	0.11	$273	$479		$752			$752
	*	756	LRD	M. Henkenhaf	8-264-03	0.11	$249	$444		$693			$693
	*	758	LRD	M. Henkenhaf	8-264-02	0.07	$234	$294		$528			$528
	*	760	LRD	F. Wiggermann	8-264-01	0.03	$208	$123		$331			$331
	*	762	LRD	A. Bick	8-265-01	0.06	$187	$273		$460			$460
	*	764	LRD	B. Moore	8-265-03	0.08	$170	$328		$498			$498
	*	766	LRD	G. Wilhelm	8-265-04	0.06	$151	$239		$390			$390
	*	768	LRD	R. Cuadra	8-265-05	0.05	$135	$205		$340			$340
	*	770	LRD	E. Bushell	8-265-06	0.04	$87	$171		$258			$258
Total Assessments in Coloured Groups							**$56,615**	**$11,698**		**$68,313**			**$68,313**
Total Assessment on Lands and Roads Bruce Beach Municipal Drain - Phase I							**$528,906**	**$315,654**	**$170,440**	**$1,015,000**	**$116,074**	**$79,390**	**$819,536**

NOTES:

1. * Denotes lands not eligible for ADIP grants.
2. The NET ESTIMATED EXPENSE is the total estimated assessment less a one-third (1/3) Provincial grant, and allowances, if applicable.
3. The NET ESTIMATED EXPENSE is provided for information purposes only.

Schedule D

Assessment for Maintenance

Schedule D - Assessment For Maintenance
Ravine - Sta. 0+161 to Sta. 0+354

	Property Details					
	Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Portion of Maintenance
*	726	LRD	G. Pollock	8-236	1.25	0.38%
	Pt. 42	CLR	Brucelea Poultry Farms Ltd.	8-240	8.50	10.14%
*	Pt. 42	CLR	T. Devos	8-240-01	0.46	0.68%
	Pt. 43	CLR	P. Schlegel	8-253	9.37	10.93%
*	Pt. 43	CLR	A. Pollock	8-253-02	0.70	0.84%
	44	CLR	P. Schlegel	8-263	10.68	12.29%
	Pt. 45 & 46	CLR	P. Schlegel	8-265	17.46	16.96%
	Pt. 46 & 47	CLR	P. Schlegel	8-284	21.04	13.41%
	48	CLR	McLarty Farms Ltd.	8-330	8.98	5.35%
	Total Assessment on above Lands					**70.98%**
	Lake Range Drive		Township of Huron Kinloss		4.35	20.76%
	Total Assessment on above Roads					**20.76%**

Orange Group

West of Lake Range Drive with Frontage onto Lake Range Drive (Orange Group)

	Property Details					
	Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Total Assessment
*	716	LRD	K. Botden	8-236-22	0.36	0.12%
*	718	LRD	G. Johannes	8-236-26	0.40	0.26%
*	720	LRD	J. Carbone	8-236-30	0.39	0.21%
*	722	LRD	J. Elliot	8-236-34	0.34	0.40%
*	724	LRD	J. Elliot	8-236-38	0.23	0.69%
*	726	LRD	Not included in Orange Group			
*	728	LRD	N. Morris	8-253-01	0.32	0.97%
*	730	LRD	D. Bell	8-254-09	0.12	0.35%
*	732	LRD	P. Smith	8-254-08	0.12	0.36%
*	734	LRD	A. Pollock	8-254-07	0.10	0.30%
*	736	LRD	L. Casciano	8-254-06	0.11	0.33%
*	738	LRD	M. Walden	8-254-03	0.13	0.40%
*	740	LRD	D. Dahmer	8-262-07	0.12	0.35%
*	742	LRD	G. Mcdonald	8-262-06	0.11	0.31%
*	744	LRD	K. Meldrum	8-262-05	0.09	0.28%
*	746	LRD	M. Sapiro	8-262-04	0.09	0.27%

Schedule D - Assessment For Maintenance
Ravine - Sta. 0+161 to Sta. 0+354

	Property Details					
	Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Portion of Maintenance
Orange Group	* 748	LRD	W. Landeck	8-262-03	0.09	0.28%
	* 750	LRD	G. Rutledge	8-262-02	0.10	0.29%
	* 752	LRD	D. Jewett	8-262-01	0.10	0.29%
	* 754	LRD	J. Morton	8-264	0.11	0.34%
	* 756	LRD	M. Henkenhaf	8-264-03	0.11	0.31%
	* 758	LRD	M. Henkenhaf	8-264-02	0.07	0.21%
	* 760	LRD	F. Wiggermann	8-264-01	0.03	0.09%
	* 762	LRD	A. Bick	8-265-01	0.06	0.19%
	* 764	LRD	B. Moore	8-265-03	0.08	0.23%
	* 766	LRD	G. Wilhelm	8-265-04	0.06	0.17%
	* 768	LRD	R. Cuadra	8-265-05	0.05	0.14%
	* 770	LRD	E. Bushell	8-265-06	0.04	0.12%
	Total Assessments in Coloured Groups					**8.26%**
	Total Assessment on Lands and Roads Ravine - Sta. 0+161 to Sta. 0+354					**100.00%**

NOTES:

1. * Denotes lands not eligible for ADIP grants.

Schedule D - Assessment For Maintenance
Detention Facility

	Property Details					
	Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Proportion of Maintenance
*	94	BBR	C. Woolford	8-109		0.55%
*	94-2	BBR	H. Moore	8-237-01	0.18	0.55%
*	95	BBR	R. Wright	8-110		0.56%
*	95-2	BBR	A. Pollock	8-109-01		0.55%
*	96	BBR	M. Clark	8-111		0.56%
*		BBR	M. Clark	8-111-01		0.56%
*	97	BBR	T. Clark	8-112		0.59%
*	98	BBR	S. Gancevich	8-113		0.59%
*		BBR	Huron-Kinloss	8-254		0.11%
*		BBR	Huron-Kinloss	8-261		0.11%
*	330	Highland	S. Billing	8-265.20		0.01%
*	332	Highland	S. Billing	8-265-02		0.01%
*	726	LRD	G. Pollock	8-236	1.25	1.61%
	Pt. 42	CLR	Brucelea Poultry Farms Ltd.	8-240	8.50	6.99%
*	Pt. 42	CLR	T. Devos	8-240-01	0.46	0.38%
	Pt. 43	CLR	P. Schlegel	8-253	9.37	7.54%
*	Pt. 43	CLR	A. Pollock	8-253-02	0.70	0.58%
	44	CLR	P. Schlegel	8-263	10.68	8.48%
	Pt. 45 & 46	CLR	P. Schlegel	8-265	17.46	11.69%
	Pt. 46 & 47	CLR	P. Schlegel	8-284	21.04	9.24%
	48	CLR	McLarty Farms Ltd.	8-330	8.98	3.69%
	Total Assessment on above Lands					**54.95%**
	Bruce Beach Road		Township of Huron Kinloss		0.34	24.86%
	Lake Range Drive		Township of Huron Kinloss		4.35	7.36%
	Total Assessment on above Roads					**32.22%**

Green Group

West of Bruce Beach Road (Green Group)

	Property Details					
	Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Proportion of Maintenance
*	298	Con. 8	D. Willoughby	8-098		0.08%
*	-	Con. 8	D. Willoughby	8-098-01		0.01%
*	-	Con. 8	D. Willoughby	8-098-02		0.01%

Schedule D - Assessment For Maintenance
Detention Facility

		Property Details					
		Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Proportion of Maintenance
Green Group	*	85	Martyn Lane	D. Post	8-099		0.13%
	*	-	Martyn Lane	D. Post	8-099-01		0.01%
	*	86	Martyn Lane	S. Harper	8-100		0.15%
	*	-	Martyn Lane	S. Harper	8-102-02		0.01%
	*	87	Martyn Lane	T. Alton	8-101		0.17%
	*	88	Martyn Lane	M. Beveridge	8-102		0.18%
	*	89	Martyn Lane	R. Outerbridge	8-103		0.19%
	*	88-2	BBR	L. Benham	8-101-01		0.13%
	*	89	BBR	B. Pollock	8-102-01		0.14%
	*	90	BBR	E. Myrick	8-104		0.20%
	*	90-2	BBR	T. Gardner	8-103-01		0.15%
	*	-	BBR	E. Myrick	8-105-01		0.02%
	*	91	BBR	B. Maclennan	8-105		0.22%
	*	92	BBR	J. Jeffreys	8-106		0.22%
	*	93	BBR	G. Ingham	8-107		0.22%
	*	93-2	BBR	H. Moore	8-108		0.17%
	*	93-3	BBR	J. Paynter	8-108-02		0.17%
	*	94 to 98	BBR	Not included in Green Group			
	*	99	BBR	L. Farrell	8-114		0.24%
	*	100	BBR	B. Clark	8-115		0.23%
	*	-	BBR	B. Clark	8-115-01		0.02%
	*	101	BBR	R. Mac Gregor	8-116		0.23%
	*	102	BBR	A. Moffatt	8-117		0.23%
	*	103	BBR	M. Mac Gregor	8-118		0.23%
	*	104	BBR	L. Newson	8-119		0.23%
	*	105	BBR	P. Holton	8-120		0.22%
	*	106	BBR	M. Bennett	8-121		0.22%
	*	106-2	BBR	B. Ekblad	8-121-01		0.17%
	*	107	BBR	J. Roche	8-122		0.22%
	*	108	BBR	N. Gabriele	8-123		0.22%
	*	108-2	BBR	A. Barnard	8-123-01		0.16%
	*	109	BBR	A. Cunningham	8-124		0.22%
	*	110	BBR	T. Jeffries	8-125		0.21%
	*	111	BBR	V. Brisbin	8-126		0.21%
	*	111-2	BBR	J. Brisbin	8-126-01		0.16%

Schedule D - Assessment For Maintenance
Detention Facility

		Property Details					
		Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Proportion of Maintenance
Green Group	*	112	BBR	R. Macdonald	8-127		0.20%
	*	112-2	BBR	R. Macdonald	8-127-01		0.15%
	*	113	BBR	S. Maccuaig	8-128		0.20%
	*	114	BBR	D. Ceolin	8-129		0.20%
	*	-	BBR	D. Ceolin	8-129-01		0.02%
	*	115	BBR	D. Ceolin	8-130		0.19%
	*	116	BBR	A. Hepburn	8-131		0.19%
	*	117	BBR	J. Tovell	8-132		0.19%
	*	-	BBR	W. Sargant	8-132-01		0.02%
	*	118	BBR	W. Sargant	8-133		0.19%
	*	119	BBR	J. Gauch	8-134		0.17%
	*	120	BBR	D. Clark	8-135		0.17%
	*	121	BBR	J. Mccarter	8-136		0.17%
	*	122	BBR	B. Mcpherson	8-137		0.17%
	*	-	BBR	Cameron Grove Cottagers	8-137-01		0.02%
	*	123	BBR	B. Mclaughlin	8-138		0.16%
	*	124	BBR	L. Currie	8-139		0.15%
	*	125	BBR	E. Stewart	8-140		0.14%
	*	126	BBR	H. Currie	8-141		0.13%
	*	127	BBR	W. Cunningham	8-142		0.13%
	*	128	BBR	V. Scholfield	8-143		0.12%
	*	129	BBR	S. Langille	8-144		0.11%
	*	130	BBR	R. Lane	8-145		0.11%
	*	131	BBR	B. McCuaig	8-146		0.10%
	*	132	BBR	R. Wyatt	8-147		0.09%
	*	133	BBR	E. Mac Dougall	8-148		0.08%
	*	134	BBR	R. Roth	8-149		0.06%
	*	135	BBR	J. Lalonde	8-150		0.05%
	*	136	BBR	J. Brezina	8-151		0.03%
	*	Right-of-Ways		Township of Huron-Kinloss			0.91%

Schedule D - Assessment For Maintenance
Detention Facility

Yellow Group

East of Bruce Beach Road with Frontage onto Bruce Beach Road (Yellow Group)

	Property Details					
	Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Total Assessment
*	84	BBR	M. Riekenbrauck	8-236-01	0.36	0.08%
*	86	BBR	D. Edwards	8-236-02	0.35	0.10%
*	88	BBR	G. Halar	8-236-03	0.20	0.12%
*	90-3	BBR	R. Black	8-236-04	0.20	0.13%
*	92-2	BBR	L. Fischer	8-237	0.18	0.14%

Orange Group

West of Lake Range Drive with Frontage onto Lake Range Drive (Orange Group)

	Property Details					
	Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Total Assessment
*	702	LRD	M. Finos	8-238	0.11	0.04%
*	704	LRD	M. Finos	8-238-01	0.13	0.04%
*	706	LRD	A. Mcewen	8-239	0.18	0.05%
*	710	LRD	T. Brown	8-236-10	0.48	0.05%
*	712	LRD	P. Mcdonald	8-236-14	0.33	0.06%
*	714	LRD	C. Botden	8-236-18	0.31	0.06%
*	716	LRD	K. Botden	8-236-22	0.36	0.06%
*	718	LRD	G. Johannes	8-236-26	0.40	0.07%
*	720	LRD	J. Carbone	8-236-30	0.39	0.07%
*	722	LRD	J. Elliot	8-236-34	0.34	0.07%
*	724	LRD	J. Elliot	8-236-38	0.23	0.07%
*	726	LRD	Not included in Orange Group			
*	728	LRD	N. Morris	8-253-01	0.32	0.07%
*	730	LRD	D. Bell	8-254-09	0.12	0.06%
*	732	LRD	P. Smith	8-254-08	0.12	0.06%
*	734	LRD	A. Pollock	8-254-07	0.10	0.06%
*	736	LRD	L. Casciano	8-254-06	0.11	0.06%
*	738	LRD	M. Walden	8-254-03	0.13	0.06%
*	740	LRD	D. Dahmer	8-262-07	0.12	0.06%
*	742	LRD	G. Mcdonald	8-262-06	0.11	0.06%
*	744	LRD	K. Meldrum	8-262-05	0.09	0.05%
*	746	LRD	M. Sapiro	8-262-04	0.09	0.05%
*	748	LRD	W. Landeck	8-262-03	0.09	0.05%
*	750	LRD	G. Rutledge	8-262-02	0.10	0.05%

Schedule D - Assessment For Maintenance
Detention Facility

		Property Details					
		Lot or Street No.	Con. or Road	Landowner	Roll No.	Approx. Hectares Affected	Total Assessment
Orange Group	*	752	LRD	D. Jewett	8-262-01	0.10	0.05%
	*	754	LRD	J. Morton	8-264	0.11	0.04%
	*	756	LRD	M. Henkenhaf	8-264-03	0.11	0.04%
	*	758	LRD	M. Henkenhaf	8-264-02	0.07	0.04%
	*	760	LRD	F. Wiggermann	8-264-01	0.03	0.03%
	*	762	LRD	A. Bick	8-265-01	0.06	0.03%
	*	764	LRD	B. Moore	8-265-03	0.08	0.03%
	*	766	LRD	G. Wilhelm	8-265-04	0.06	0.02%
	*	768	LRD	R. Cuadra	8-265-05	0.05	0.02%
	*	770	LRD	E. Bushell	8-265-06	0.04	0.01%
		Total Assessments in Coloured Groups					**12.83%**
		Total Assessment on Lands and Roads Detention Facility					**100.00%**

NOTES: 1. * Denotes lands not eligible for ADIP grants.

Specifications for the Construction of Municipal Drainage Works

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

DIVISION A

General Conditions

CONTENTS

A.1. SCOPE....1
A.2. TENDERS....1
A.3. EXAMINATIONS OF SITE, DRAWINGS, AND SPECIFICATIONS....1
A.4. PAYMENT....2
A.5. CONTRACTOR'S LIABILITY INSURANCE....2
A.6. LOSSES DUE TO ACTS OF NATURE, ETC.....2
A.7. COMMENCEMENT AND COMPLETION OF WORK....2
A.8. WORKING AREA AND ACCESS....3
A.9. SUB-CONTRACTORS....3
A.10. PERMITS, NOTICES, LAWS AND RULES....3
A.11. RAILWAYS, HIGHWAYS, AND UTILITIES....3
A.12. ERRORS AND UNUSUAL CONDITIONS....3
A.13. ALTERATIONS AND ADDITIONS....3
A.14. SUPERVISION....4
A.15. FIELD MEETINGS....4
A.16. PERIODIC AND FINAL INSPECTIONS....4
A.17. ACCEPTANCE BY THE MUNICIPALITY....4
A.18. WARRANTY....4
A.19. TERMINATION OF CONTRACT BY THE MUNICIPALITY....4
A.20. TESTS....5
A.21. POLLUTION....5
A.22. SPECIES AND RISK....5
A.23. ROAD CROSSINGS....5
A.23.1. ROAD OCCUPANCY PERMIT....5
A.23.2. ROAD CLOSURE REQUEST AND CONSTRUCTION NOTIFICATION....6
A.23.3. TRAFFIC CONTROL....6
A.23.4. WEATHER....6
A.23.5. EQUIPMENT....6
A.24. LANEWAYS....6

A.25. FENCES 7
A.26. LIVESTOCK 7
A.27. STANDING CROPS 7
A.28. SURPLUS GRAVEL 7
A.29. IRON BARS 7
A.30. RIP-RAP 7
A.31. CLEARING, GRUBBING AND BRUSHING 7
A.32. RESTORATION OF LAWNS 8

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
- Dietrich Engineering Ltd.

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 B

Specifications for Open Drains

CONTENTS

B.1. ALIGNMENT 1
B.2. PROFILE 1
B.3. EXCAVATION 1
B.4. EXCAVATED MATERIAL 1
B.5. EXCAVATION AT EXISTING BRIDGE AND CULVERT SITES 2
B.6. PIPE CULVERTS 2
B.7. RIP-RAP PROTECTION FOR CULVERTS 2
B.8. CLEARING, GRUBBING AND MULCHING 2
B.9. TRIBUTARY TILE OUTLETS 3
B.10. SEEDING 3
B.11. HYDRO SEEDING 3
B.12. HAND SEEDING 3
B.13. COMPLETION 3

DIVISION B – SPECIFICATIONS FOR OPEN DRAINS

B.1. Alignment

The drain shall be constructed in a straight line and shall follow the course of the present drain or water run unless noted on the drawings. Where there are unnecessary bends or irregularities on the existing course of the drain, the Contractor shall contact the Engineer before commencing work to verify the manner in which such irregularities or bends may be removed from the drain. All curves shall be made with a minimum radius of fifteen (15) metres from the centre line of the drain.

B.2. Profile

The Profile Drawing shows the depth of cuts from the top of the bank to the final invert of the ditch in metres and decimals of a metre, and also the approximate depth of excavated material from the bottom of the existing ditch to the final invert of the ditch. These cuts are established for the convenience of the Contractor; however, bench marks (established along the course of the drain) will govern the final elevation of the drain. The location and elevation of the bench marks are given on the Profile Drawing. Accurate grade control must be maintained by the Contractor during ditch excavation.

B.3. Excavation

The bottom width and the side slopes of the ditch shall be those shown on the drawings. If the channel cross-section is not specified it shall be a one metre bottom width with 1.5(h):1(v) side slopes. At locations along the drain where the cross section dimensions change, there shall be a transitional length of not less than 10:1 (five metre length to 0.5 metre width differential). Where the width of the bottom of the existing ditch is sufficient to construct the design width, then construction shall proceed without disturbing the existing banks.

Where existing side slopes become unstable, the Contractor shall immediately notify the Engineer. Alternative methods of construction and/or methods of protection will then be determined prior to continuing work.

Where an existing drain is being relocated or where a new drain is being constructed, the Contractor shall strip the topsoil for the full width of the drain, including the location of the spoil pile. Upon completion of levelling, the topsoil shall be spread to an even depth across the full width of the spoil.

An approved hydraulic excavator shall be used to carry out the excavation of the open ditch unless otherwise directed by the Engineer.

B.4. Excavated Material

Excavated material shall be placed on the low side of the drain or opposite trees and fences. The Contractor shall contact all Landowners before proceeding with the work to verify the location to place and level the excavated material.

No excavated material shall be placed in tributary drains, depressions, or low areas which direct water behind the spoil bank. The excavated material shall be placed and levelled to a maximum depth of 200 mm, unless instructed otherwise and commence a minimum of one (1) metre from the top of the bank. The edge of the spoil bank away from the ditch shall be feathered down to the existing ground; the edge of the spoil bank nearest the ditch shall have a maximum slope of 2(h):1(v). The material shall be levelled such that it may be cultivated with ordinary farm equipment without causing undue

hardship to the farm machinery and farm personnel. No excavated material shall cover any logs, brush, etc. of any kind.

Any stones or boulders which exceed 300mm in diameter shall be removed and disposed of in a location specified by the Landowner.

Where it is necessary to straighten any unnecessary bends or irregularities in the alignment of the ditch or to relocate any portion or all of an existing ditch, the excavated material from the new cut shall be used for backfilling the original ditch. Regardless of the distance between the new ditch and the old ditch, no extra compensation will be allowed for this work and must be included in the Contractor's lump sum price for the open work.

B.5. Excavation at Existing Bridge and Culvert Sites

The Contractor shall excavate the drain to the full specified depth under all bridges and to the full width of the structure. Temporary bridges may be carefully removed and left on the bank of the drain but shall be replaced by the Contractor when the excavation is complete. Permanent bridges must, if at all possible, be left intact. All necessary care and precautions shall be taken to protect the structure. The Contractor shall notify the Landowner if excavation will expose the footings or otherwise compromise the structural integrity of the structure.

The Contractor shall clean through all pipe culverts to the grade and width specified on the profile.

B.6. Pipe Culverts

All pipe culverts shall be installed in accordance with the standard detail drawings. If couplers are required, five corrugation couplers shall be used for up to and including 1200mm diameter pipes and 10 corrugation couplers for greater than 1200mm diameter pipes.

When an existing crossing is being replaced, the Contractor may backfill the new culvert with the existing native material that is free of large rocks and stones. The Contractor is responsible for any damage to a culvert pipe that is a result of rocks or stones in the backfill.

B.7. Rip-Rap Protection For Culverts

Quarry stone rip-rap shall be used as end treatment for new culverts and placed on geotextile filter material (Mirafi 160N or approved equal). The rip-rap shall be adequately keyed in along the bottom of the slope, and shall extend to the top of the pipe or as directed on the drawings. The maximum slope for rip-rap shall be 1(h):1(v) or as directed by the Engineer.

The Contractor shall be responsible for any defects or damages that may develop in the rip-rap or the earth behind the rip-rap that the Engineer deems to have been fully or partially caused by faulty workmanship or materials.

B.8. Clearing, Grubbing and Mulching

Prior to excavation, all trees, scrub, fallen timber and debris shall be removed from the side slopes of the ditch and for such a distance on the working side so as to eliminate any interference with the construction of the drain or the spreading of the spoil. The side slopes shall be neatly cut and cleared flush with the slope whether or not they are affected directly by the excavation. With the exception of large stumps causing damage to the drain, the side slopes shall not be grubbed. All other cleared areas shall be grubbed and the stumps put into piles for disposal by the Landowner.

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 the excavation of the ditch, and shall not be completed simultaneously at the same location.

B.9. Tributary Tile Outlets

All tile outlets in existing ditches shall be marked by the Landowner prior to excavation. The Contractor shall guard against damaging the outlets of tributary drains. Any tile drain outlets that were marked or noted on the drawings and are subsequently damaged by the Contractor shall be repaired by the Contractor at his expense. The Landowner shall be responsible for repairs to damaged tile outlets that were not marked.

B.10. Seeding

The side slopes where disturbed shall be seeded using an approved grass seed mixture. The grass seed shall be applied the same day as the excavation of the open ditch.

Grass seed shall be fresh, clean and new crop seed, meeting the requirements of the MTO and composed of the following varieties mixed in the proportion by weight as follows:

- 55% Creeping Red Fescue
- 40% Perennial Rye Grass
- 5% White Clover

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

B.11. Hydro Seeding

The areas specified in the contract document shall be hydro seeded and mulched upon completion of construction in accordance with O.P.S.S. 572.

B.12. Hand Seeding

Placement of the seed shall be of means of an approved mechanical spreader.

B.13. Completion

At the time of completion and final inspection, all work in the Contract shall have the full dimensions and cross-sections specified without any allowance for caving of banks or sediment in the ditch bottom.

END OF DIVISION

Headway Engineering

DIVISION C

Specifications for Tile Drains

CONTENTS

C.1. PIPE MATERIALS 1
C.2. ALIGNMENT 1
C.3. PROFILE 1
C.4. EXCAVATION 2
C.5. INSTALLATION 2
C.6. TRENCH CROSSINGS 3
C.7. OUTLET PROTECTION 3
C.8. CATCH BASINS AND JUNCTION BOXES 3
C.9. TRIBUTARY DRAINS 4
C.10. CLEARING, GRUBBING AND MULCHING 5
C.11. ROADS AND LANEWAY SUB-SURFACE CROSSINGS 5
C.12. FILLING IN EXISTING DITCHES 5
C.13. CONSTRUCTION OF GRASSED WATERWAYS 5
C.14. UNSTABLE SOIL 5
C.15. ROCKS 5
C.16. BROKEN OR DAMAGED TILE 6
C.17. RECOMMENDED PRACTICE FOR CONSTRUCTION OF SUB-SURFACE DRAINAGE SYSTEMS 6

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

F.1. WORK INCLUDED 1
F.2. EXCAVATION 1
F.2.1. TRENCH EXCAVATION 1
F.2.2. ROCK EXCAVATION 1
F.2.3. BRACING AND SHORING 2
F.2.4. TEMPORARY BRIDGES 2
F.3. BACKFILLING 2
F.3.1. ROADWAY CROSSINGS 2
F.3.2. TRENCHES 2
F.3.3. MANHOLES AND OTHER STRUCTURES 2
F.3.4. MAINTENANCE 2
F.4. PIPE 2
F.5. JOINTS 3
F.5.1. TIGHT JOINTS 3
F.5.2. OPEN JOINTS 3
F.6. LAYING PIPE 3
F.6.1. WATER IN TRENCHES 3
F.6.2. LIMIT OF TRENCH OPENED 3
F.6.3. EXPOSED ENDS PROTECTED 3
F.6.4. PIPES KEPT CLEAN 3
F.7. CONNECTIONS 4
F.8. INSPECTION OF JOINTS 4
F.9. APPROVAL OF MATERIALS 4
F.10. MANHOLES AND CATCH BASINS 4
F.10.1. BENCHING OR CHANNELS 4
F.10.2. FRAMES AND COVERS 4
F.10.3. LOCATION 4
F.10.4. STEPS 4
F.10.5. CATCH BASINS 5

F.10.6. MANHOLES 5
F.10.7. CATCH BASIN LEADS 5
F.10.8. BACKFILL 5
F.11. PRIVATE SERVICE CONNECTIONS 5
F.11.1. MATERIALS 5
F.11.2. CONSTRUCTION 5
F.11.3. LOCATION OF P.D.C. 5
F.11.4. MARKER STAKES 5
F.12. MAINTENANCE OF TRAFFIC 6
F.13. EXISTING SERVICES 6
F.14. RESTORATION 6
F.15. ROADSIDE DITCHES 6

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

Bruce Beach Municipal Drain

CONTENTS

1.0 GENERAL 1
2.0 UTILITIES 1
3.0 WORKING AREA AND ACCESS 2
4.0 CLEARING BRUSHING AND MULCHING 2
5.0 PIPE OUTLET STRUCTURE 2
6.0 TOPSOIL 2
7.0 RIP-RAP 3
8.0 SOILS & EXCAVATIONS 3
9.0 PIPE INSTALLATION 4
10.0 CATCH BASINS & MANHOLES 4
11.0 DETENTION FACILITY OUTLET STRUCTURE 5
12.0 EMERGENCY OVERFLOW SPILLWAY 6
13.0 FINAL GRADING & SEEDING 6
14.0 LAKE RANGE DRIVE CROSSING 6

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 any standard or supplemental specification.

1.0 GENERAL

The Contractor shall organize and hold a preconstruction meeting with the Engineer and the Drainage Superintendent prior to the start of construction. The Contractors shall notify and invite all Landowners and all applicable road authorities on whose property where works are proposed.

The Contractor shall notify the Landowners, the Township Drainage Superintendent (Mr. Grant Collins) and the Engineer one week prior to construction.

The Engineer shall lay out the location of the proposed drainage system through the ravine and the detention facility. The Contractor shall provide the Engineer with sufficient notice.

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 shall be responsible for notifying all applicable emergency services, schools, and the public of any road closures, detours or construction taking place unless otherwise stated by the Township of Huron-Kinloss.

The Contractor must maintain access to all driveways as well as maintain access for all emergency vehicles at all times during construction.

The Contractor shall be responsible to arrange all traffic detours, 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 Huron-Kinloss and the Ministry of Transportation for specified local procedures, guidelines and timelines. Traffic control shall meet the standards of Book 7 of the Ontario Traffic Manual.

The Contractor should make their own independent interpretation of the subsurface information as it may affect their proposed construction means and methods, equipment selection, scheduling, pricing and the like.

All objects or obstructions within the construction working area such as signs, mailboxes, fences, property ornamentals, etc., that interfere with the installation of the drain shall be removed and re-erected in the same location or another location satisfactory to the Landowner. Any damages to such objects by the Contractor shall be repaired, replaced, installed and paid for by the Contractor at the discretion of the Engineer.

The Contractor shall be responsible for all settlement.

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.

The Contractor shall contact the Engineer if the Contractor discovers a conflict or discrepancy between the design as detailed on the attached set of plans and the utility locates.

3.0 WORKING AREA AND ACCESS

Access to the working area for the ravine and for the construction of the detention facility shall be using Bruce Beach Road and Lake Range Drive.

The working area for the construction of the detention facility shall be as shown in the attached set of drawings.

The working area for the ravine work from Sta. 0+161 (Bruce Beach Road East Road Limit) to Sta. 0+354 shall be an average width of 20 metres.

The Contractor shall be responsible for all damages and the costs to repair damaged areas outside the working areas.

4.0 CLEARING BRUSHING AND MULCHING

The Contractor shall clear, brush and mulch/chip/stump trees from within the working area that interferes with the construction of the drainage systems. 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 construction of the detention facility, unless the Engineer has authorized the full clearing of the trees.

An approved mulching attachment for a hydraulic excavator of wood chipper shall be used. Clearing and grubbing, mulching shall be done prior to the construction of the drain and excavation of the detention facility.

All trees, limbs and brush less than 150mm in diameter shall be mulched/chipped. Trees greater than 150mm in diameter shall be cut into lengths of no greater than four (4) metres and neatly placed into nearby piles designated by the Landowners.

All fallen trees and dead wood must be cleared from within the working areas and disposed of off-site.

5.0 PIPE OUTLET STRUCTURE

The Contractor shall place quarry stone rip rap protection 150mm to 300mm in diameter placed 450mm deep and placed one metre up the side slopes of the ditch and around the new outlet pipe at Sta. 0+164. The rip-rap shall be placed on an approved geotextile filter material (Mirafi 160N of approved equivalent).

6.0 TOPSOIL

The Contractor shall strip all available topsoil from within the areas of the working corridor that are expected to be disturbed during construction and stockpile it on-site.

The Contractor shall later spread the topsoil over the disturbed areas of the ravine to a minimum depth of 100mm and over the detention facility to a minimum depth of 200mm.

The average depth of topsoil within the working area for the detention facility is approximately 250mm. If the average depth of topsoil is greater than 250mm, the Contractor shall be responsible for the stripping of the entire depth of topsoil from within the working area and shall be paid the contract price for any excess stripping.

Under no circumstances will the Contractor attempt to place frozen topsoil over the backfilled ravine or the detention facility.

All excess topsoil shall be stockpiled on-site at a nearby location designated by the landowner at the time of construction.

7.0 RIP-RAP

All stone rip-rap material used at the pipe outlet around catch basins shall be quarry stone 150 mm to 300 mm dia. and placed to a depth of 450 mm.

All stone rip-rap material used for the construction of swales and rock chutes shall be quarry stone 100 mm to 200 mm dia. and placed to a depth of 300 mm.

All rip-rap material shall be placed on geo-textile filter material (Mirafi 180N).

8.0 SOILS & EXCAVATIONS

The Contractor shall conduct all excavations in accordance with Ontario Regulation 213/91 of the Occupational Health and Safety Act.

Excavations conducted at the bottom of the ravine and toe of the side slopes should be the minimum required to prepare the area for fill placement.

During excavation of materials in the ravine, the Contractor shall immediately contact the Engineer if any indications if possible slope failures are observed, including but not limited to, soil tension cracks, leaning or falling trees, slumping of soil along adjacent side slopes.

All approved fill material shall be at suitable moisture contents at the time of placement and compaction to achieve the necessary density for the specified compaction limits. If wet or saturated soils are encountered, the Contractor shall allow for sufficient drying of the soils to achieve the desired levels of compaction. The Contractor may be required to work the soils in order to facilitate the drying process.

Soils approved for use as fill and berm construction must be placed in loose lifts not exceeding 300mm in depth for granular soils and 200mm in depth for clay soils.

Any fill placed, including bulk subgrade fill and pipe backfill must be “benched” into the existing ravine side slopes.

Any soft, organic or unstable soils encountered during all excavations must be sub-excavated and replaced with suitable approved fill material approved by the Engineer. All unsuitable excavated material must be hauled off-site by the Contractor.

Approved materials supporting structures such as catch basins and manholes as well as fill for the reconstruction of Lake Range Drive shall be compacted to 100% Standard Proctor Maximum Dry Density (SPMDD).

Approved materials used as backfill and for berm construction shall be compacted to at least 95% SPMDD.

All granular materials used as backfill shall be compacted using an approved heavy vibratory smooth drum roller.

All clay materials used as backfill and for berm construction shall be compacted using an approved heavy pad-foot type vibratory compactor.

9.0 PIPE INSTALLATION

After stripping the topsoil, but prior to the installation of the 600mm dia. H.D.P.E. pipe in the ravine, the Contractor shall fill the ravine to Grade Line 1 (approximately) using suitable excess excavated material from the excavation of the Detention Facility (see "Typical Ravine Cross Section" on Drawing No. 8).

After the Contractor has filled the ravine to Grade Line 1, they may commence the installation of the 600mm dia. H.D.P.E. pipe according to the specifications below.

The Contractor may elect to fill the entire ravine to Grade Line 1 prior to commencing the installation of the pipe drainage system or may choose to install the tile drainage system as they incrementally fill the ravine to Grade Line 1. The Contractor shall notify the Engineer of their intended sequence of construction activities prior to the installation of the H.D.P.E. pipe.

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

The Contractor shall be responsible for all trench settlement.

9.1 High Density Polyethylene Pipe (H.D.P.E.)

All H.D.P.E. pipe shall be CSA B182.8-02/320 KPa with water tight joining systems.

All H.D.P.E. pipe shall be installed using 19mm (3/4") crushed stone bedding (or approved equivalent) from 150mm below the pipe to 150mm above the pipe and 300mm on both sides of the pipe. Bedding material shall be wrapped in geotextile filter material. Suitable native material or excess excavated material from the detention facility shall be used as backfill from 150mm above the pipe to the underside of the topsoil.

10.0 CATCH BASINS & MANHOLES

All catch basins shall be precast concrete catch basins (Coldstream Concrete Ltd. or approved equal).

All catch basins to have 300mm sumps.

The catch basin grate elevations shall be set to the satisfaction of the Engineer.

All catch basin grates shall be fastened to the new catch basins.

All catch basins shall be hot dipped galvanized bird cage grates as per Coldstream Concrete Ltd. (or approved equal).

Knockouts shall be provided in all catch basins.

All catch basins shall be installed using 19mm (3/4") crushed stone bedding from 150mm below the structure to 300mm above the top of the highest pipe entering or exiting the structure.

Structures within the road allowances shall have 300mm minimum M.T.O. Granular 'A' backfill around all sides 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 so as to minimize settlement around the structures.

The Contractor shall place quarry stone rip-rap material around all sides of the catch basins for a minimum width of one metre and shall be placed on an approved geo-textile filter material.

All manholes to be O.P.S.D. compliant with 1200mm diameter taper cones (as per O.P.S.D. 701.03) where applicable.

All manholes to come with hollow aluminum steps as per O.P.S.D. 405.010.

All manholes to have closed cast iron grate covers (as per O.P.S.D. 401.010-A).

All manholes to be benched.

Lifts (modulocs) shall be placed by the Contractor on all catch basins or manholes if necessary to achieve the desired elevation when field setting the structures.

All catch basins and manholes to be fitted with approved rubber boots to provide a sealed watertight connection between the pipes and manhole structure.

All holes for manhole 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.

11.0 DETENTION FACILITY OUTLET STRUCTURE

The Contractor shall supply and install a 2400mm dia. fully perforated galvanized C.S.P. riser as an outlet structure for the detention facility. The outlet structure shall have 50mm dia. perforations with minimum row and horizontal spacing as per manufacturers recommendations to maintain structural integrity of the riser. The first row of holes shall be at elevation 204.70.

The lid for the outlet structure shall be a galvanized steel, half-grated lid with a hinged, lockable access door. The lid shall be fastened to outlet structure.

The outlet structure shall have an access ladder mounted to the inside of the structure as per O.P.S.D. 406.020. The access ladder shall be placed on the same side as, and above, the pipe outlet. The grate for the outlet structure shall be placed so the hinged access door is on the same side as the access ladder.

The bottom of the 2400mm dia. outlet structure shall be filled with a low strength concrete mix (approximately 15 MPa min.) placed to a depth of 300mm.

The Contractor shall embed the outlet structure in 150mm of low strength concrete poured over a 200mm compacted granular based pad.

The Contractor shall place a 100mm to 200mm dia. quarry stone rip-rap jacket two metres wide around the outlet structure. The rip-rap shall be placed to an elevation equal to the top row of perforations.

The Contractor shall supply and place an H.D.P.E. pipe end cap over the 525mm H.D.P.E. pipe at Sta. 0+427. The end cap shall have a 350mm dia. orifice opening with an invert elevation of 203.00. The end cap shall be fastened to the 525mm H.D.P.E. pipe.

12.0 EMERGENCY OVERFLOW SPILLWAY

The Contractor shall construct an emergency overflow spillway at the south-west corner of the detention facility. The spillway shall be lined with a CC35 Cable Concrete matting (IECS or an approved equivalent) with stainless steel cable installed according to the manufacturer's installation instructions using all recommended equipment and accessories. The Contractor shall fill the voids between the concrete blocks with topsoil and apply an approved hydroseed mixture.

13.0 FINAL GRADING & SEEDING

The Contractor shall fine grading of the detention facility and ravine prior to seeding.

The Contractor shall supply and spread an approved lawn seed mixture over all berms and disturbed areas of the detention facility except in the bottom of facility, and within the road allowance of Lake Range Drive by means of hydroseed and mulch using the seed manufacturers application recommendations.

The Contractor shall supply and spread an approved native seed mixture over all disturbed areas of the ravine by means of hydroseed with bonded fibre matrix mulch using the seed manufacturers application recommendations.

The Contractor shall apply the hydroseed as soon as possible after final grading of the ravine and detention facility to establish vegetation and minimize erosion.

The Contractor shall be responsible for regrading and reapplication of the hydroseed mixture for up to one year after the completion of construction in areas that have been significantly eroded or exhibit poor growth, as determined by the Engineer.

14.0 LAKE RANGE DRIVE CROSSING

The Contractor shall notify the Engineer and local road authority having jurisdiction over the road a minimum of forty-eight (48) hours prior to each of the scheduled crossings through the road.

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.

The guiderail on both sides of Lake Range Drive shall be removed and replaced by the Contractor.

The existing 1800mm dia., 50 metre length culvert, shall be removed and disposed of offsite by the Contractor.

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

Construction of the drain through the road shall occur during low flow or no flow conditions. If construction is not possible during low flow conditions, the Contractor shall implement a flow diversion scheme.

The 600mm dia. H.D.P.E. surface pipe and the 525mm dia. H.D.P.E. pipe shall be installed using using 19mm (3/4") crushed stone bedding (or approved equivalent) from 150mm below the pipe to 150mm above the pipe and 300mm on both sides of the pipe.

The new H.D.P.E. pipes shall have M.T.O. Granular 'B' backfill to 300mm below finished road grade. The Contractor shall place 250mm of M.T.O. Granular 'A from the top of the M.T.O. Granular 'B' layer to 50mm below finished asphalt.

The Contractor shall be responsible for all trench settlement and settlement around the catch basins.

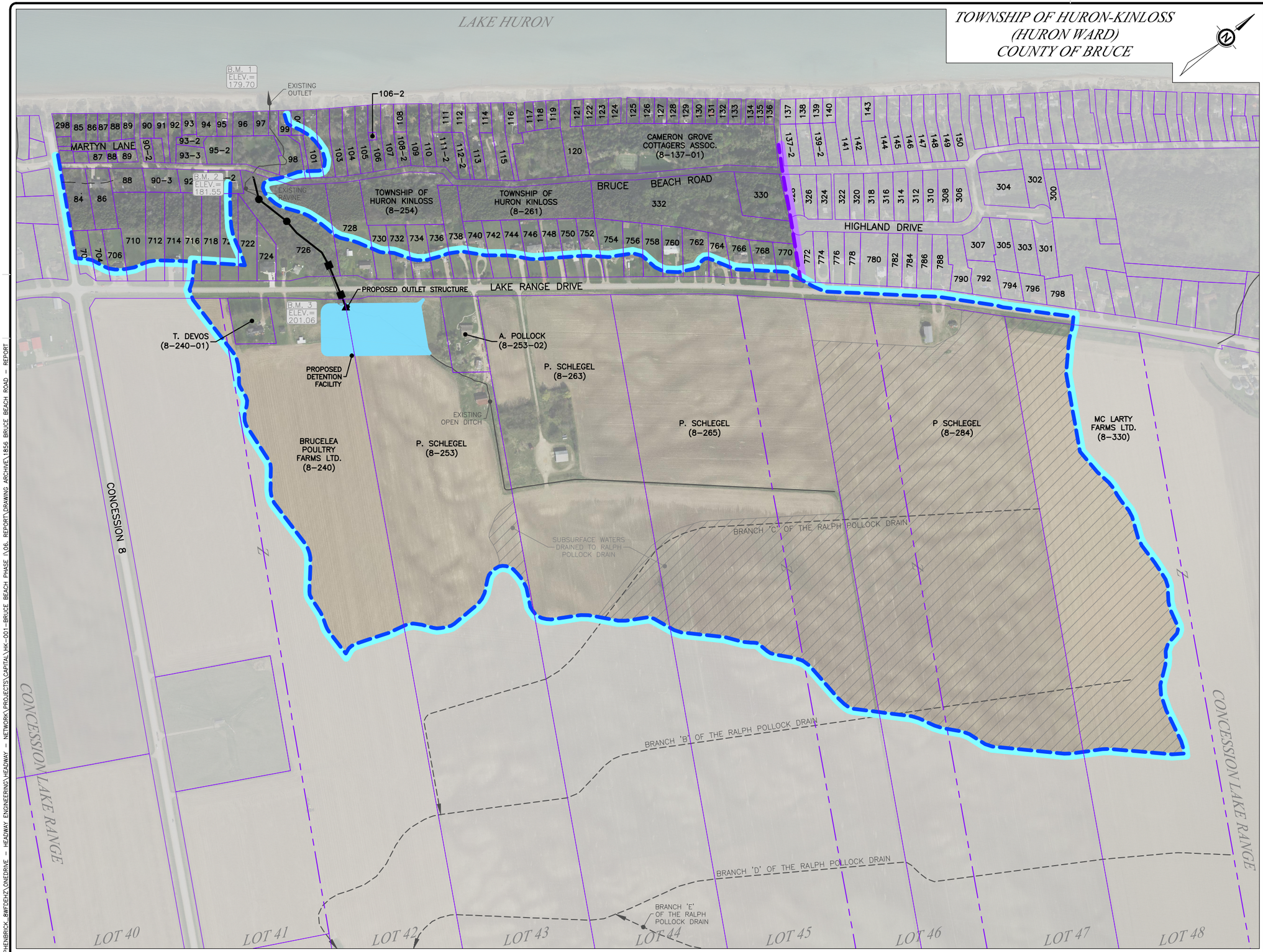
The asphalt shall be saw cut square with the road.

The Contractor shall place (1) 50mm lift of HL4 surface course. The Contractor shall restore the pavement surface to match the existing cross section of the road.

The Contractor shall install guard rail in the same location and extent as the existing guard rail.

The Contractor shall construct rip-rap lined swales from the road ditch on the west side of Lake Range Drive (one from the north side and one from the south side of the proposed crossing) to the ditch inlet catch basin at Sta. 0+376. The swales shall be lined with 100mm – 200mm dia. quarry stone rip-rap material placed 300mm deep on an approved geotextile filter fabric.

Any areas disturbed within the Municipal Right-of-Way during construction shall be top soiled and hydroseeded with an approved grass seed mixture.



PLAN SCALE

0 80 160 240 320m

NOTES:

BENCHMARK No. 1 ELEV.=179.70
NAIL IN NORTH FACE OF 600mm DIA. TREE 2 METRES NORTH OF STA. 0+039

BENCHMARK No. 2 ELEV.=181.55
TOP CENTRE UPSTREAM END OF 600mm DIA. H.D.P.E. SURFACE PIPE AT STA. 0+172

BENCHMARK No. 3 ELEV.=201.06
TOP CENTRE UPSTREAM END OF 1800mm DIA. C.S.P. SURFACE PIPE 4m SOUTH OF STA. 0+436

LEGEND:

- DRAIN NAME — EXISTING MUNICIPAL DRAIN
- EXISTING WATERCOURSE
- INTERIOR/EXTERIOR WATERSHED BOUNDARY
- PROPERTY BOUNDARY
- LOT OR CONCESSION BOUNDARY
- DRAIN NAME — MUNICIPAL DRAIN (AREA OF WORK)
- WATERSHED BOUNDARY
- PROPOSED OUTLET STRUCTURE
- PROPOSED MANHOLE
- PROPOSED CATCHBASIN
- BENCHMARK LOCATION — B.M. 1 ELEV.= 50.00 — BENCHMARK No. / BENCHMARK ELEVATION

No.	ISSUES AND REVISIONS	DATE	BY
7.	REPORT SUBMISSION	2021-07-08	HW
6.	ISSUED FOR SVCA APPROVAL	2021-02-11	DEL
5.	ISSUED FOR GEOTECHNICAL REVIEW	2020-12-11	DEL
4.	PUBLIC INFORMATION MEETING	2019-11-30	DEL
3.	COUNCIL INFORMATION MEETING	2019-10-21	DEL
2.	PUBLIC OPEN HOUSE	2019-05-25	DEL

LICENCED PROFESSIONAL ENGINEERS — July 8, 2021 — STEPHEN R. BRICKMAN — 100150920 — PROVINCE OF ONTARIO

Huron-Kinloss

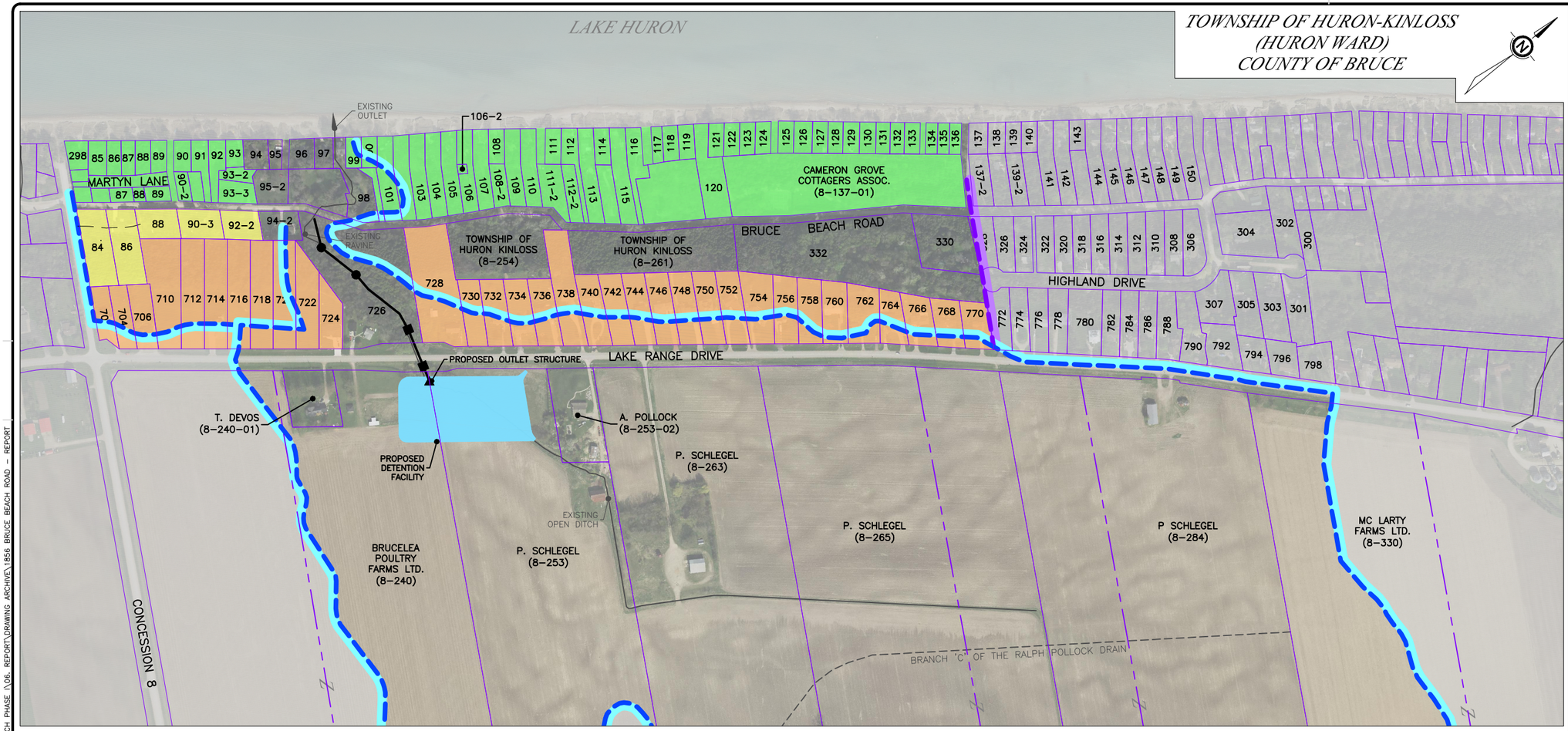
PROJECT: BRUCE BEACH MUNICIPAL DRAIN PHASE I

DRAWING: Watershed Plan

Headway Engineering

PROJ. MGR: S.B.	DESIGNED BY: M.T.	DRAWN BY: R.U.	CHECKED BY: S.B.
DRAWING SCALE: AS NOTED	DATE: JULY 8, 2021	PROJECT No. HK-001	DRAWING No. 1 of 8

C:\USERS\STEPHENBRICK_8WFDEH2\ONEDRIVE - HEADWAY ENGINEERING\HEADWAY - NETWORK\PROJECTS\CAPITAL\HK-001-BRUCE BEACH PHASE I\06. REPORT\DRAWING ARCHIVE\1856 BRUCE BEACH ROAD - REPORT



PLAN SCALE

0 80 160 240 320m

SCHEDULE OF OWNERSHIP

No.	NAME	ROLL No.
CONCESSION 8		
298	D. WILLOUGHBY	8-098
	D. WILLOUGHBY	8-098-01
	D. WILLOUGHBY	8-098-02
MARTYN LANE		
85	D. POST	8-099
	D. POST	8-099-01
86	S. HARPER	8-100
	S. HARPER	8-102-02
87	T. ALTON	8-101
88	M. BEVERIDGE	8-102
89	R. OUTERBRIDGE	8-103
BRUCE BEACH ROAD		
84	M. RIEKENBRAUCK	8-236-01
86	D. EDWARDS	8-236-02
87	S. HARPER	8-100-01
88	G. HALAR	8-236-03
88-2	L BENHAM	8-101-01
89	B. POLLOCK	8-102-01
90	E. MYRICK	8-104
90-2	T. GARDNER	8-103-01
90-3	R. BLACK	8-236-04
	E. MYRICK	8-105-01
91	B. MACLENNAN	8-105
92	J. JEFFREYS	8-106
92-2	L. FISHER	8-237
93	G. INGHAM	8-107
93-2	H. MOORE	8-108
93-3	J. PAYNTER	8-108-02
94	C. WOOLFORD	8-109
94-2	H. MOORE	8-237-01
95	R. WRIGHT	8-110
95-2	A. POLLOCK	8-109-01
96	M. CLARK	8-111
	M. CLARK	8-111-01
97	T. CLARK	8-112
98	S. GANCEVICH	8-113
99	L. FARELL	8-114
100	B. CLARK	8-115
	B. CLARK	8-115-01
101	R. MAC GREGOR	8-116
102	A. MOFFATT	8-117
103	M. MAC GREGOR	8-118
104	L. NEWSON	8-119
105	P. HOLTON	8-120
106	M. BENNETT	8-121
106-2	B. EKBLAD	8-121-01
107	J. ROCHE	8-122
108	N. GABRIELE	8-123
108-2	A. BARNARD	8-123-01
109	A. CUNNINGHAM	8-124
110	T. JEFFRIES	8-125
111	V. BRISBIN	8-126
111-2	J. BRISBIN	8-126-01
112	R. MACDONALD	8-127
112-2	R. MACDONALD	8-127-01
113	S. MACCUAIG	8-128
114	D. CEOLIN	8-129
	D. CEOLIN	8-129-01
115	D. CEOLIN	8-130
116	A. HEPBURN	8-131
117	J. TOVELL	8-132
	W. SARGANT	8-132-01
118	W. SARGANT	8-133
119	J. GAUCH	8-134
120	D. CLARK	8-135
121	J. MCCARTER	8-136
122	B. MCPHERSON	8-137
	CAMERON GROVE COTTAGERS	8-137-01
123	B. MCLAUGHLIN	8-138
124	L. CURRIE	8-139
125	E. STEWART	8-140
126	H. CURRIE	8-141
127	W. CUNNINGHAM	8-142
128	V. SCHOLFIELD	8-143
129	S. LANGILLE	8-144
130	R. LANE	8-145
131	B. McCUAIG	8-146
132	R. WYATT	8-147
133	E. MAC DOUGALL	8-148
134	R. ROTH	8-149
135	J. LALONDE	8-150
136	J. BREZINA	8-151
LAKE RANGE DRIVE		
702	M. FINOS	8-238
704	M. FINOS	8-238-01
706	A. MCEWEN	8-239
710	T. BROWN	8-236-10
712	P. MCDONALD	8-236-14
714	C. BOTDEN	8-236-18
716	K. BOTDEN	8-236-22
718	G. JOHANNES	8-236-26
720	J. CARBONE	8-236-30
722	J. ELLIOT	8-236-34
724	J. ELLIOT	8-236-38
726	G. POLLOCK	8-236
728	N. MORRIS	8-253-01
730	D. BELL	8-254-09
732	P. SMITH	8-254-08
734	A. POLLOCK	8-254-07
736	L. CASCIANO	8-254-06
738	M. WALDEN	8-254-03
740	D. DAHMER	8-262-07
742	G. MCDONALD	8-262-06
744	K. MELDRUM	8-262-05
746	M. SAPIRO	8-262-04
748	W. LANWECK	8-262-03
750	G. RUTLEDGE	8-262-02
752	D. JEWETT	8-262-01
754	J. MORTON	8-264
756	M. HENKENHAF	8-264-03
758	M. HENKENHAF	8-264-02
760	F. WIGGERMANN	8-264-01
762	A. BICK	8-265-01
764	B. MOORE	8-265-03
766	G. WILHELM	8-265-04
768	R. CUADRA	8-265-05
770	E. BUSHELL	8-265-06
HIGHLAND DRIVE		
330	S. BILLING	8-265-20
332	S. BILLING	8-265-02

NOTES:

LEGEND:

- DRAIN NAME — EXISTING MUNICIPAL DRAIN
- EXISTING WATERCOURSE
- INTERIOR/EXTERIOR WATERSHED BOUNDARY
- PROPERTY BOUNDARY
- LOT OR CONCESSION BOUNDARY
- DRAIN NAME — MUNICIPAL DRAIN (AREA OF WORK)
- WATERSHED BOUNDARY
- PROPOSED OUTLET STRUCTURE
- PROPOSED MANHOLE
- PROPOSED CATCHBASIN
- ASSESSED BLOCK A
- ASSESSED BLOCK B
- ASSESSED BLOCK C

No.	ISSUES AND REVISIONS	DATE	BY
7.	REPORT SUBMISSION	2021-07-08	HW
6.	ISSUED FOR SVCA APPROVAL	2021-02-11	DEL
5.	ISSUED FOR GEOTECHNICAL REVIEW	2020-12-11	DEL
4.	PUBLIC INFORMATION MEETING	2019-11-30	DEL
3.	COUNCIL INFORMATION MEETING	2019-10-21	DEL
2.	PUBLIC OPEN HOUSE	2019-05-25	DEL

LICENSED PROFESSIONAL ENGINEERS — July 8, 2021 — STEPHEN R. BRICKMAN — 100150920 — PROVINCE OF ONTARIO

Huron-Kinloss

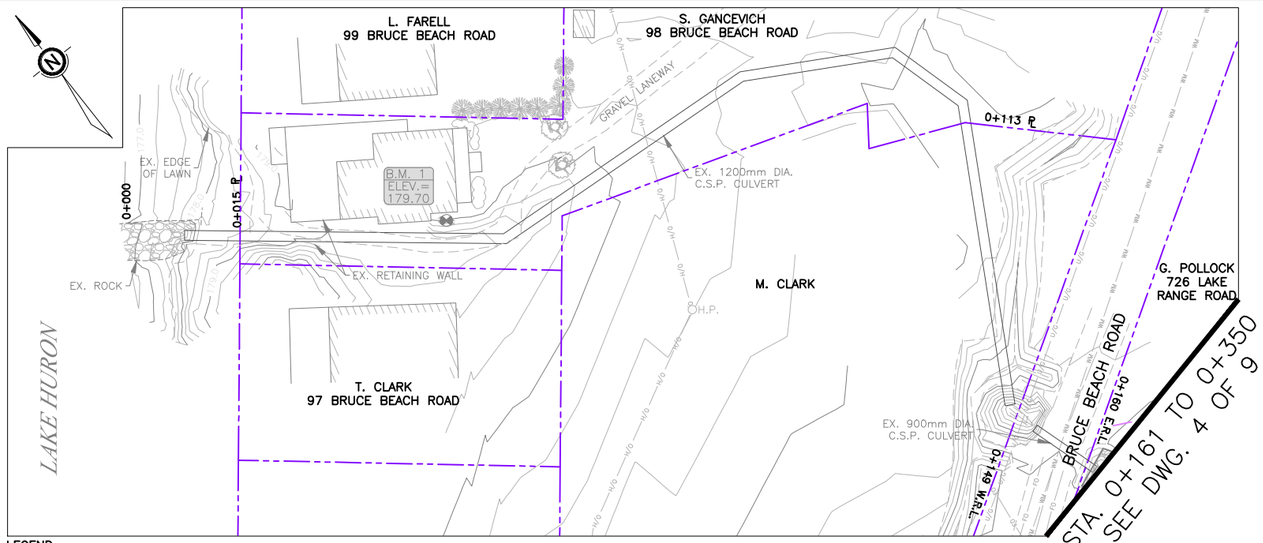
PROJECT: BRUCE BEACH MUNICIPAL DRAIN PHASE I

DRAWING: Ownership Plan

Headway Engineering

PROJ. MGR: S.B.	DESIGNED BY: M.T.	DRAWN BY: R.U.	CHECKED BY: S.B.
DRAWING SCALE: AS NOTED	DATE: JULY 8, 2021	PROJECT No. HK-001	DRAWING No. 2 of 8

C:\USERS\STEPHENBRICK_8WFDEH2\ONEDRIVE - HEADWAY ENGINEERING\HEADWAY - NETWORK\PROJECTS\CAPITAL\HK-001-BRUCE BEACH PHASE I\06. REPORT\DRAWING ARCHIVE\1856 BRUCE BEACH ROAD - REPORT



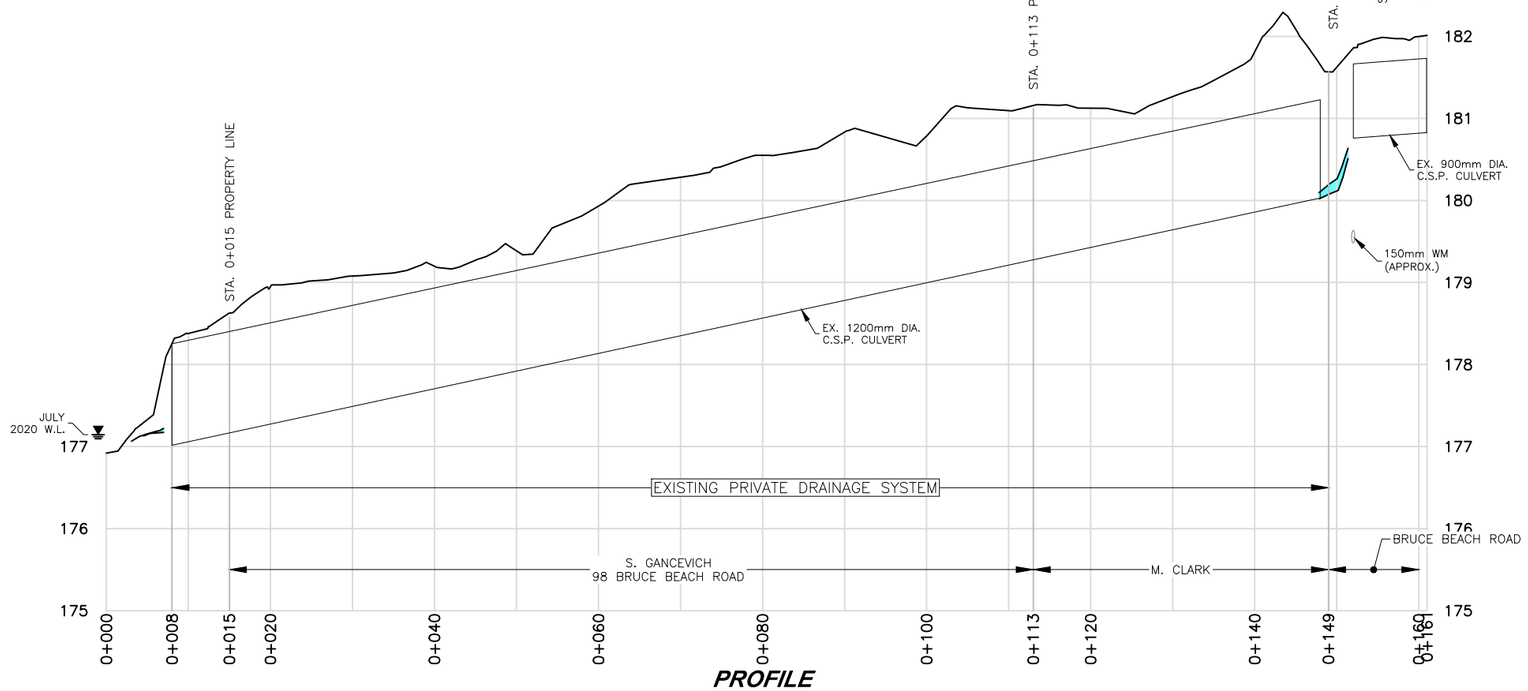
PLAN

PLAN SCALE

0 10 20 30 40m

LEGEND:

- PROPERTY BOUNDARY
- LOT OR CONCESSION BOUNDARY
- 190 EXISTING CONTOUR
- 200 PROPOSED CONTOUR
- WM EXISTING WATER MAIN
- TEL EXISTING TELEPHONE CABLE
- FO EXISTING FIBRE OPTIC
- U/G EXISTING TELEVISION CABLE
- O/H EXISTING OVERHEAD HYDRO
- OH.P. EXISTING TELEVISION CABLE
- LIMIT OF MAINTENANCE CORRIDOR
- BENCHMARK LOCATION — B.M. 1 ELEV.= 50.00 — BENCHMARK No. / BENCHMARK ELEVATION

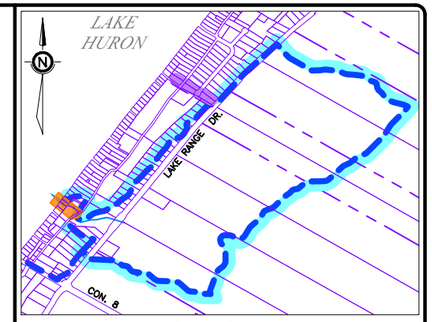


PROFILE

PROFILE SCALES

HORZ. 0 10 20 30 40m

VERT. 0 1 2 3 4m



KEY PLAN

N.T.S.

NOTES:

1. THE LOCATIONS AND ELEVATIONS OF ALL UTILITIES SHOWN ON THE DRAWINGS ARE APPROXIMATE. ACTUAL LOCATIONS AND ELEVATIONS OF ALL UTILITIES MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. ALL H.D.P.E. PIPE SHALL BE CSA B182.8–02/320 KPa WITH WATER TIGHT JOINING SYSTEMS.
3. 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 CONSTRUCTION OF THE DETENTION FACILITY.
4. EXCAVATIONS CONDUCTED AT THE BOTTOM OF THE RAVINE AND TOE OF THE SIDE SLOPES SHOULD BE THE MINIMUM REQUIRED TO PREPARE THE AREA FOR FILL PLACEMENT.
5. THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE ENGINEER IF ANY INDICATIONS OF POSSIBLE SLOPE FAILURES ARE OBSERVED, INCLUDING BUT NOT LIMITED TO, SOIL TENSION CRACKS, LEANING OR FALLING TREES, SLUMPING OF SOIL ALONG ADJACENT SIDE SLOPES.
6. SOILS APPROVED FOR USE AS FILL AND BERM CONSTRUCTION MUST BE PLACED IN LOOSE LIFTS NOT EXCEEDING 300mm IN DEPTH FOR GRANULAR SOILS AND 200mm IN DEPTH FOR CLAY SOILS.
7. ANY FILL PLACED, INCLUDING BULK SUBGRADE FILL AND PIPE BACKFILL, MUST BE "BENCHED" INTO THE EXISTING RAVINE SIDE SLOPES.
8. APPROVED MATERIALS USED AS BACKFILL AND FOR BERM CONSTRUCTION SHALL BE COMPACTED TO AT LEAST 95% STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).

BENCHMARK No. 1 ELEV.=179.70
NAIL IN NORTH FACE OF 600mm DIA. TREE 2 METRES NORTH OF STA. 0+039

BENCHMARK No. 2 ELEV.=181.55
TOP CENTRE UPSTREAM END OF 600mm DIA. H.D.P.E. SURFACE PIPE AT STA. 0+172

BENCHMARK No. 3 ELEV.=201.06
TOP CENTRE UPSTREAM END OF 1800mm DIA. C.S.P. SURFACE PIPE 4m SOUTH OF STA. 0+436

No.	ISSUES AND REVISIONS	DATE	BY
7.	REPORT SUBMISSION	2021–07–08	HW
6.	ISSUED FOR SVCA APPROVAL	2021–02–11	DEL
5.	ISSUED FOR GEOTECHNICAL REVIEW	2020–12–11	DEL
4.	PUBLIC INFORMATION MEETING	2019–11–30	DEL
3.	COUNCIL INFORMATION MEETING	2019–10–21	DEL
2.	PUBLIC OPEN HOUSE	2019–05–25	DEL

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

Huron-Kinloss

PROJECT: BRUCE BEACH MUNICIPAL DRAIN
PHASE I

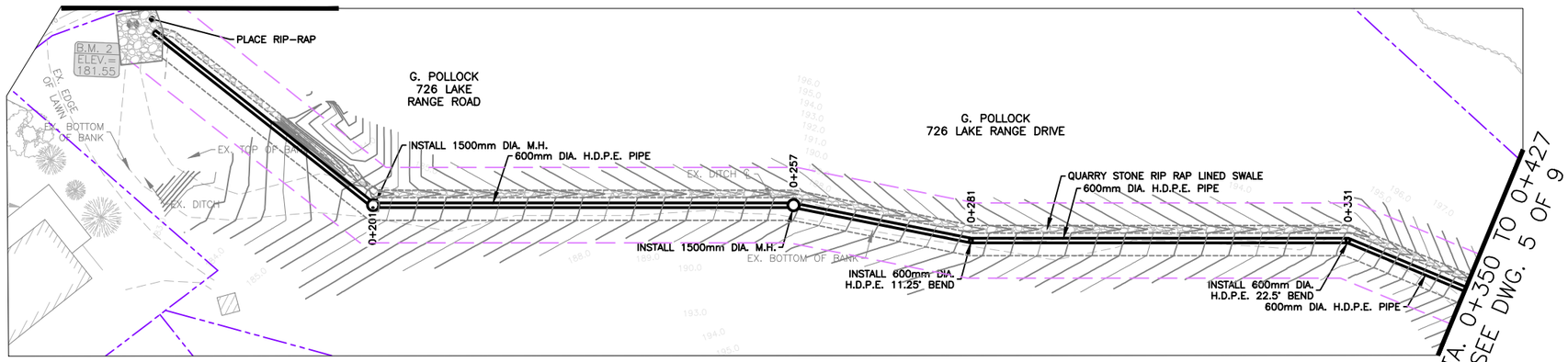
DRAWING: Main Drain Plan & Profile
Sta. 0+000 to Sta. 0+161

Headway Engineering

PROJ. MGR: S.B.	DESIGNED BY: M.T.	DRAWN BY: R.U.	CHECKED BY: S.B.
DRAWING SCALE: AS NOTED	DATE: JULY 8, 2021	PROJECT No. HK-001	DRAWING No. 3 of 8

C:\USERS\STEPHENBRICK_8WFDEHZ\ONEDRIVE - HEADWAY ENGINEERING\HEADWAY - NETWORK\PROJECTS\CAPITAL\HK-001-BRUCE BEACH PHASE I\06. REPORT\DRAWING ARCHIVE\1856 BRUCE BEACH ROAD - REPORT

STA. 0+000 TO 0+161
SEE DWG. 3 OF 9



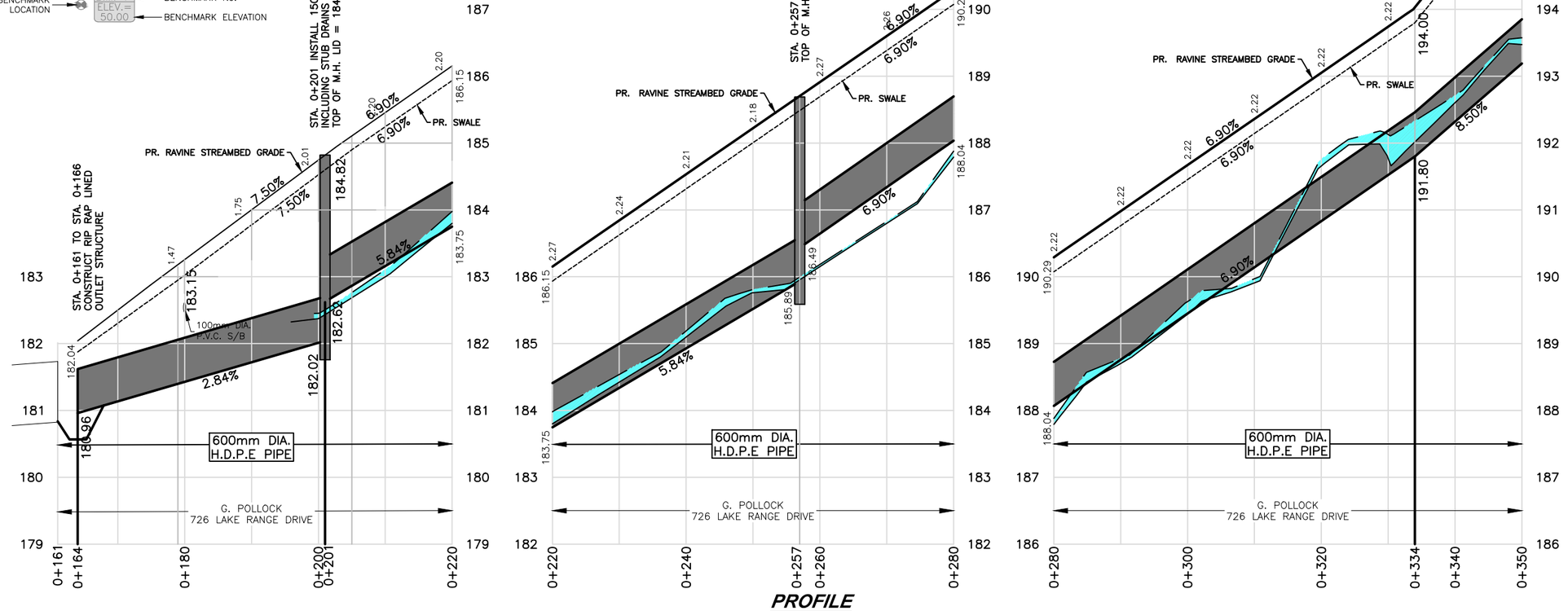
PLAN

PLAN SCALE
0 10 20 30 40m

LEGEND:

- PROPERTY BOUNDARY
- LOT OR CONCESSION BOUNDARY
- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXISTING WATER MAIN
- EXISTING TELEPHONE CABLE
- EXISTING FIBRE OPTIC
- EXISTING TELEVISION CABLE
- EXISTING OVERHEAD HYDRO
- EXISTING TELEVISION CABLE
- LIMIT OF MAINTENANCE CORRIDOR
- BENCHMARK No.
- BENCHMARK ELEVATION

BENCHMARK LOCATION — B.M. 1 ELEV.= 50.00

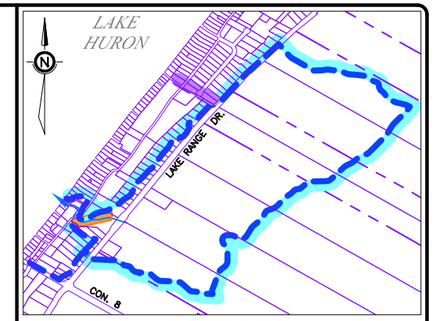


PROFILE

PROFILE SCALES
HORZ. 0 10 20 30 40m
VERT. 0 1 2 3 4m

SCHEDULE OF PIPE SIZES

No.	ITEM	SIZE (mm)	STATION	LENGTH (m)
1.	HIGH DENSITY POLYETHYLENE PIPE	600	0+164 – 0+350	186



KEY PLAN
N.T.S.

NOTES:

1. THE LOCATIONS AND ELEVATIONS OF ALL UTILITIES SHOWN ON THE DRAWINGS ARE APPROXIMATE. ACTUAL LOCATIONS AND ELEVATIONS OF ALL UTILITIES MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. ALL H.D.P.E. PIPE SHALL BE CSA B182.8–02/320 KPa WITH WATER TIGHT JOINING SYSTEMS.
3. 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 CONSTRUCTION OF THE DETENTION FACILITY.
4. EXCAVATIONS CONDUCTED AT THE BOTTOM OF THE RAVINE AND TOE OF THE SIDE SLOPES SHOULD BE THE MINIMUM REQUIRED TO PREPARE THE AREA FOR FILL PLACEMENT.
5. THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE ENGINEER IF ANY INDICATIONS OF POSSIBLE SLOPE FAILURES ARE OBSERVED, INCLUDING BUT NOT LIMITED TO, SOIL TENSION CRACKS, LEANING OR FALLING TREES, SLUMPING OF SOIL ALONG ADJACENT SIDE SLOPES.
6. SOILS APPROVED FOR USE AS FILL AND BERM CONSTRUCTION MUST BE PLACED IN LOOSE LIFTS NOT EXCEEDING 300mm IN DEPTH FOR GRANULAR SOILS AND 200mm IN DEPTH FOR CLAY SOILS.
7. ANY FILL PLACED, INCLUDING BULK SUBGRADE FILL AND PIPE BACKFILL, MUST BE "BENCHED" INTO THE EXISTING RAVINE SIDE SLOPES.
8. APPROVED MATERIALS USED AS BACKFILL AND FOR BERM CONSTRUCTION SHALL BE COMPACTED TO AT LEAST 95% STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).

BENCHMARK No. 1 ELEV.=179.70
NAIL IN NORTH FACE OF 600mm DIA. TREE 2 METRES NORTH OF STA. 0+039

BENCHMARK No. 2 ELEV.=181.55
TOP CENTRE UPSTREAM END OF 600mm DIA. H.D.P.E. SURFACE PIPE AT STA. 0+172

BENCHMARK No. 3 ELEV.=201.06
TOP CENTRE UPSTREAM END OF 1800mm DIA. C.S.P. SURFACE PIPE 4m SOUTH OF STA. 0+436

No.	ISSUES AND REVISIONS	DATE	BY
7.	REPORT SUBMISSION	2021–07–08	HW
6.	ISSUED FOR SVCA APPROVAL	2021–02–11	DEL
5.	ISSUED FOR GEOTECHNICAL REVIEW	2020–12–11	DEL
4.	PUBLIC INFORMATION MEETING	2019–11–30	DEL
3.	COUNCIL INFORMATION MEETING	2019–10–21	DEL
2.	PUBLIC OPEN HOUSE	2019–05–25	DEL

LICENSED PROFESSIONAL ENGINEER — STEPHEN R. BRICKMAN 100150920 — PROVINCE OF ONTARIO

Huron-Kinloss

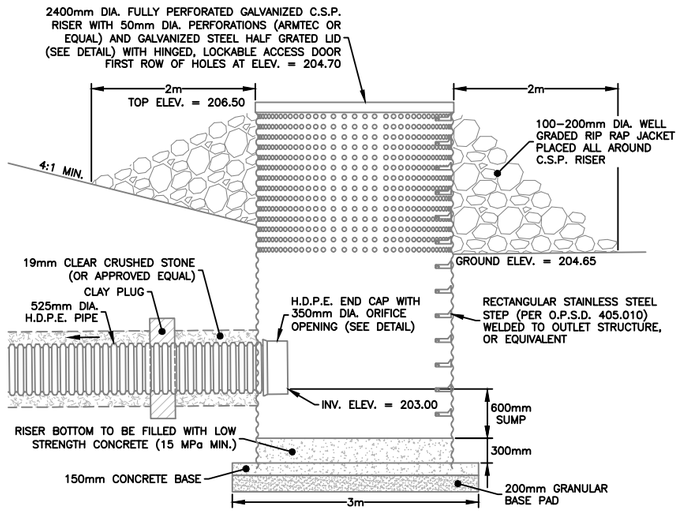
PROJECT: BRUCE BEACH MUNICIPAL DRAIN PHASE I

DRAWING: Main Drain Plan & Profile Sta. 0+161 to Sta. 0+350

Headway Engineering

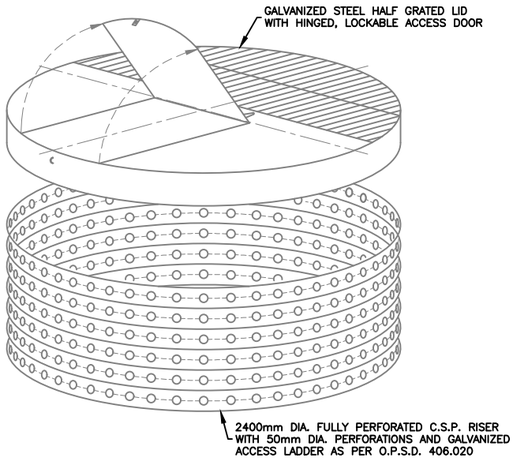
PROJ. MGR: S.B.	DESIGNED BY: M.T.	DRAWN BY: R.U.	CHECKED BY: S.B.
DRAWING SCALE: AS NOTED	DATE: JULY 8, 2021	PROJECT No. HK-001	DRAWING No. 4 of 8

C:\USERS\STEPHENBRICK_BWFDEHZ\ONEDRIVE - HEADWAY ENGINEERING\HEADWAY - NETWORK\PROJECTS\CAPITAL\HK-001-BRUCE BEACH PHASE I\06. REPORT\DRAWING ARCHIVE\1856 BRUCE BEACH ROAD - REPORT



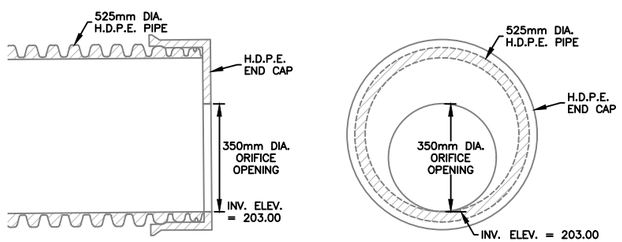
RISER PIPE OUTLET DETAIL

N.T.S.



RISER PIPE LID DETAIL

N.T.S.

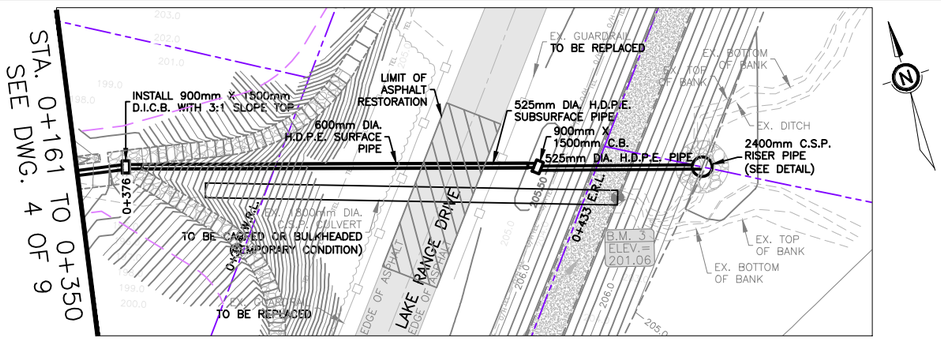


ORIFICE END CAP DETAIL

N.T.S.

SCHEDULE OF PIPE SIZES

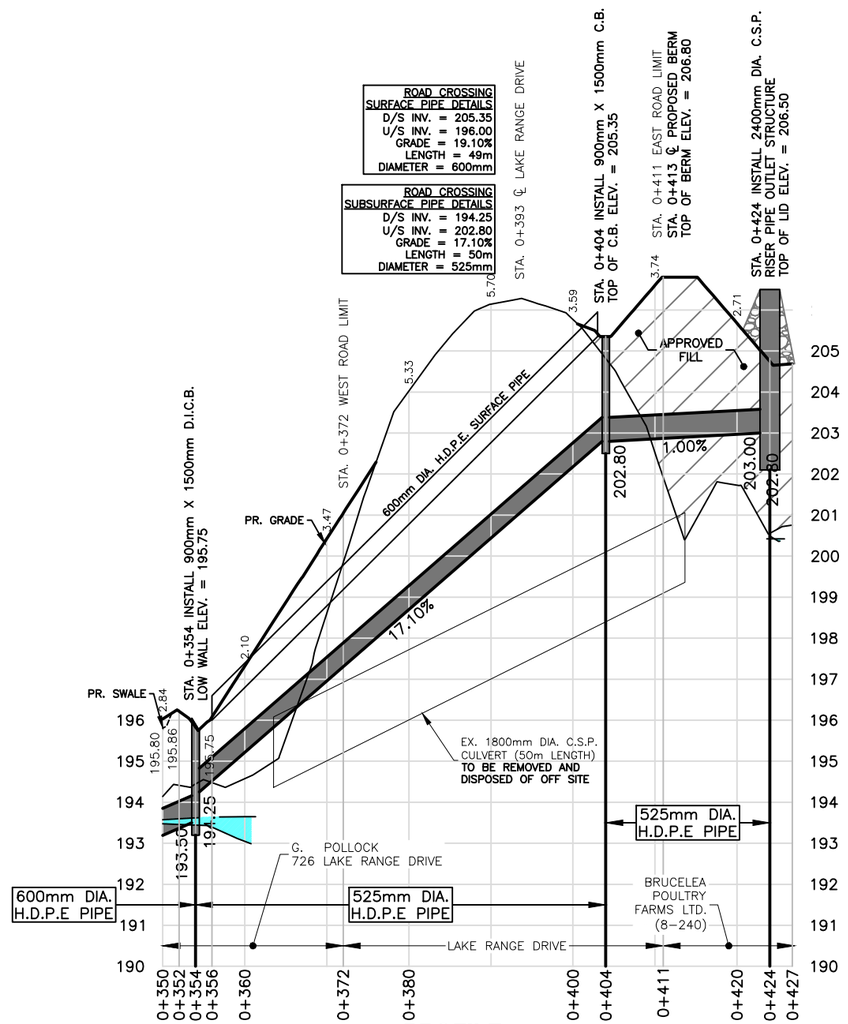
No.	ITEM	SIZE (mm)	STATION	LENGTH (m)
1.	HIGH DENSITY POLYETHYLENE PIPE	600	0+350 – 0+354	4
2.	HIGH DENSITY POLYETHYLENE PIPE	525	0+354 – 0+404	50
3.	HIGH DENSITY POLYETHYLENE PIPE	525	0+404 – 0+424	20



PLAN

PLAN SCALE

0 10 20 30 40m

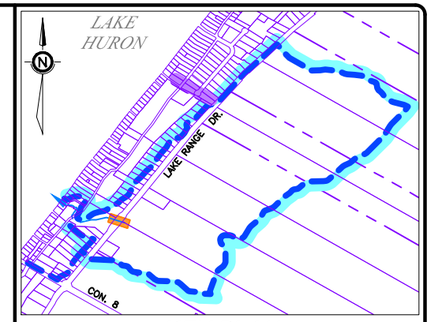


PROFILE

PROFILE SCALES

HORZ. 0 10 20 30 40m

VERT. 0 2 4 6 8m



KEY PLAN

N.T.S.

NOTES:

1. THE LOCATIONS AND ELEVATIONS OF ALL UTILITIES SHOWN ON THE DRAWINGS ARE APPROXIMATE. ACTUAL LOCATIONS AND ELEVATIONS OF ALL UTILITIES MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. ALL H.D.P.E. PIPE SHALL BE CSA B182.8–02/320 KPa WITH WATER TIGHT JOINING SYSTEMS.
3. 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 CONSTRUCTION OF THE DETENTION FACILITY.
4. SOILS APPROVED FOR USE AS FILL AND BERM CONSTRUCTION MUST BE PLACED IN LOOSE LIFTS NOT EXCEEDING 300mm IN DEPTH FOR GRANULAR SOILS AND 200mm IN DEPTH FOR CLAY SOILS.
5. APPROVED FILL FOR THE RECONSTRUCTION OF LAKE RANGE DRIVE SHALL BE COMPACTED TO AT LEAST 100% STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).

BENCHMARK No. 1 ELEV.=179.70
NAIL IN NORTH FACE OF 600mm DIA. TREE 2 METRES NORTH OF STA. 0+039

BENCHMARK No. 2 ELEV.=181.55
TOP CENTRE UPSTREAM END OF 600mm DIA. H.D.P.E. SURFACE PIPE AT STA. 0+172

BENCHMARK No. 3 ELEV.=201.06
TOP CENTRE UPSTREAM END OF 1800mm DIA. C.S.P. SURFACE PIPE 4m SOUTH OF STA. 0+436

LEGEND:

- PROPERTY BOUNDARY
- LOT OR CONCESSION BOUNDARY
- 199 EXISTING CONTOUR
- 200 PROPOSED CONTOUR
- WM EXISTING WATER MAIN
- TEL EXISTING TELEPHONE CABLE
- FO EXISTING FIBRE OPTIC
- U/G EXISTING TELEVISION CABLE
- O/H EXISTING OVERHEAD HYDRO
- O.H.P. EXISTING TELEVISION CABLE
- LIMIT OF MAINTENANCE CORRIDOR
- BENCHMARK LOCATION — B.M. 1 ELEV.= 50.00 — BENCHMARK No. / BENCHMARK ELEVATION

No.	ISSUES AND REVISIONS	DATE	BY
7.	REPORT SUBMISSION	2021–07–08	HW
6.	ISSUED FOR SVCA APPROVAL	2021–02–11	DEL
5.	ISSUED FOR GEOTECHNICAL REVIEW	2020–12–11	DEL
4.	PUBLIC INFORMATION MEETING	2019–11–30	DEL
3.	COUNCIL INFORMATION MEETING	2019–10–21	DEL
2.	PUBLIC OPEN HOUSE	2019–05–25	DEL

LICENSED PROFESSIONAL ENGINEER — July 8, 2021 — SCOTT R. BRICKMAN — 100150920 — PROVINCE OF ONTARIO

Huron-Kinloss

PROJECT: BRUCE BEACH MUNICIPAL DRAIN PHASE I

DRAWING: Main Drain Plan & Profile Sta. 0+350 to Sta. 0+427

Headway Engineering

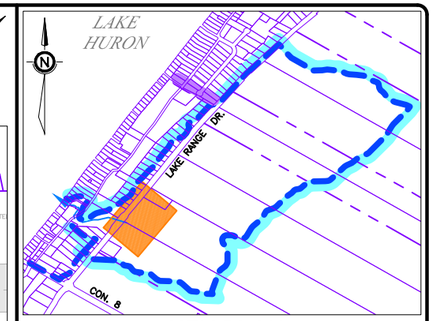
PROJ. MGR: S.B.	DESIGNED BY: M.T.	DRAWN BY: R.U.	CHECKED BY: S.B.
DRAWING SCALE: AS NOTED	DATE: JULY 8, 2021	PROJECT No. HK-001	DRAWING No. 5 of 8

C:\USERS\STEPHENBRICK_8WFDEH2\ONEDRIVE - HEADWAY ENGINEERING\HEADWAY - NETWORK\PROJECTS\CAPITAL\HK-001-BRUCE BEACH PHASE I\06. REPORT\DRAWING ARCHIVE\1856 BRUCE BEACH ROAD - REPORT

TOWNSHIP OF HURON-KINLOSS
(HURON WARD)
COUNTY OF BRUCE

EX. GUARD RAIL TO BE REPLACED
EX. 1800mm DIA. CULVERT TO BE REMOVED
EX. GUARD RAIL TO BE REPLACED
525mm H.D.P.E. SUBSURFACE PIPE
600mm H.D.P.E. SURFACE PIPE
LAKE RANGE DRIVE
EDGE OF ASPHALT
EDGE OF ASPHALT
EX. 450mm DIA. CULVERT TO BE REMOVED
PROPOSED ACCESS ROAD
900mm X 1500mm C.B.
525mm H.D.P.E. PIPE
TOP OF BERM = 206.80
4m
4:1
20:1
206.50
B.M. 3 ELEV.= 201.06
R2.5m
R2.5m
205.10
R10m
25m
204.65
2400mm DIA. C.S.P. RISER PIPE OUTLET (SEE DETAIL)
106m
EMERGENCY OVERFLOW SPILLWAY (SEE DETAIL) TO BE LINED WITH CC35 CABLE CONCRETE MATTING
R10m
205.25
RIP RAP ROCK CHUTE (SEE DETAIL)
EX. 100mm C.S.P. OUTLET INV.=203.33
EX. 200mm C.S.P. OUTLET INV.=203.59
EX. 100mm C.S.P. OUTLET INV.=203.58
PR. BOTTOM OF BANK
15:1
PR. BOTTOM OF BANK
73m
EX. TOP OF BANK
EX. TOP OF BANK
EX. EDGE OF FIELD
EX. BOTTOM OF BANK
EX. DITCH
4:1
144m
R10m
205.75
EX. 100mm AG. TUBE OUTLET INV.=205.85
EX. BOTTOM OF BANK
205.75
A. POLLOCK
(8-253-02)
40:1
15:1
15:1
206.75
RIP RAP ROCK CHUTE (SEE DETAIL)
LIMIT OF MAINTENANCE WORKING AREA
BRUCELEA POULTRY FARMS LTD. (8-240)
P. SCHLEGEL
(8-253)
LIMIT OF CONSTRUCTION (WORKING AREA)

PLAN SCALE
0 12 24 36 48m



KEY PLAN
N.T.S.

NOTES:

1. THE LOCATIONS AND ELEVATIONS OF ALL UTILITIES SHOWN ON THE DRAWINGS ARE APPROXIMATE. ACTUAL LOCATIONS AND ELEVATIONS OF ALL UTILITIES MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. ALL H.D.P.E. PIPE SHALL BE CSA B182.8-02/320 KPa WITH WATER TIGHT JOINING SYSTEMS.
3. 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 CONSTRUCTION OF THE DETENTION FACILITY.
4. SOILS APPROVED FOR USE AS FILL AND BERM CONSTRUCTION MUST BE PLACED IN LOOSE LIFTS NOT EXCEEDING 300mm IN DEPTH FOR GRANULAR SOILS AND 200mm IN DEPTH FOR CLAY SOILS.
5. APPROVED MATERIALS USED AS BACKFILL AND FOR BERM CONSTRUCTION SHALL BE COMPACTED TO AT LEAST 95% STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).

BENCHMARK No. 1 ELEV.=179.70
NAIL IN NORTH FACE OF 600mm DIA. TREE 2 METRES NORTH OF STA. 0+039

BENCHMARK No. 2 ELEV.=181.55
TOP CENTRE UPSTREAM END OF 600mm DIA. H.D.P.E. SURFACE PIPE AT STA. 0+172

BENCHMARK No. 3 ELEV.=201.06
TOP CENTRE UPSTREAM END OF 1800mm DIA. C.S.P. SURFACE PIPE 4m SOUTH OF STA. 0+436

LEGEND:

- PROPERTY BOUNDARY
- LOT OR CONCESSION BOUNDARY
- 190 EXISTING CONTOUR
- 200 PROPOSED CONTOUR
- TEL EXISTING TELEPHONE CABLE
- O/H EXISTING OVERHEAD HYDRO
- O.H.P. EXISTING TELEVISION CABLE
- LIMIT OF CONSTRUCTION
- LIMIT OF MAINTENANCE CORRIDOR
- BENCHMARK LOCATION — B.M. 1 ELEV.= 50.00 — BENCHMARK No. / BENCHMARK ELEVATION

No.	ISSUES AND REVISIONS	DATE	BY
7.	REPORT SUBMISSION	2021-07-08	HW
6.	ISSUED FOR SVCA APPROVAL	2021-02-11	DEL
5.	ISSUED FOR GEOTECHNICAL REVIEW	2020-12-11	DEL
4.	PUBLIC INFORMATION MEETING	2019-11-30	DEL
3.	COUNCIL INFORMATION MEETING	2019-10-21	DEL
2.	PUBLIC OPEN HOUSE	2019-05-25	DEL

LICENSED PROFESSIONAL ENGINEERS — July 8, 2021 — STEPHEN R. BRICKMAN — 100150920 — PROVINCE OF ONTARIO

Huron-Kinloss

PROJECT: BRUCE BEACH MUNICIPAL DRAIN PHASE I

DRAWING: Proposed Detention Facility

Headway Engineering

PROJ. MGR: S.B.	DESIGNED BY: M.T.	DRAWN BY: R.U.	CHECKED BY: S.B.
DRAWING SCALE: AS NOTED	DATE: JULY 8, 2021	PROJECT No. HK-001	DRAWING No. 6 of 8

C:\USERS\STEPHENBRICK_BWFDEHZ\ONEDRIVE - HEADWAY ENGINEERING\HEADWAY - NETWORK\PROJECTS\CAPITAL\HK-001-BRUCE BEACH PHASE 1\06. REPORT\DRAWING ARCHIVE\1856 BRUCE BEACH ROAD - REPORT

TOWNSHIP OF HURON-KINLOSS
(HURON WARD)
COUNTY OF BRUCE

LAKE RANGE DRIVE

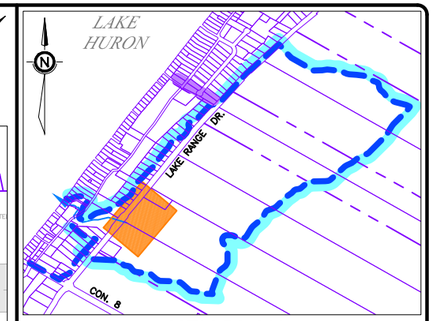
A. POLLOCK
(8-253-02)

BRUCELEA
POULTRY
FARMS LTD.
(8-240)

P. SCHLEGEL
(8-253)

LIMIT OF CONSTRUCTION (WORKING AREA)

PLAN SCALE
0 12 24 36 48m



KEY PLAN
N.T.S.

NOTES:

1. THE LOCATIONS AND ELEVATIONS OF ALL UTILITIES SHOWN ON THE DRAWINGS ARE APPROXIMATE. ACTUAL LOCATIONS AND ELEVATIONS OF ALL UTILITIES MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. ALL CUT AND FILL VALUES ARE IN METRES UNLESS OTHERWISE NOTED.

BENCHMARK No. 1 ELEV.=179.70
NAIL IN NORTH FACE OF 600mm DIA. TREE 2 METRES NORTH OF STA. 0+039

BENCHMARK No. 2 ELEV.=181.55
TOP CENTRE UPSTREAM END OF 600mm DIA. H.D.P.E. SURFACE PIPE AT STA. 0+172

BENCHMARK No. 3 ELEV.=201.06
TOP CENTRE UPSTREAM END OF 1800mm DIA. C.S.P. SURFACE PIPE 4m SOUTH OF STA. 0+436

LEGEND:

- PROPERTY BOUNDARY
- LOT OR CONCESSION BOUNDARY
- 190 EXISTING CONTOUR
- 200 PROPOSED CONTOUR
- TEL EXISTING TELEPHONE CABLE
- O/H EXISTING OVERHEAD HYDRO
- O.H.P. EXISTING TELEVISION CABLE
- LIMIT OF CONSTRUCTION
- 0.89 PROPOSED CUT (m)
- 1.72 PROPOSED FILL (m)
- BENCHMARK LOCATION — B.M. 1 ELEV.= 50.00 — BENCHMARK No. / BENCHMARK ELEVATION

No.	ISSUES AND REVISIONS	DATE	BY
7.	REPORT SUBMISSION	2021-07-08	HW
6.	ISSUED FOR SVCA APPROVAL	2021-02-11	DEL
5.	ISSUED FOR GEOTECHNICAL REVIEW	2020-12-11	DEL
4.	PUBLIC INFORMATION MEETING	2019-11-30	DEL
3.	COUNCIL INFORMATION MEETING	2019-10-21	DEL
2.	PUBLIC OPEN HOUSE	2019-05-25	DEL

LICENSED PROFESSIONAL ENGINEER — July 8, 2021 — S.B. R. BRICKMAN — 100150920 — PROVINCE OF ONTARIO

Huron-Kinloss

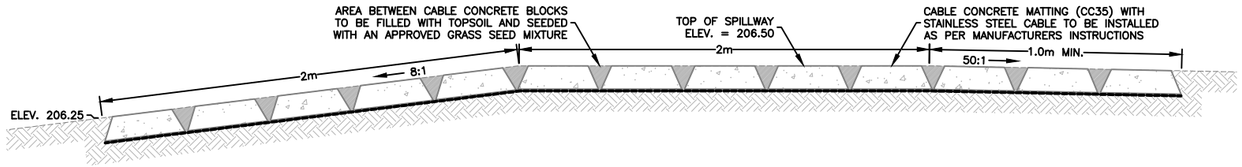
PROJECT: BRUCE BEACH MUNICIPAL DRAIN
PHASE I

DRAWING: Proposed Detention Facility Cut Fill Plan

Headway Engineering

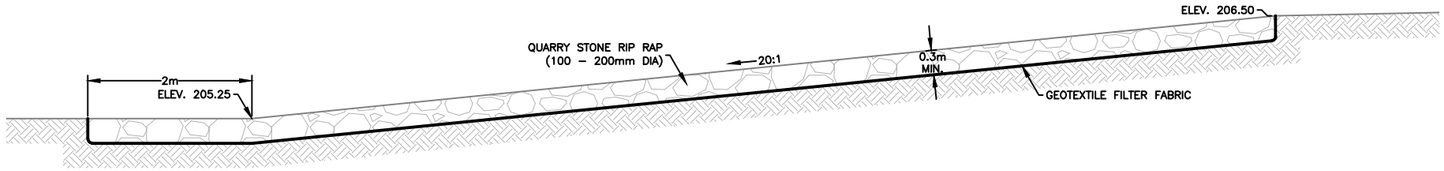
PROJ. MGR: S.B.	DESIGNED BY: M.T.	DRAWN BY: R.U.	CHECKED BY: S.B.
DRAWING SCALE: AS NOTED	DATE: JULY 8, 2021	PROJECT No. HK-001	DRAWING No. 7 of 8

C:\USERS\STEPHENBRICK_BWFDEHZ\ONEDRIVE - HEADWAY ENGINEERING\HEADWAY - NETWORK\PROJECTS\CAPITAL\HK-001-BRUCE BEACH PHASE I\06. REPORT\DRAWING ARCHIVE\1856 BRUCE BEACH ROAD - REPORT



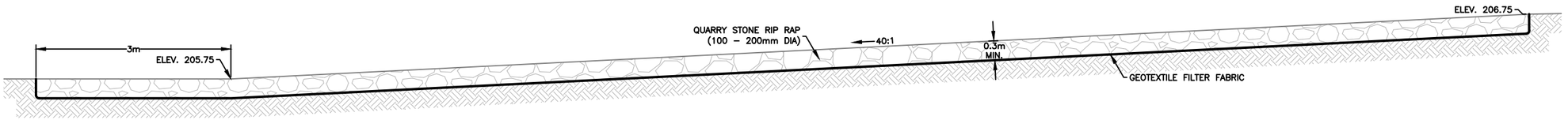
EMERGENCY OVERFLOW SPILLWAY DETAIL (SECTION A-A)

N.T.S.



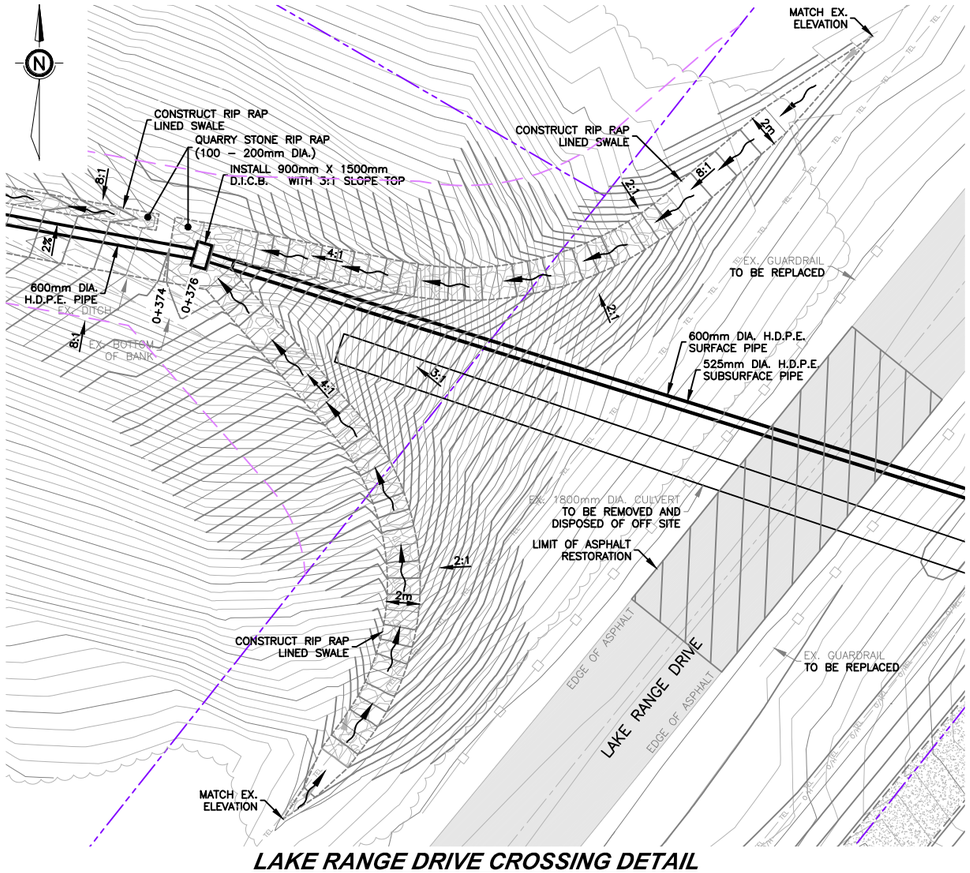
ROCK CHUTE DETAIL (SECTION B-B)

N.T.S.



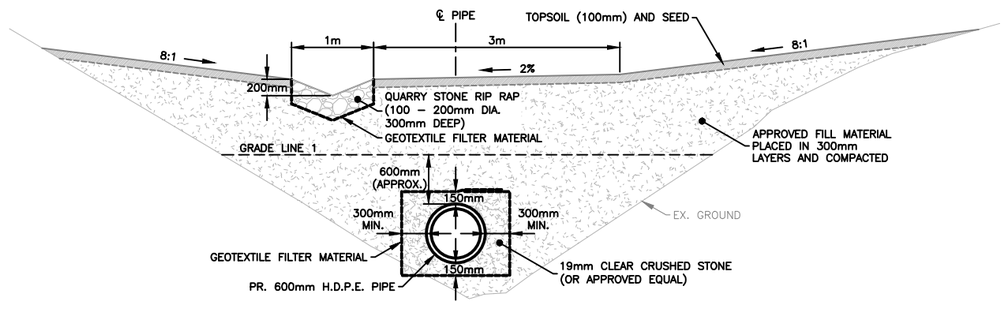
ROCK CHUTE DETAIL (SECTION C-C)

N.T.S.



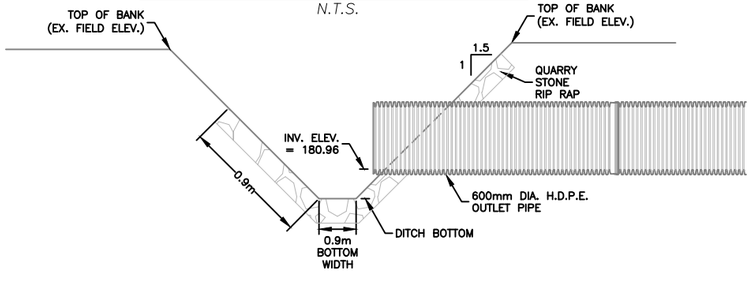
LAKE RANGE DRIVE CROSSING DETAIL

N.T.S.



TYPICAL RAVINE CROSS SECTION

N.T.S.



TYPICAL OUTLET DETAIL

N.T.S.

SEQUENCE OF RAVINE CONSTRUCTION ACTIVITIES

1. CLEARING, BRUSHING AND MULCHING WITHIN THE WORKING CORRIDOR;
2. STRIPPING AVAILABLE TOPSOIL;
3. PARTIALLY FILLING IN RAVINE WITH APPROVED FILL MATERIAL TO "GRADE LINE 1" (APPROXIMATELY 600mm ABOVE THE TOP OF THE NEW 600mm DIA. H.D.P.E. PIPE) INCLUDING COMPACTION OF FILL;
4. INSTALLATION OF NEW 600mm DIA. H.D.P.E. PIPE AS PER "TYPICAL RAVINE CROSS SECTION" DETAIL;
5. COMPLETE FILLING AND SHAPING RAVINE TO PROPOSED FINISHED GRADE, INCLUDING COMPACTION OF FILL, CONSTRUCTION OF 1m WIDE SWALE (WITH RIP RAP), THE PLACEMENT OF TOPSOIL, AND SEEDING WITH APPROVED SEED MIXTURE. SEEDING TO BE UNDERTAKEN AS SOON AS POSSIBLE.

NOTES:

1. THE LOCATIONS AND ELEVATIONS OF ALL UTILITIES SHOWN ON THE DRAWINGS ARE APPROXIMATE. ACTUAL LOCATIONS AND ELEVATIONS OF ALL UTILITIES MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. ALL H.D.P.E. PIPE SHALL BE CSA B182.8–02/320 KPa WITH WATER TIGHT JOINING SYSTEMS.
3. 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 CONSTRUCTION OF THE DETENTION FACILITY.
4. EXCAVATIONS CONDUCTED AT THE BOTTOM OF THE RAVINE AND TOE OF THE SIDE SLOPES SHOULD BE THE MINIMUM REQUIRED TO PREPARE THE AREA FOR FILL PLACEMENT.
5. THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE ENGINEER IF ANY INDICATIONS OF POSSIBLE SLOPE FAILURES ARE OBSERVED, INCLUDING BUT NOT LIMITED TO, SOIL TENSION CRACKS, LEANING OR FALLING TREES, SLUMPING OF SOIL ALONG ADJACENT SIDE SLOPES.
6. SOILS APPROVED FOR USE AS FILL AND BERM CONSTRUCTION MUST BE PLACED IN LOOSE LIFTS NOT EXCEEDING 300mm IN DEPTH FOR GRANULAR SOILS AND 200mm IN DEPTH FOR CLAY SOILS.
7. ANY FILL PLACED, INCLUDING BULK SUBGRADE FILL AND PIPE BACKFILL, MUST BE "BENCHED" INTO THE EXISTING RAVINE SIDE SLOPES.
8. APPROVED MATERIALS USED AS BACKFILL AND FOR BERM CONSTRUCTION SHALL BE COMPACTED TO AT LEAST 95% STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).
9. APPROVED FILL FOR THE RECONSTRUCTION OF LAKE RANGE DRIVE SHALL BE COMPACTED TO AT LEAST 100% STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).

BENCHMARK No. 1 ELEV.=179.70
NAIL IN NORTH FACE OF 600mm DIA. TREE 2 METRES NORTH OF STA. 0+039

BENCHMARK No. 2 ELEV.=181.55
TOP CENTRE UPSTREAM END OF 600mm DIA. H.D.P.E. SURFACE PIPE AT STA. 0+172

BENCHMARK No. 3 ELEV.=201.06
TOP CENTRE UPSTREAM END OF 1800mm DIA. C.S.P. SURFACE PIPE 4m SOUTH OF STA. 0+436

LEGEND:

No.	ISSUES AND REVISIONS	DATE	BY
7.	REPORT SUBMISSION	2021–07–08	HW
6.	ISSUED FOR SVCA APPROVAL	2021–02–11	DEL
5.	ISSUED FOR GEOTECHNICAL REVIEW	2020–12–11	DEL
4.	PUBLIC INFORMATION MEETING	2019–11–30	DEL
3.	COUNCIL INFORMATION MEETING	2019–10–21	DEL
2.	PUBLIC OPEN HOUSE	2019–05–25	DEL

LICENSED PROFESSIONAL ENGINEER — SCOTT R. BRICKMAN — 100150920 — PROVINCE OF ONTARIO

Huron-Kinloss

PROJECT: BRUCE BEACH MUNICIPAL DRAIN PHASE I

DRAWING: Details

Headway Engineering

PROJ. MGR: S.B.	DESIGNED BY: M.T.	DRAWN BY: R.U.	CHECKED BY: S.B.
DRAWING SCALE: AS NOTED	DATE: JULY 8, 2021	PROJECT No. HK-001	DRAWING No. 8 of 8

C:\USERS\STEPHENBRICK_8WF0EH2\ONEDRIVE - HEADWAY ENGINEERING\HEADWAY - NETWORK\PROJECTS\CAPITAL\HK-001-BRUCE BEACH PHASE I\06. REPORT\DRAWING ARCHIVE\1856 BRUCE BEACH ROAD - REPORT