



**ALTERNATIVE FOUNDATION ASSESSMENT REPORT  
FOR  
HIGHWAY 11 ACCESS REVIEW  
FROM MUSKOKA ROAD 117/CEDAR LANE NORTHERLY 6.3 KM  
TOWN OF BRACEBRIDGE  
DISTRICT MUNICIPALITY OF MUSKOKA  
TOWNSHIP MACAULAY  
G.W.P. NO. 322-00-00  
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PML Ref.: 09TF006A  
Index No.: 024FAR  
GEOCRES No.: 31E-304  
July 9, 2010



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Figure 1 – Project Location Map

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Drawing B – Legend for Access (Interchange) Alternatives

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**ALTERNATIVE FOUNDATION ASSESSMENT REPORT**

For

Highway 11 Access Review from Muskoka Road 117/Cedar Lane Northerly 6.3 km  
Town of Bracebridge, District Municipality of Muskoka  
Township of Macaulay  
G.W.P. No. 322-00-00

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**1. INTRODUCTION**

This report provides alternative interchange location foundation assessment for a section of Highway 11 that extends from Muskoka Road 117/Cedar Lane northerly about 6.3 km within the Town of Bracebridge in the District Municipality of Muskoka. The study was carried out for the Ministry of Transportation of Ontario (MTO) on behalf of Stantec Consulting Ltd. (Stantec).

The study corridor extends from the Muskoka Road 117/Cedar Lane and Highway 11 interchange, about Sta. 16+500 to about 1,550 m north of the existing Alpine Ranch Road and Highway 11 at-grade crossing, about Sta. 22+800 in the Township of Macaulay.

This section of Highway 11 is a four-lane divided highway and the median is presently about 15 m wide from south end of the study limit (High Falls Road corridor) through curve north of intersection about Sta. 11+500. From this Sta. 11+500 to north end of the study limit, median is about 30 m wide. Traffic access to the highway occurs at at-grade intersections located at High Falls Road-Muskoka Road 50 (west side) / Holiday Park Drive (east side), Bracebridge Resource Management Centre (east side access) and Alpine Ranch Road.

This study involves the review of the alternatives for a fully controlled access to the subject section of Highway 11 including interchange options that are intended to remove all existing at-grade accesses. Consequently, the project will entail the future construction of a new interchange and grade separation structures.

Upon completion of the preliminary reviews, the study area was organized into two parts: North Branch Muskoka River crossing alternatives and access alternatives as shown on the attached Key Map (Drawing A) and as described below.





### **North Branch Muskoka River Crossing Alternatives**

- **MR 1** - About 700 m west of Highway 11, connecting Denniss Drive and High Falls Road
- **MR 2** - About 400 m west of Highway 11, new alignment connecting Cedar Lane and High Falls Road
- **MR 3** - About 150 m west of Highway 11, new alignment connecting Cedar Lane and High Falls Road through MTO Picnic Area
- **MR 4** - About 150 m east of Highway 11, new alignment connecting Muskoka Road 117 and Holiday Park Drive
- **MR 5** - About 200 m east of Highway 11, new alignment connecting Muskoka Road 117 and Holiday Park Drive
- **MR 6** – About 700 m east of Highway 11, about 350 m north of Muskoka Road 117 from Forrester Trail and Muskoka Road 117 at-grade crossing, new alignment connecting Forrester Trail and Holiday Park Drive

### **Access (Interchange) Alternatives**

- **Alternative 1**
  - Interchange at Sta. 19+500 (Parclo AB)
  - New West and East Service Roads from High Falls Road/Holiday Park Drive to interchange site
  - Underpass at Sta. 21+340 (Alpine Ranch Road )
  - Alpine Ranch Road extension to Lone Pine Drive
- **Alternative 2**
  - Interchange at Sta. 19+500 (Diamond)
  - New West and East Ramp connections from High Falls Road/Holiday Park Drive to Alpine Ranch Road
- **Alternative 3**
  - Interchange at Sta. 17+235 (Split Diamond)
  - New East and West Ramp Connections from Muskoka Road 117/Cedar Lane to interchange site (include east and west side North Branch Muskoka River crossings)
  - Underpass at Sta. 21+340 (Alpine Ranch Road)
  - Alpine Ranch Road extension to Lone Pine Drive



- **Alternative 4**

- Underpass at Sta. 17+100
- New West Service Road from Cedar Lane to underpass site (includes west side North Branch Muskoka River Crossing, MR3)
- Underpass at Sta. 21+340 (Alpine Ranch Road)
- Alpine Ranch Road extension to Lone Pine Drive

- **Alternative 5a**

- Underpass Sta. 17+100
- New East Service Road from Muskoka Road 117 to underpass site (includes east side North Branch Muskoka River crossing, MR5)
- Underpass at Sta. 21+340 (Alpine Ranch Road)
- Alpine Ranch Road extension to Lone Pine Drive

- **Alternative 5b**

- Underpass at Sta. 17+100
- New East Service Road from Muskoka Road 117 to Alpine Ranch Road (includes east side North Branch Muskoka River Crossing, MR5)

- **Alternative 1992 Recommended Plan**

- Interchange at Sta. 17+690 (Parclo A)
- Underpass at Sta. 21+340 (Alpine Ranch Road)
- Alpine Ranch Road extension to Lone Pine Drive

Stantec provided site plans of the study corridor illustrating the North Muskoka Branch River crossing alternatives and access (interchange) alternatives. As indicated by Stantec, for the North Branch Muskoka River crossing alternatives, the advantages and disadvantages should be provided and the full foundation evaluation should be carried out for interchange alternatives 1 to 5 including 1992 Recommended Plan.



The purpose of this assessment was to identify the geologic features and hydrogeology along the highway corridor and to assess the potential impact of these features on the design and construction of the possible structures listed above. All elevations in this report are expressed in metres.

## **2. SITE DESCRIPTION**

The study area is located in the Town of Bracebridge about 145 km south of North Bay in the Geographic Township of Macaulay and District Municipality of Muskoka. The study section of Highway 11 being reviewed extends from Muskoka Road 117/Cedar Lane to about 1.5 km north of Alpine Ranch Road. A Project Location Map (Figure 1) is enclosed for reference.

Land uses in the vicinity of the highway corridor within the study limits include the Ministry of Natural Resources Bracebridge Office, the Lakeland Energy power dam and MTO Picnic area at the southwest corner of High Falls Road and the Highway 11 at-grade crossing and a number of recreational residences located along High Falls Road and Holiday Park Drive. The Bracebridge Resource Management Centre entrance is situated to the east of Highway 11 at about 2.4 km from High Falls Road/Holiday Park Drive and Highway 11 at-grade intersection. Scattered residential properties are also present at Alpine Ranch Road.

A TransCanada Pipe Lines Ltd. (TCPL) facility is located west of the Highway 11. The TCPL alignment approaches Highway 11 to within about 300 m west at Sta. 19+500 and narrows to about 130 m west of Highway 11 at Sta. 20+600 and northerly to the northern project limit.



Currently, Highway 11 at-grade intersections and structures along the study corridor include the following:

AT-GRADE INTERSECTION	STATION	STRUCTURE	STATION
High Falls Road (west side)/Holiday Park Drive (east side)	17+070	Highway 11 Underpass at Muskoka Road 117/ Cedar Lane (Site 42-174)	16+500
Bracebridge Resource Management Centre (East side access only)	19+470	North Branch Muskoka River/ Highway 11 SBL Bridge (Site 42 -58)	16+725
Alpine Ranch Road	21+220 / 21+250	North Branch Muskoka River/Highway 11 NBL Bridge (Site No. not found)	16+725
		Unnamed Creek Culvert	20+020
		Unnamed Creek Culvert	20+500

From about 500 m north of the Muskoka Road 117/Cedar Lane and Highway 11 underpass at about Sta. 17+000, the topographic levels within the existing Highway 11 corridor rise about 30 m (profile slopes upward about 3%) northerly from about elevation 274 to elevation 304 at about Sta. 18+300. The topographic levels north of this section to Sta. 18+900 drop about 7 m along the highway corridor from about elevation 304 to elevation 297 (downward about 1.5%). The next section of the Highway 11 corridor from Sta. 18+900 to 20+100 is generally level between elevation 293 and 297. To the north of this section, (Sta. 20+100 to 21+300) the Highway 11 corridor rises about 11 m from elevation 293 to 304. The next section of the Highway 11 is relatively flat to about Sta. 21+700.

The study area is located in the Huronian Area of the Canadian Shield where the typical geology comprises of bedrock outcrops alternating with swamps, glaciofluvial, ground moraine deposit and glaciolacustrine deposits. A Site Geology map (Figure 2) showing the distribution of soils and the known bedrock depths along the alignment is included with this report.



### **3. SITE ASSESSMENT PROCEDURES**

#### **3.1 General**

The foundation evaluation involved a review of the available geological, topographical and hydrogeological mapping, existing geotechnical reports, aerial photographs and construction drawings for the existing highway. A field visual reconnaissance was carried out to verify the inferred data. Subsurface explorations, in-situ testing and sampling were not carried out in accordance with the terms of reference for the study.

#### **3.2 Reference Documents and Literature Review**

The general physiographic conditions along the corridor and the alternate interchange locations were obtained primarily from existing geological maps and reports from the MTO GEOCREST library. Well records which were obtained from the MOE supplemented the data.

The documents and literature reviewed in whole or in part for this study are listed in Appendix A. The list reflects the selected data that contains geotechnical content relevant to the assessment. The list of the wells considered for the project is included in Appendix B.

The delineation of swamps and water courses/bodies as well as the location of significant earth deposits (silt/sand) and rock outcrops along the study corridor were interpreted from maps including Ontario Base Maps and aerial photographs provided by the Ministry of Natural Resources.

#### **3.3 Site Reconnaissance**

An initial reconnaissance visit of the existing alignment and the adjacent lands within the study corridor was carried out on September 9, 2009. A follow-up second site visit was carried out on November 12, 2009. The site reconnaissance visits consisted of a drive-by and walk-through of selected sections of Highway 11 and adjacent lands.



The alternative structure locations are identified by unique colours as shown in Drawing A (Legend) and reproduced on Drawings B1 to B3 attached to this report.

The ground truth checks verified the surficial geology and drainage conditions inferred from the literature and map reviews. Relevant natural features in selected areas of the corridor were photographed. The locations of 13 representative site photographs are indicated on Drawings B1 to B3. The photographs are included in Appendix C.

### 3.3.1 Site Reconnaissance Notes

Travelling north on Highway 11 from the Muskoka Road 117/Cedar Lane interchange, the terrain conditions are typical of the Northern Ontario landscape ; gently undulating to rolling with bedrock outcrops or with thin veneer soil cover over bedrock, glaciolacustrine, deltaic and till moraine deposits over bedrock and localized swamps. East of Highway 11 along the North Branch Muskoka River, alluvial and outwash plain deposits are present.

The terrain along the Highway 11 corridor north of Muskoka Road 117/Cedar Lane interchange (Town of Bracebridge) is gently undulating with isolated rock exposures and rock cuts. (Photographs 1 and 12).

The North Branch Muskoka River crosses Highway 11 about 200 m north of Muskoka Road 117/Cedar Lane interchange (Photograph 1). Extensive bedrock exposures are visible at the river bed west of Highway 11 and at the Lakeland Energy Power dam area (viewing from MTO picnic area).

The next section of the corridor includes the High Falls Road/Holiday Park Drive at-grade crossing. Swamp/soft grounds are visible at north and south of Holiday Park Drive and east of Highway 11 (Photographs 3 and 4).

From the north of the High Falls Road / Holiday Park Drive at-grade crossing to Alpine Ranch Road at-grade crossing, the topography is typically forested both east and west sides of Highway 11 (Photographs 6, 7 and 8). Hilly terrain with bedrock exposures are found east of



Highway 11, and unnamed creek valley areas are present east and west of Highway 11 (Photograph 7).

The northernmost section of the Highway 11 corridor from Alpine Ranch Road within the project is somewhat similar to the southernmost section, where bedrock outcrops and bedrock cuts are scattered in forested glaciolacustrine plains (Photographs 9, 10 and 11).

### **High Falls Road/ Holiday Park Drive**

The terrain along High Falls Road is characterized by rugged bedrock topography and the extensive bedrock exposures and cuts are visible along High Falls Road from about 200 m west of the Highway 11 and High Falls at-grade crossing (Photograph 12).

Holiday Park Drive is on relatively level terrain with swamp/soft ground deposits on both sides (Photograph 3).

## **4. INFERRED SUBSURFACE CONDITIONS**

### **4.1 General**

The site is located in the area of the Canadian Shield where extensive glaciation has occurred. This project is located within the physiographic region known as the Number 11 Strip. This area is comprised of a narrow strip of land that follows Highway 11 from Gravenhurst to North Bay. The local topography is undulating as the highway traverses areas which alternate between steep rock ridges and low lying swampy areas. The native overburden soils consist mainly of fine sands and silts, generally classified as Berriedale fine sand and Magnetawan silt.

The alignment traverses several different geological units:

- Glaciolacustrine delta comprising sands and gravels
- Bedrock knobs and ridges
- Bedrock outcrops, where the bedrock is exposed or under a relatively thin soil veneer



- Sandy ground moraine deposits over bedrock
- Sandy alluvial plain and sand and gravel outwash plains east of Highway 11 along the North Branch Muskoka River
- Localized wetland areas containing peat, silt, sand and clay deposits, typical of the Northern Ontario Region

The study area of Highway 11 is located within the Central Gneiss Belt. The bedrock in this area consists of Precambrian rock of Mesoproterozoic age. The predominant bedrock types in the area are gneisses (biotite and hornblende gneisses), migmatites and felsic igneous rocks (granodiorites and granites). The local bedrock along this section of highway undulated from near or at ground surface and locally dipped to more than 20 m below the ground surface; a few bedrock outcroppings are present at the North Branch Muskoka River bed and the north end of the project limit.

The anticipated extent of the major physiographic units and geology along the study corridor is shown on the enclosed Drawings B1 to B3. The legends and symbols used are provided on the Legend, Drawing B.

The approximate average extent of these physiographic/geologic formations along Highway 11 is generally summarized below with reference to the existing alignment chainage.

APPROXIMATE CHAINAGE	PREDOMINANT GEOLOGIC UNIT	LENGTH (m)	PERCENT OF TOTAL (%)
16+500 to 17+800	Sandy/gravelly glaciolacustrine, delta deposits and bedrock knobs [GL (D) + BR (N)]	1,300	20.6
17+800 to 19+000	Sandy till ground moraine deposits and bedrock covered with veneer of soils [M(G) +BR (V) ]	1,200	19.1
19+000 to 21+500	Sandy glaciolacustrine Delta [GL (D)]	2,500	39.7
21+500 to 22+800	Sandy till ground moraine deposits and bedrock knobs [M(G) +BR (N) ]	1,300	20.6
<b>TOTAL LENGTH</b>		<b>6,300</b>	<b>100.0</b>





The average extent of the geologic units is approximate and will vary for the NBL and SBL of the highway.

#### **4.2 Drainage**

The main drainage course of the study area is the North Branch Muskoka River which crosses Highway 11 about 330 m north of Muskoka Road 117/Cedar Lane and Highway 11 interchange. Also, surface water runoff along the study corridor drains into streams, such as unnamed creeks at Sta. 20+020 and 20+500 and other unnamed creeks, swamps and scattered ponds. These streams flow generally towards the North Branch Muskoka River. The North Branch Muskoka River flows approximately east to west direction at Highway 11.

### **5. FOUNDATION ASSESSMENT AND RANKING**

#### **5.1 Criteria Used In Assessing Alternatives**

The terms of reference for this project identified six criteria to be considered from a foundation perspective, as follows:

- Extent of Soft Ground
- Groundwater Conditions
- Structure Foundations
- Embankment Settlement
- Embankment Stability
- Construction Considerations

A rationale for what each criterion represents and a method for measuring and evaluating each criterion was developed. The results of the evaluation are provided in Tables S-1 to S-6 for the structure alternatives. A discussion of the assessment criteria follows.



#### 5.1.1 Extent of Soft Ground/Swamps (Table S-1)

The potential impact of soft ground and/or swamps for each alternative interchange location was evaluated on the basis of the total length of the alternative with inferred soft ground/swamps between 0 and 3 m deep; 3 and 10 m deep; and over 10 m deep.

For the purpose of this discussion, soft ground/swamps less than 3 m deep that may be excavated with conventional backhoe equipment were considered the most favourable. Soft and/or swamp grounds that are between 3 and 10 m deep typically requires a long-stick excavator and are of intermediate favourability. The treatment of areas with soft ground/swamps over 10 m deep need special equipment such as drag lines or require non-conventional treatment (wick drains, preloading) and are the least favourable.

#### 5.1.2 Groundwater Conditions (Table S-2)

The extent of each interchange alternative with inferred groundwater at depths greater than 5 m (most favourable condition); between 1 and 5 m deep; and between 0 and 1 m deep (least favourable condition) were employed to assess the potential impact of this criterion.

The greater the groundwater depth the easier structures and embankments are to construct and the better the performance of embankments.

#### 5.1.3 Structure Foundations (Table S-3)

The type of foundation required to support bridges, interchange structures and major culverts was employed to assess the potential impact of this criterion. Shallow foundations were considered to be the most favourable and deep foundations the least favourable. The favourability of integral abutment foundations was considered to fall between the shallow and deep type of foundations. The potential foundation type was estimated based on the inferred type and quality of founding subgrade materials for each alternative.



#### 5.1.4 Embankment Settlement (Table S-4)

Evaluation of embankment settlement was based on the total length of structure alternatives over compressible materials. For evaluation purposes, the compressible soils were grouped into less than 3 m deep; 3 to 10 m deep; and more than 10 m deep zones. Each of these groups was further divided into potentially sandy or clayey deposits.

The most favourable condition was defined as the swamp areas containing less than 3 m of compressible deposits of a sandy nature (for example, loose sand), and the least favourable conditions are in areas with compressible deposits of soft clayey soils deeper than 10 m.

#### 5.1.5 Embankment Stability (Table S-5)

The potential impact of embankment stability was evaluated on the basis of the total length of embankment and composition of the founding material. Conventional embankments that require little or no excavation and use conventional slope configurations were considered the most favourable, followed in decreasing favourability by embankments that require significant subexcavation, embankments that may require toe-stabilizing berms and (the least favourable) sections that may contain deeper than 10 m soft clays or sections with twinning of high embankments requiring pre-loading and wick drains.

#### 5.1.6 Construction Feasibility (Table S-6)

The impact of construction feasibility was considered on the basis of the number of structures (bridge and major culvert) required on each alternative for Table S-6 in conjunction with the inferred founding conditions for Table S-3. In addition, embankments in swamps requiring conventional construction were considered most favourable and those requiring special construction were considered least favourable.



## 5.2 Weighting of Evaluation Criteria for Interchange Alternatives (Tables S-1 to S-6)

A weighting system was developed to enable selection of the preferred interchange location. The weighting system involved two factors:

- A favourability factor  $F$  to score the assessment for each of the evaluation criteria based on the foregoing discussion. The  $F$  values ranged from 5 for the most favourable to 1 for the least favourable.
- An impact weight  $B_i$  to reflect the significance of each of the six criteria on the design and construction of the highway. The impact weight for all criteria totals 1.00. The six evaluation criteria were compared in terms of relative importance and impact and assigned an individual impact weight as presented below:

EVALUATION CRITERION	IMPACT WEIGHT, $B_i$
Soft Ground/Swamp	0.10
Groundwater Conditions	0.15
Structure Foundations	0.25
Embankment Settlement	0.20
Embankment Stability	0.20
Construction Feasibility	0.10
<b>TOTAL</b>	<b>1.00</b>

The more important the individual evaluation criterion was considered for the design and/or construction of the highway, the higher the impact weight assigned. A value of 0 would be assigned if the criterion was deemed to have no impact on alternative route selection for the specific project.



The favourability factors,  $F$ , used in Tables S-1 to S-6, and the impact weights,  $B_i$ , used in the scoring Tables S-7 are summarized in the following table.

EVALUATION CRITERION	IMPACT WEIGHT, B <sub>i</sub>	FAVOURABILITY FACTOR, F						TABLE	
		MOST		AVERAGE		LEAST			
Soft Ground/ Swamps	0.10	Based on relative length and depth of soft ground (SG) and/or swamps (SWP):						S-1	
		SG or SWP 0 to 3 m Deep		SG or SWP 3 to 10 m Deep		SG or SWP Over 10 m Deep			
		F=5		F=3		F=1			
Groundwater Conditions	0.15	Based on inferred groundwater (G/W) depth:						S-2	
		G/W Deeper than 5 m		G/W 1 to 5 m		G/W 0 to 1 m			
		F=5		F=3		F=1			
Structure Foundations	0.25	Based on estimated type of foundation requirements:						S-3	
		Shallow Found.		Integral abutment		Deep Found.			
		F=5		F=4		F=3			
Embankment Settlement	0.20	Based on length of sections with compressible soil within three depth ranges:						S-4	
		Less than 3 m deep		3 to 10 m deep		Deeper than 10 m			
		Silty/ Sandy	Clayey	Silty / Sandy	Clayey	Silty / Sandy	Clayey		
		F=5	F=4	F=4	F=3	F=2	F=1		
Embankment Stability	0.20	Based on estimated type of construction required to establish embankment on competent ground:						S-5	
		Conventional Embankment		Significant Subexcavation		Toe-Stabilizing Berms Required			Potential Pre-Loading/ Wick Drains
		F=5		F=3		F=2			F=1
Construction Feasibility	0.10	Based on the required number of structures						S-6	
		Bridge Foundation			Culverts				
		Shallow		Deep		New			Extension
		F=5		F=4		F=4			F=5

The computations provide Weighted Favourability Values  $A_i$  for each subsection. For example, with reference to Table S-1, Soft Ground/Swamps Evaluation Criterion, the weighted favourability value  $A_1$  for the embankment alternative was obtained by multiplying the Favourability factor  $F$  by the length of alignment for which the condition is applicable and dividing by the total length of the soft ground or swamp in the subsection, as presented below.



DEPTH RANGE (m)	LENGTH (m)	FAVOURABILITY FACTOR, F
0 – 3	440	5
3 – 10	160	3
>10	0	1

$$A_1 = \text{Weighted Favourability Value} = \frac{(440 \times 5) + (160 \times 3) + (0 \times 1)}{440 + 160 + 0} = 4.47$$

The weighted favourability value,  $A_i$ , computed for each subsection is provided on Tables S-1 to S-6.

### 5.3 Scoring of Foundation Criteria for Structure Alternatives (Table S-7)

For the scoring of the foundation criteria, each of the Favourability Values  $A_i$  was normalized to ratios of 1.0. The Normalized Favourability Values,  $N_i$ , shown next to each  $A_i$  on the table eliminate the effect of unrelated  $A_i$  numbers on the Scores and provide a meaningful input of the Impact Weights on the final rankings. This is achieved by dividing each Weighted Favourability Value  $A_i$  by the highest  $A_i$  amongst all Alternatives for the criterion, and thus making all Normalized Favourability Values less than 1.00.

The interchange alternatives were scored by adding the  $N_i$  for each of the evaluation criteria multiplied by the Impact Weight,  $B_i$  for the criterion. The Scores based on the  $N_i$  values (multiplied by 5 to produce values higher than 1.00 for ease of comparison) are shown on Table S-7.

An example of the computation of the Scores is provided below, for reference. The example is the calculation of the Normalized Score of **4.87** for the access alternative 1 which was obtained as follows.



EVALUATION CRITERIA	SOFT GROUND/ SWAMPS	GROUNDWATER CONDITIONS	STRUCTURE FOUNDATIONS	EMBANKMENT SETTLEMENT	EMBANKMENT STABILITY	CONSTRUCTION FEASIBILITY
TABLE NO.	S-1	S-2	S-3	S-4	S-5	S-6
IMPACT WEIGHT, B <sub>i</sub>	0.10	0.15	0.25	0.20	0.20	0.10
1	A1	4.47	2.99	4.50	4.03	4.87
	Ni	1.00	0.90	0.96	0.99	1.00

Note: For all access alternatives, the following are the highest A<sub>i</sub> values

Highest A <sub>i</sub>	4.47	3.31	4.67	4.06	4.87	4.67
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$$\text{Normalized Score 1} = 5[(4.47/4.47) \times 0.10 + (2.99/3.31) \times 0.15 + (4.50/4.67) \times 0.25 + (4.03/4.06) \times 0.20 + (4.87/4.87) \times 0.20 + (4.67/4.67) \times 0.10]$$

**Normalized Score 1 = 4.87**

[The ratios in brackets represent each of the N<sub>i</sub> values, such as (4.47/4.47) = 1.00]

These Scores and Rankings of the foundation evaluation for each alternative are provided in Table S-7 and the results are summarized below:

INTERCHANGE ALTERNATIVES		SCORE	RANKING
1	Interchange at Sta. 19+500 (Note 1) (Parclo B and Diamond)	4.87	1
2	Interchange at Sta. 19+500 (Note 2) (Diamond)	4.55	5
3	Interchange at Sta. 17+235 (Note 3) (Diamond)	4.69	3
4	Underpass at Sta. 17+100 (Note 4)	4.80	2
5a	Underpass at Sta. 17+100 (Note 5)	4.53	6
5b	Underpass at Sta. 17+100 and East Service Road (Note 6)	4.48	7
	1992 Recommended Plan (Note 3) (Interchange at Sta. 17+690)	4.66	4

Note 1: Includes underpass at Sta. 21+340 (Alpine Ranch Road) and east and west service roads from High Falls Road/Holiday Park Drive to interchange site.

Note 2: Includes east and west service roads from High Falls Road/Holiday Park Drive to Alpine Ranch Road.

Note 3: Includes underpass at Sta. 21+340 (Alpine Ranch Road).

Note 4: Includes west side North Branch Muskoka River crossing and underpass at Sta. 21+340 (Alpine Ranch Road).

Note 5: Includes east side North Branch Muskoka River crossing and underpass at Sta. 21+340 (Alpine Ranch Road).

Note 6: Includes east side North Branch Muskoka River crossing.



The results indicated that alternative 1 (interchange at Sta. 19+500) has the highest score of 4.87. The score 4.80 for alternative 4 is close to the highest score of 4.87 and is practically equivalent in terms of foundation favourability. These alternatives are preferred over the alternatives 3, the 1992 recommended plan, 2, 5a and 5b and which have lower scores of 4.69, 4.66, 4.55, 4.53 and 4.48, respectively.

There was a relatively close range of scores (4.48 to 4.87) for the seven options. All options are considered acceptable from a foundation perspective.

The selection of the Preferred Plan also depends on other parameters or facets that are being analysed by Stantec.

## **6. ACCESS (INTERCHANGE) ALTERNATIVES REVIEW AND RECOMMENDATIONS**

### **6.1 General**

From the interchange foundation design and construction perspective, the alternative that incorporates the highest scoring is preferred. It is considered that the alternative 1 which includes interchange at Sta. 19+500 has the highest Score of 4.87 as shown on Table S-7. This score is close and practically equivalent to the score of 4.80 for the alternative 4. Therefore, either of those two alternatives is preferable over the remaining alternatives 3 (Score 4.69), the 1992 Recommended Plan (Score 4.66), 2 (Score 4.55), 5a (Score 4.53), and 5b (Score 4.48).

The preferred structure location/access scenario should be selected to achieve bedrock or competent soil subgrade and avoid swamp or soft areas, while minimizing the length of new construction that would be required for the ramps and sideroads. Embankments constructed over bedrock or competent soil subgrade will be easier to drain; will be relatively easier to construct; will perform better; and will be subjected to only minimal post-construction settlements and therefore will require less maintenance.





## **6.2 Embankment Design**

Considering the construction of new ramps service roads and sideroads, the alternatives 1 and 5a traverse comparatively shorter sections of wet and swampy soils than the other interchange alternatives. Consequently, embankment design of alternatives 1 and 5 would be relatively more straightforward.

The embankments should be made of rockfill in sections requiring construction below the water table or in swampy terrain. Elsewhere embankments could be constructed of earth fill, including the zones above the rockfill. Embankment design and construction procedures for rockfill and earth fill embankments shaped at 1.25H:1V and 2H:1V respectively above original grades should be suitable for this project. Embankment geometry through swamps should include a minimum 2 m wide bench on both sides according to Northeastern Region Directive 98-200.

For preliminary evaluation purposes the design of embankments through swamps should allow for subexcavation of soft and compressible soils to depths typically less than 3 m. Locally, deeper deposits of soft and compressible soils may occur up to about 10 m deep. At these locations the slope of the rockfill below existing grade should be taken as 1.25H:1V. Also as a guideline for preliminary design, the rockfill line should be carried at least 2.0 m above the water level in the swamps where earth fill is used in combination with rockfill to construct the embankments. Above grade, the embankments constructed with earth fill will be stable at 2H: 1V slopes or flatter above the water table. Rockfill embankments should also be stable at 1.25H: 1V slopes or flatter.

## **6.3 Embankment Stability**

It is anticipated that limited subexcavation of soft soils and organics (less than 10 m) will be typically required for construction of the roadway embankments. Most of the alignment alternatives traverse similar geologic formations comprising glaciolacustrine deposits containing sands and silts. However, construction of embankments up to 12 m high for crossing roads and ramps are also expected in view of the undulation topography along the corridor and for approach embankment to the contemplated structures.



The requirement to use non-standard slope configurations for the new embankments to achieve stable conditions, such as toe-stabilizing berms or preloading / surcharging with wick drains and/or a wider median width to preserve the stability of the existing embankments depends on the design embankment height and local depth of soft ground. About 150 m length of open water swamp located north east of Holiday Park Drive and Highway 11 at-grade crossing will likely require special requirements depending on the soft soil depth. It should be investigated during future preliminary or Detail design studies.

#### **6.4 Embankment Settlements**

It is anticipated that the post-construction settlement of embankments founded on bedrock or competent glaciolacustrine soil deposits will be minimal. Significant settlement may occur in the wet and swampy areas located at the north and south of Holiday Park Drive and east of Highway 11.

The magnitude and rate of the settlements will depend on the thickness and nature of the soils in swamps and may exceed MTO criteria if placed on very soft to firm clayey soils and/or may affect existing embankments/structures which are in close proximity.

The preliminary investigation for an underpass at Holiday Park Drive/High Falls Road indicated that significant thickness of cohesionless soils with no clayey mineral soils are present at east side of Highway 11 and cohesionless soils overlying shallow bedrock was encountered at the west of Highway 11. It is anticipated the embankment settlement would likely to occur in short-term after placement of fill.

However, Holiday Park Drive/High Falls Road realignment is over an about 150 m open water swamp north of Holiday Park Drive and east of Highway 11. Localized clayey deposits should be anticipated in this swamp area. It is anticipated that the localized clayey deposits will be fully subexcavated and therefore any settlement from the rockfill settlements should be minimal and take place shortly after completion of construction. Further studies should be undertaken during future preliminary or detail design studies.



## **6.5 Structure Foundations**

The structure foundation type is likely to comprise shallow foundations (spread footings) on bedrock for west side North Branch Muskoka River Crossings alternatives and Alpine Ranch Road Underpass. The other alternative structure foundations are likely to include piles driven to bedrock or a shallow foundation founded on competent soils or structural fill.

The type of foundation (shallow or deep) will depend ultimately on the road grades at the structures and structural design concepts. Foundation material for deep pile foundations is expected to consist of competent glaciolacustrine till soils or bedrock. Cobbles and boulders are anticipated in the ground moraine deposit.

Foundations for culverts are expected to include competent native soils or rockfill.

## **6.6 Construction Considerations**

It is anticipated that the typical embankment construction will be accomplished with conventional methods since the alignment traverses competent glaciolacustrine deposits for the most part with areas covered by shallow deposits mantling bedrock and bedrock outcrops.

Non-conventional construction procedures for swamp excavation or embankment widening would only be required to reduce post-construction settlements to tolerable levels or to twin embankments through soft deposits without negative effects on the stability of the existing embankments. Special construction methods may include the use of lightweight fill, wick drains and/or staged construction.

## **6.7 Assessment of Advantages and Disadvantages**

The following tables were presented to overview assessments of the advantages and disadvantages, costs and risk/consequences of the North Branch Muskoka River Crossing Alternatives and interchange alternatives from the foundation perspective.



NORTH BRANCH MUSKOKA RIVER CROSSING ALTERNATIVES	ADVANTAGES	DISADVANTAGES
Alternative MR1 About 700 m west of Highway 11, connecting Denniss Drive and High Falls Road	<ul style="list-style-type: none"> <li>• North abutments for bridge may be founded on rock</li> <li>• South abutments may be founded on integral abutments on pile foundation</li> <li>• Moderate to high cost for structure foundation</li> </ul>	<ul style="list-style-type: none"> <li>• High fills at the south abutment will be required to match High Falls Road grade</li> <li>• Wide river crossing may require piers in the water and may need to costly and timely approaches</li> <li>• Requires a new culvert and extensive bedrock cut for High Falls Road Realignment</li> </ul>
Alternative MR2 About 400 m west of Highway 11, connecting Cedar Lane and High Falls Road	<ul style="list-style-type: none"> <li>• North abutments for bridge may be founded on bedrock</li> <li>• South abutments may be founded on integral abutments on pile foundation</li> <li>• Moderate to high cost for structure foundation</li> </ul>	<ul style="list-style-type: none"> <li>• The south approach embankment at bridge location will be over wet and low –lying area (flooded) with possible artesian conditions may require extensive toe stabilization berms and preloading</li> <li>• High fills at the south abutment will be required to match with High Falls Road grade</li> </ul>
Alternative MR3 About 150 m west of Highway 11, connecting Cedar Lane and High Falls Road through MTO Picnic Area	<ul style="list-style-type: none"> <li>• Structure foundations may be founded on bedrock</li> <li>• Lower cost for structure foundation</li> </ul>	<ul style="list-style-type: none"> <li>• Requires new culverts for south approach and north approach</li> </ul>
Alternative MR4 About 150 m east of Highway 11, connecting Muskoka Road 117 and Holiday Park Drive	<ul style="list-style-type: none"> <li>• Structure foundations may be founded on integral abutments on pile foundation</li> <li>• Moderate cost for structure foundation</li> </ul>	<ul style="list-style-type: none"> <li>• Approach embankments partially over swamps/flooded areas with possible artesian conditions may require toe stabilization berms and preloading</li> </ul>
Alternative MR5 About 200 m east of Highway 11, connecting Muskoka Road 117 and Holiday Park Drive	<ul style="list-style-type: none"> <li>• Structure foundations may be founded on integral abutments on pile foundation</li> <li>• Moderate cost for structure foundation</li> </ul>	<ul style="list-style-type: none"> <li>• Approach embankments partially over swamps/flooded areas with possible artesian conditions may require extensive toe stabilization berms and preloading</li> </ul>
Alternative MR6 About 700 m east of Highway 11, connecting Forrester Trail and Holiday Park Drive	<ul style="list-style-type: none"> <li>• Structure foundations may be founded on integral abutments on pile foundation</li> <li>• Moderate cost for structure foundation</li> </ul>	<ul style="list-style-type: none"> <li>• West approach partially over flooded area may require toe stabilization berms and preloading</li> <li>• Requires Forrester Trail Realignment</li> <li>• Erosion protection will be required for approach embankments</li> </ul>



INTERCHANGE ALTERNATIVES	ADVANTAGES	DISADVANTAGES
<p>Alternative 1</p> <p>Interchange at Sta. 19+500 (Parclo B and Diamond)</p> <p>Includes underpass at Sta. 21+340 (Alpine Ranch Road) and east and west service roads from High Falls Road/Holiday Park Drive to Interchange site</p>	<ul style="list-style-type: none"> <li>• Structure foundations for interchange underpass at Sta. 18+460 may be founded on spread footings on competent native soils or on integral abutments on pile foundation</li> <li>• Underpass at Sta. 21+340 (Alpine Ranch Road) may founded on shallow foundations on bedrock or structural fills</li> <li>• Lower to moderate cost for structure foundations</li> </ul>	<ul style="list-style-type: none"> <li>• Crossings of TCPL for Alpine ranch Road extension to Lone Pine Drive</li> </ul>
<p>Alternative 2</p> <p>Interchange at Sta. 19+500 (Diamond)</p> <p>Includes east and west service roads from High Falls Road/Holiday Park Drive to Alpine Ranch Road</p>	<ul style="list-style-type: none"> <li>• Structure foundations for interchange underpass at Sta. 19+500 may be founded on spread footings on competent native soils or on integral abutments on pile foundation</li> <li>• Moderate cost for structure foundation</li> </ul>	<ul style="list-style-type: none"> <li>• Requires 4 new culverts at east and west service roads</li> <li>• Requires widening of the existing culvert</li> </ul>
<p>Alternative 3</p> <p>Interchange at Sta. 17+235 (Diamond)</p> <p>Includes west and east side river crossings and underpass at Sta. 21+340 (Alpine Ranch Road)</p>	<ul style="list-style-type: none"> <li>• Structure foundations for interchange at Sta. 17+235 may be founded spread footings on competent native soils or on integral abutments on pile foundation</li> <li>• West side North Branch Muskoka River bridge may be founded on bedrock</li> <li>• East side North Branch Muskoka River bridge widening may founded on integral abutments on pile foundation</li> <li>• Underpass at Sta. 21+340 (Alpine Ranch Road) may founded on shallow foundations</li> <li>• Moderate cost for structure foundations</li> </ul>	<ul style="list-style-type: none"> <li>• Approach embankment at east side crossing location will be over wet and low –lying area (flooded) with possible artesian conditions may require toe stabilization berms and preloading</li> <li>• Crossings of TCPL for Alpine Ranch Road extension to Lone Pine Drive</li> </ul>



INTERCHANGE ALTERNATIVES	ADVANTAGES	DISADVANTAGES
<p>Alternative 4</p> <p>Underpass at Sta. 17+100 Includes west side river crossing (MR-3) and underpass at</p> <p>Sta. 21+340 (Alpine Ranch Road)</p>	<ul style="list-style-type: none"> <li>• Structure foundations for underpass at Sta. 17+100 may be on integral abutments on pile foundation or shallow foundations on competent soils or structural fills</li> <li>• Structure foundations for west side river crossing may be on shallow foundation on bedrock</li> <li>• Underpass at Sta. 21+340 (Alpine Ranch Road) may be founded on shallow foundations on bedrock or structural fills</li> <li>• Low to moderate cost for structure foundation</li> </ul>	<ul style="list-style-type: none"> <li>• Crossings of TCPL for Alpine Ranch Road extension to Lone Pine Drive</li> </ul>
<p>Alternative 5a</p> <p>Underpass at Sta. 17+100 Includes east side river crossing (MR-5) and underpass at</p> <p>Sta. 21+340 (Alpine Ranch Road)</p>	<ul style="list-style-type: none"> <li>• Structure foundations for underpass at Sta. 17+100 may be on integral abutments on pile foundation or shallow foundations on competent soils or structural fills</li> <li>• Structure foundations for east side crossing may be on integral abutments on pile foundation</li> <li>• Underpass at Sta. 21+340 (Alpine Ranch Road) may be founded on shallow foundations on bedrock or structural fills</li> <li>• Moderate cost for structure foundation</li> </ul>	<ul style="list-style-type: none"> <li>• Approach embankments for river crossing and underpass at Sta. 17+100 partially over swamps/flooded areas with possible artesian conditions may require toe stabilization berms and preloading</li> <li>• Crossings of TCPL for Alpine Ranch Road extension to Lone Pine Drive</li> </ul>



INTERCHANGE ALTERNATIVES	ADVANTAGES	DISADVANTAGES
<p>Alternative 5b</p> <p>Underpass at Sta. 17+100 and East Service Road</p> <p>Includes east side river crossing (MR-5)</p>	<ul style="list-style-type: none"> <li>• Structure foundations for underpass at Sta. 17+100 may be on integral abutments on pile foundation or shallow foundations on competent soils or structural fills</li> <li>• Structure foundations for underpass at Sta. 17+100 may be on integral abutments on pile foundation</li> <li>• Moderate cost for structure foundation</li> </ul>	<ul style="list-style-type: none"> <li>• Requires 2 new culverts for unnamed creek crossings at east service road</li> <li>• Approach embankments for river crossing and underpass at Sta.17+100 partially over swamps/flooded areas with possible artesian conditions may require toe stabilization berms and preloading</li> </ul>
<p>Alternative</p> <p>1992 Recommended Plan</p> <p>Interchange at Sta. 17+690</p> <p>Includes underpass at Sta. 21+340 (Alpine Ranch Road)</p>	<ul style="list-style-type: none"> <li>• Structure foundations for interchange at Sta. 17+690 may be founded on integral abutments on pile foundation</li> <li>• Underpass at Sta. 21+340 (Alpine Ranch Road) may be founded on shallow foundations on bedrock or structural fills</li> <li>• Moderate cost for structure foundation</li> </ul>	<ul style="list-style-type: none"> <li>• Requires 2 new culvert for unnamed creek at ramps</li> <li>• Crossings of TCPL for Alpine Ranch Road extension to Lone Pine Drive</li> </ul>

## 7. PREFERRED ACCESS ALTERNATIVE

### 7.1 Preferred Alternative Overview

Stantec indicated that the preferred alternative is alternative 5b located east side of Highway 11. This alternative 5b is shown on the enclosed Drawings C1 to C3.

This preferred alternative includes east service road from Muskoka Road 117 to Alpine Ranch Road, a bridge over the North Muskoka River and an underpass over the existing Highway 11 northbound and southbound lanes at Sta. 17+125 (Highway 11 chainage) and associated High Falls Road/Holiday Park Drive Realignment.

The Score for the preferred alternative from a Foundations perspective (alternative 5b) was 4.48 and the lowest of the other alternatives, however, practically equivalent to the highest score of 4.87 from a geotechnical point of view.



It is noted that the preliminary foundation investigation was carried out for bridge over the North Muskoka River and an underpass at High Falls Road/Holiday Park Drive and will be provided in separate Report (PML Ref: 09TF006B).

## **7.2 Additional Studies**

The preliminary assessments in this report are based on literature reviews and site reconnaissance only. The recommendations are intended for planning purposes only. Additional data should be obtained by conducting subsurface investigation(s) to confirm the data inferred during these studies. In particular, the depth and extent of organic/soft/wet soils in swamps and low-lying areas should be investigated.

The potential bridge and interchange structure locations, underpass structures and major culvert locations should also be investigated. The bedrock at each location should be carefully delineated both longitudinally and transversely and proven with cores to confirm that the preferred sites are adequate for the construction of the structures.

The recommended locations for foundations investigations provided in Table 1.





## 8. CLOSURE

This report was prepared by Ms. N.S Balakumaran, BSc and Mr. C.M.P. Nascimento, P. Eng., Senior Project Engineer and reviewed by Mr. B.R. Gray, MEng, P.Eng., MTO Designated Principal Contact.

Yours very truly,

Peto MacCallum Ltd.



Carlos M. P. Nascimento, P. Eng.  
Senior Project Engineer



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MTO Designated Principal Contact

CN/BRG:nb-lnr



**TABLE 1**  
**RECOMMENDED LOCATIONS FOR FOUNDATION INVESTIGATIONS**  
**HIGHFILLS AND STRUCTURES**  
**PREFERRED ALTERNATIVE**

<b>STATIONS <sup>(1)</sup></b>	<b>PROPOSED WORKS</b>
<b>East Service Road</b>	
Sta.9+720 to 9+780	Embankment fill up to 5 m high
Sta.9+780 to 10+850	East side North Branch Muskoka River bridge <sup>(2)</sup>
Sta.9+850 to 10+200	Embankment fill up to 8 m high <sup>(2)</sup> , access culvert
Sta.12+880 to 12+940	Embankment fill up to 8 m high , culvert
Sta. 13+100 to 13+170	Embankment fill up to 14 m high, culvert
<b>High Falls Road/Holiday Park Drive Realignment</b>	
Sta.9+760 to 9+960	Embankment fill up to 10 m high, access culvert
Sta.9+960 to 10+060	Underpass at Sta. 17+125 (Highway 11 chainage) <sup>(2)</sup>
Sta.10+060 to 10+180	Embankment fill up to 10 m high, swamp area

**NOTES:** (1) Chainages refer to respective new alignment.

(2) Preliminary foundation investigation was carried for the North Branch Muskoka River bridge and underpass at Sta. 17+125 (Highway 11 chainage) and at high fill 9+950 to 10+000 (East Service Road chainage). Details of subsurface data and preliminary recommendations are presented in a Preliminary Foundation Report, PML Ref: 09TF006B.



**TABLE S-1 – SOFT GROUND/SWAMPS**

ACCESS (INTERCHANGE) ALTERNATIVES		SOFT GROUND/SWAMPS DEPTHS AND FAVOURABILITY						WEIGHTED FAVOURABILITY VALUE(A <sub>i</sub> )	
		L1	F1	L2	F2	L3	F3		
		Depth Range ( 0 - 3 m )		Depth Range ( 3 - 10 m )		Depth Range ( >10 m )			
1	Interchange at Sta. 19+500 (Note 1) (Parclo B and Diamond)	440	5	160	3	—	1	<b>4.47</b>	A <sub>1</sub>
2	Interchange at Sta. 19+500 (Note 2) (Diamond)	450	5	830	3	—	1	<b>3.70</b>	A <sub>2</sub>
3	Interchange at Sta. 17+235 (Note 3) (Diamond)	20	5	650	3	—	1	<b>3.06</b>	A <sub>3</sub>
4	Underpass at Sta. 17+100 (Note 4)	120	5	300	3	—	1	<b>3.57</b>	A <sub>4</sub>
5a	Underpass at Sta. 17+100 (Note 5)	120	5	550	3	—	1	<b>3.36</b>	A <sub>5</sub>
5b	Underpass at Sta. 17+100 and East Service Road (Note 6)	240	5	980	3	—	1	<b>3.39</b>	A <sub>6</sub>
	1992 Recommended Plan (Note 3) (Interchange at Sta. 17+690)	70	5	390	3	—	1	<b>3.30</b>	A <sub>7</sub>

NOTES: Embankment lengths (L1, L2, L3) measured at ramps and approach fills.

Enter weighted favourability value A<sub>i</sub> in Table S-7.

Note 1: Includes underpass at Sta. 21+340 (Alpine Ranch Road) and east and west service roads from High Falls Road/Holiday Park Drive to interchange site.

Note 2: Includes east and west service roads from High Falls Road/Holiday Park Drive to All Pine Cabins Road/Alpine Ranch Road.

Note 3: Includes underpass at Sta. 21+340 (Alpine Ranch Road).

Note 4: Includes west side North Branch Muskoka River crossing and underpass at Sta. 21+340 (Alpine Ranch Road).

Note 5: Includes east side North Branch Muskoka River crossing and underpass at Sta. 21+340 (Alpine Ranch Road).

Note 6: Includes east side North Branch Muskoka River crossing.



TABLE S-2 – GROUNDWATER CONDITIONS

ACCESS (INTERCHANGE) ALTERNATIVES		GROUNDWATER DEPTHS AND FAVOURABILITY						WEIGHTED FAVOURABILITY VALUE(Ai)	
		L1	F1	L2	F2	L3	F3		
		Depth Range ( >5m )		Depth Range ( 1 - 5m )		Depth Range ( 0 -1 m )			
1	Interchange at Sta. 19+500 (Note 1) (Parclo B and Diamond)	910	5	8375	3	970	1	<b>2.99</b>	A <sub>1</sub>
2	Interchange at Sta. 19+500 (Note 2) (Diamond)	910	5	10760	3	1650	1	<b>2.89</b>	A <sub>2</sub>
3	Interchange at Sta. 17+235 (Note 3) (Diamond)	1020	5	3190	3	970	1	<b>3.02</b>	A <sub>3</sub>
4	Underpass at Sta. 17+100 (Note 4)	805	5	1240	3	420	1	<b>3.31</b>	A <sub>4</sub>
5a	Underpass at Sta. 17+100 (Note 5)	720	5	1290	3	670	1	<b>3.04</b>	A <sub>5</sub>
5b	Underpass at Sta. 17+100 and East Service Road (Note 6)	1590	5	4040	3	1220	1	<b>3.11</b>	A <sub>6</sub>
	1992 Recommended Plan (Note 3) (Interchange at Sta. 17+690)	600	5	4140	3	480	1	<b>3.05</b>	A <sub>7</sub>

NOTES: Refer to Notes 1, 2, 3, 4, 5 and 6 in Table S-1 for full description of alternatives.

Enter weighted favourability value A<sub>i</sub> in Table S-7.



TABLE S-3 – STRUCTURE FOUNDATIONS

ACCESS (INTERCHANGE) ALTERNATIVES		CONTEMPLATED STRUCTURE/INTERCHANGE SITE										WEIGHTED FAVOURABILITY VALUE(Ai)	
		Underpass At Sta. 17+100 (High Falls Road/Holiday Park Drive)		Highway 11 Interchange At Sta. 17+235 <sup>(1)</sup> Sta. 17+690 <sup>(2)</sup> Sta. 19+500 <sup>(3)</sup>		North Branch Muskoka River Bridge Widening		North Branch Muskoka River New Bridge (East <sup>(a)</sup> / West <sup>(b)</sup> of Highway 11) Crossings		Underpass At Sta. 21+340 (Alpine Ranch Road)			
Type	F1	Type	F2	Type	F3	Type	F4	Type	F5				
1	Interchange at Sta. 19+500 (Note 1) (Parclo B and Diamond)	—	—	B	4	—	—	—	—	A	5	4.50	A <sub>1</sub>
2	Interchange at Sta. 19+500 (Note 2) (Diamond)	—	—	B	4	—	—	—	—	—	—	4.00	A <sub>2</sub>
3	Interchange at Sta. 17+235 (Note 3) (Diamond)	—	—	B	4	B	4	A	5	A	5	4.50	A <sub>3</sub>
4	Underpass at Sta. 17+100 (Note 4)	B	4	—	—			A	5	A	5	4.67	A <sub>4</sub>
5a	Underpass at Sta. 17+100 (Note 5)	B	4	—	—	—	—	B	4	A	5	4.33	A <sub>5</sub>
5b	Underpass at Sta. 17+100 and East Service Road (Note 6)	B	4	—	—	—	—	B	4	—	—	4.00	A <sub>6</sub>
	1992 Recommended Plan (Note 3) (Interchange at Sta. 17+690)	—	—	B	4	—	—	—	—	A	5	4.50	A <sub>7</sub>

NOTES: Refer to Notes 1, 2, 3, 4, 5 and 6 in Table S-1 for full description of alternatives.

Enter weighted favourability value Ai in Table S-7.

A: Shallow Foundation, F = 5

B: Deep Foundation: Integral Abutments, F = 4; Others, F=3

<sup>(1)</sup> Alternative 3 Sta. (Highway 11 Chainage) <sup>(2)</sup> Alternative 1992 Recommended Sta. (Highway 11 Chainage) <sup>(3)</sup> Alternatives 1 and 2 Sta. (Highway 11 Chainage)

<sup>(a)</sup> Alternatives 5a and 5b <sup>(b)</sup> Alternatives 3, 4a and 4b



**TABLE S-4 – EMBANKMENT SETTLEMENT**

ACCESS (INTERCHANGE) ALTERNATIVES		SUBSOIL TYPE AND FAVOURABILITY FACTOR						WEIGHTED FAVOURABILITY VALUE(A <sub>i</sub> )	
		Less than 3 m Deep		3-10 m Deep		Deeper than 10 m			
		L1	L2	L3	L4	L5	L6		
		Sandy/Silty (F1=5)	Clayey (F2 =4)	Sandy/Silty (F3=4)	Clayey (F4 =3)	Sandy/Silty (F5=2)	Clayey (F6 =1)		
1	Interchange at Sta. 19+500 (Note 1) (Parclo B and Diamond)	420	480	9075	120	–	–	<b>4.03</b>	A <sub>1</sub>
2	Interchange at Sta. 19+500 (Note 2) (Diamond)	420	450	11460	830	–	–	<b>3.97</b>	A <sub>2</sub>
3	Interchange at Sta. 17+235 (Note 3) (Diamond)	900	20	2790	650	–	–	<b>4.06</b>	A <sub>3</sub>
4	Underpass at Sta. 17+100 (Note 4)	–	120	1240	300	–	–	<b>3.82</b>	A <sub>4</sub>
5a	Underpass at Sta. 17+100 (Note 5)	–	120	1290	550	–	–	<b>3.72</b>	A <sub>5</sub>
5b	Underpass at Sta. 17+100 and East Service Road (Note 6)	–	220	4810	1000	–	–	<b>3.83</b>	A <sub>6</sub>
	1992 Recommended Plan (Note 3) (Interchange at Sta. 17+690)	–	70	4140	410	–	–	<b>3.91</b>	A <sub>7</sub>

NOTES: Refer to Notes 1, 2, 3, 4, 5 and 6 in Table S-1 for full description of alternatives.  
Enter weighted favourability value A<sub>i</sub> in Table S-7.



**TABLE S-5 – EMBANKMENT STABILITY**

ACCESS (INTERCHANGE) ALTERNATIVES		EMBANKMENT REQUIRING SPECIAL OR CONVENTIONAL DESIGN				WEIGHTED FAVOURABILITY VALUE(A <sub>i</sub> )	
		L1	L2	L3	L4		
		Conventional Embankment (F1 = 5)	Embankment Requiring Subexcavation (F2 = 3)	Embankment Requiring Toe- Stabilizing Berms (F3 = 2)	Embankment Requiring pre- loading/ Wick Drains (F4 = 1)		
1	Interchange at Sta. 19+500 (Note 1) (Parclo B and Diamond)	9655	480	120	–	<b>4.87</b>	A <sub>1</sub>
2	Interchange at Sta. 19+500 (Note 2) (Diamond)	12040	1160	120	–	<b>4.80</b>	A <sub>2</sub>
3	Interchange at Sta. 17+235 (Note 3) (Diamond)	4510	670	–	–	<b>4.74</b>	A <sub>3</sub>
4	Underpass at Sta. 17+100 (Note 4)	2045	420	–	–	<b>4.66</b>	A <sub>4</sub>
5a	Underpass at Sta. 17+100 (Note 5)	2010	670	–	–	<b>4.50</b>	A <sub>5</sub>
5b	Underpass at Sta. 17+100 and East Service Road (Note 6)	5630	1220	–	–	<b>4.64</b>	A <sub>6</sub>
	1992 Recommended Plan (Note 3) (Interchange at Sta. 17+690)	4740	290	190	–	<b>4.78</b>	A <sub>7</sub>

NOTES: Refer to Notes 1, 2, 3, 4, 5 and 6 in Table S-1 for full description of alternatives.  
Enter weighted favourability value A<sub>i</sub> in Table S-7.



TABLE S-6 – CONSTRUCTION FEASIBILITY

ACCESS (INTERCHANGE)      ALTERNATIVES		REQUIRED NUMBER OF STRUCTURES				WEIGHTED FAVOURABILITY VALUE(A <sub>i</sub> )	
		Bridges		Major Culverts			
		Shallow Foundation (F=5)	Deep Foundation (F=4)	To be Constructed (F=4)	To be Extended (F=5)		
1	Interchange at Sta. 19+500 (Note 1) (Parclo B and Diamond)	1	1	—	1	<b>4.67</b>	A <sub>1</sub>
2	Interchange at Sta. 19+500 (Note 2) (Diamond)	—	1	4	1	<b>4.17</b>	A <sub>2</sub>
3	Interchange at Sta. 17+235 (Note 3) (Diamond)	2	2	—	—	<b>4.50</b>	A <sub>3</sub>
4	Underpass at Sta. 17+100      (Note 4)	2	1	—	—	<b>4.67</b>	A <sub>4</sub>
5a	Underpass at Sta. 17+100      (Note 5)	1	2	—	—	<b>4.33</b>	A <sub>5</sub>
5b	Underpass at Sta. 17+100 and East Service Road (Note 6)	—	2	2	—	<b>4.00</b>	A <sub>6</sub>
	1992 Recommended Plan (Note 3) (Interchange at Sta. 17+690)	1	1	2	—	<b>4.25</b>	A <sub>7</sub>

NOTES: Refer to Notes 1, 2, 3, 4, 5 and 6 in Table S-1 for full description of alternatives.

Enter weighted favourability value A<sub>i</sub> in Table S-7.

Embankment construction is considered not applicable for this Table on this project.

Bridge Foundations Favourability: Shallow F=5 and Deep F=4; Culvert Favourability: New F=4; Extension F=5;





**TABLE S-7 – SCORING OF FOUNDATION CRITERIA (ACCESS ALTERNATIVES)**

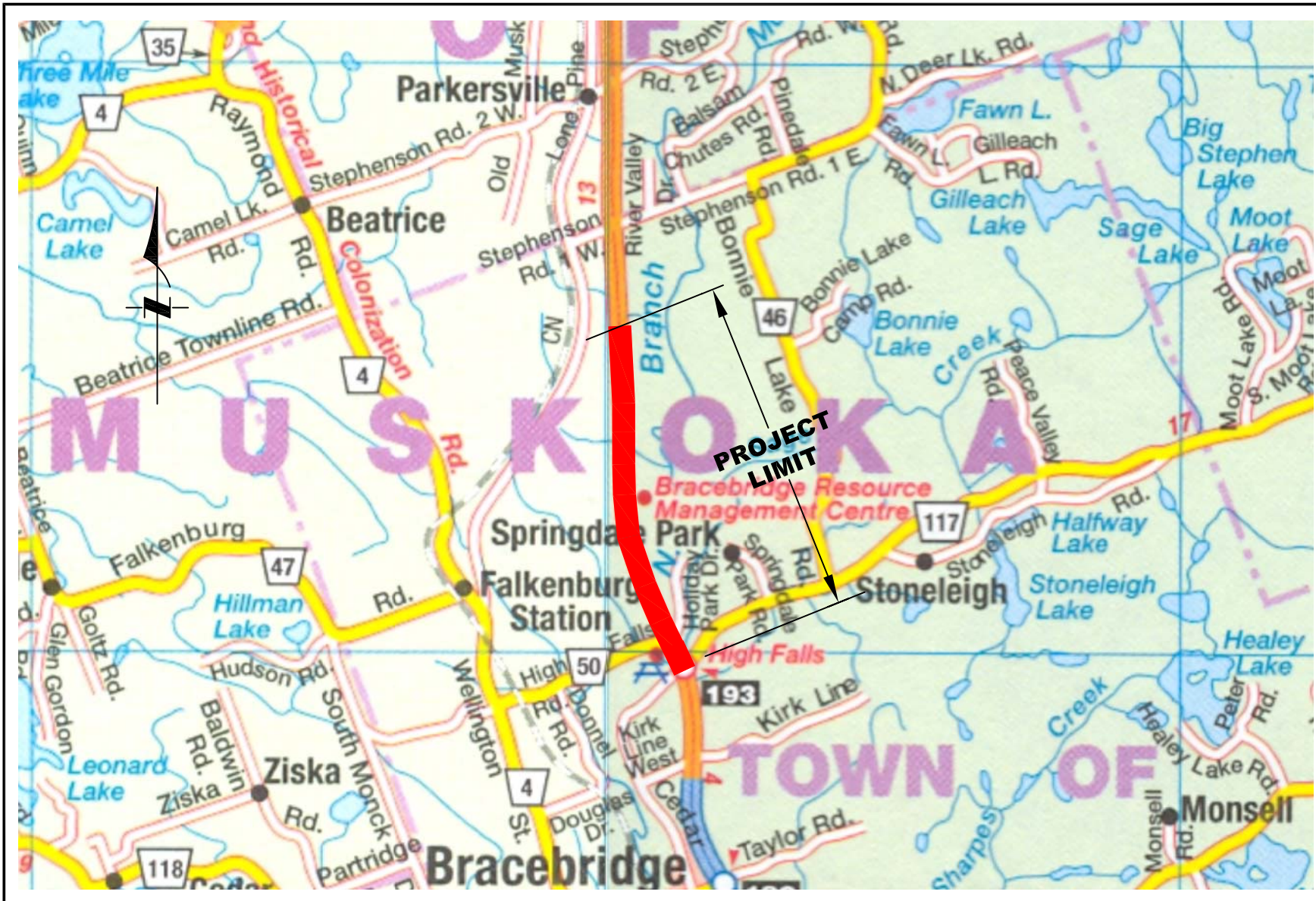
EVALUATION CRITERIA		SOFT GROUND/ SWAMPS		GROUNDWATER CONDITIONS		STRUCTURE FOUNDATIONS		EMBANKMENT SETTLEMENT		EMBANKMENT STABILITY		CONSTRUCTION FEASIBILITY		NORMALIZED SCORE	RANKING
TABLE No.		S1		S2		S3		S4		S5		S6			
IMPACT WEIGHT, Bi		0.10		0.15		0.25		0.20		0.20		0.10			
ACCESS ALTERNATIVES		Ai	Ni	Ai	Ni	Ai	Ni	Ai	Ni	Ai	Ni	Ai	Ni		
1	Interchange at Sta. 19+500 (Note 1) (Parclo B and Diamond)	4.47	1.00	2.99	0.90	4.50	0.96	4.03	0.99	4.87	1.00	4.67	1.00	4.87	1
2	Interchange at Sta. 19+500 (Note 2) (Diamond)	3.70	0.83	2.89	0.87	4.00	0.86	3.97	0.98	4.80	0.99	4.17	0.89	4.55	5
3	Interchange at Sta. 17+235 (Note 3) (Diamond)	3.06	0.69	3.02	0.91	4.50	0.96	4.06	1.00	4.74	0.97	4.50	0.96	4.69	3
4	Underpass at Sta. 17+100 (Note 4)	3.57	0.80	3.31	1.00	4.67	1.00	3.82	0.94	4.66	0.96	4.67	1.00	4.80	2
5a	Underpass at Sta. 17+100 (Note 5)	3.36	0.75	3.04	0.92	4.33	0.93	3.72	0.92	4.50	0.92	4.33	0.93	4.53	6
5b	Underpass at Sta. 17+100 and East Service Road (Note 6)	3.39	0.76	3.11	0.94	4.00	0.86	3.83	0.94	4.64	0.95	4.00	0.86	4.48	7
	1992 Recommended Plan (Note 3) (Interchange at Sta. 17+690)	3.30	0.74	3.05	0.92	4.50	0.96	3.91	0.96	4.78	0.98	4.25	0.91	4.66	4

NOTES: Refer to Notes 1, 2, 3, 4, 5 and 6 in Table S-1 for full description of alternatives.

Enter weighted favourability value Ai in Table S-7.

Ai - Weighted Favourability Value

Ni - Normalized Favourability Value



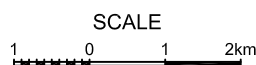
REFERENCE: THIS FIGURE WAS REPRODUCED FROM ONTARIO ROAD ATLAS – 2006 BY MAPART PUBLISHING CORP.

GEOCREs No.: 31E-304

# PROJECT LOCATION MAP HIGHWAY 11 ACCESS REVIEW

FROM MUSKOKA ROAD 117 / CEDAR LANE  
NORTHERLY FOR 6.3km

METRIC



Ontario



**Peto MacCallum Ltd.**  
CONSULTING ENGINEERS



Stantec Consulting Ltd.

**HIGHWAY 11**

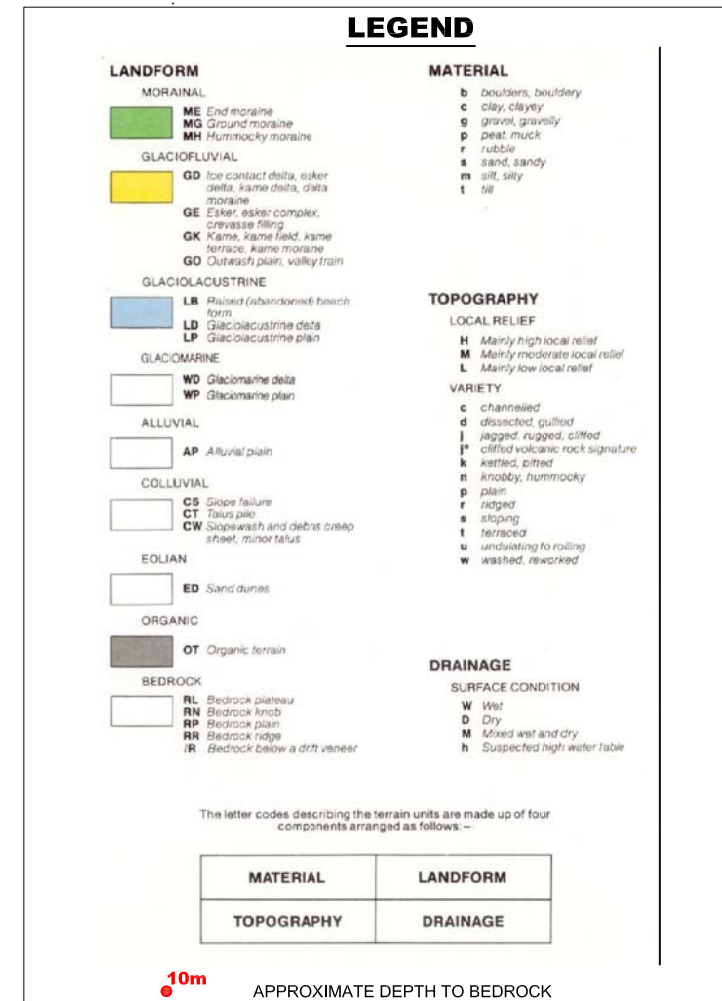
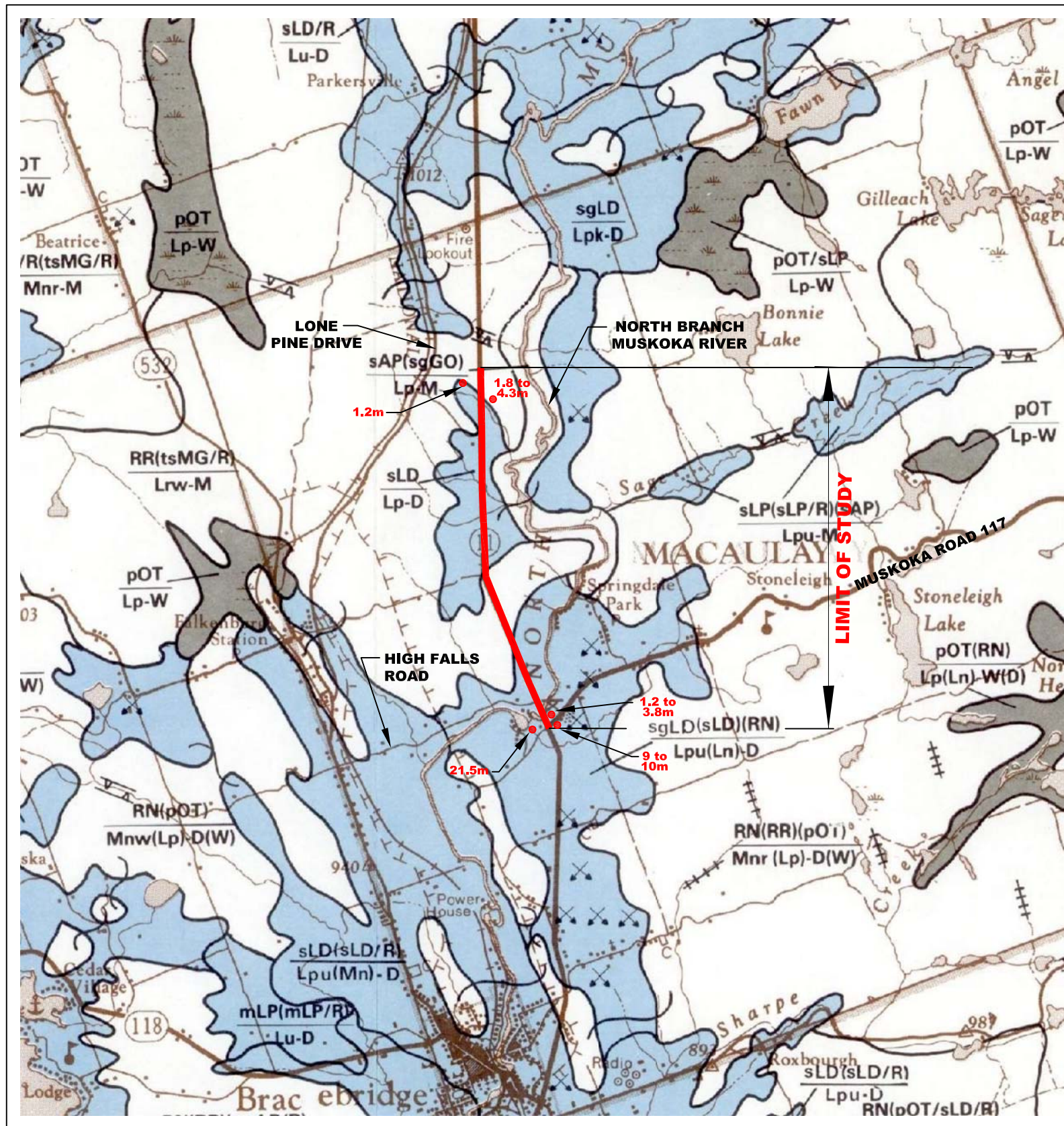
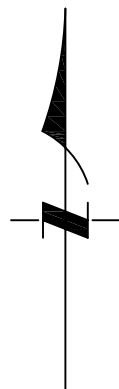
G.W.P. 322 - 00 - 00



FIGURE

1





REFERENCE: THIS DRAWING WAS REPRODUCED FROM ONTARIO GEOLOGICAL MAP 5504 FROM THE MINISTRY OF NATURAL RESOURCES, SOUTHERN ONTARIO ENGINEERING GEOLOGY TERRAIN STUDY, DATA BASE MAP MUSKOKA, SCALE: 1 : 100,000, PUBLISHED 1981.

GEOCRES No. : 31E-304

SITE GEOLOGY - SOILS AND BEDROCK DEPTHS  
HIGHWAY 11 ACCESS REVIEW  
FROM MUSKOKA ROAD 117 / CEDAR LANE  
NORTHERLY FOR 6.3km

METRIC

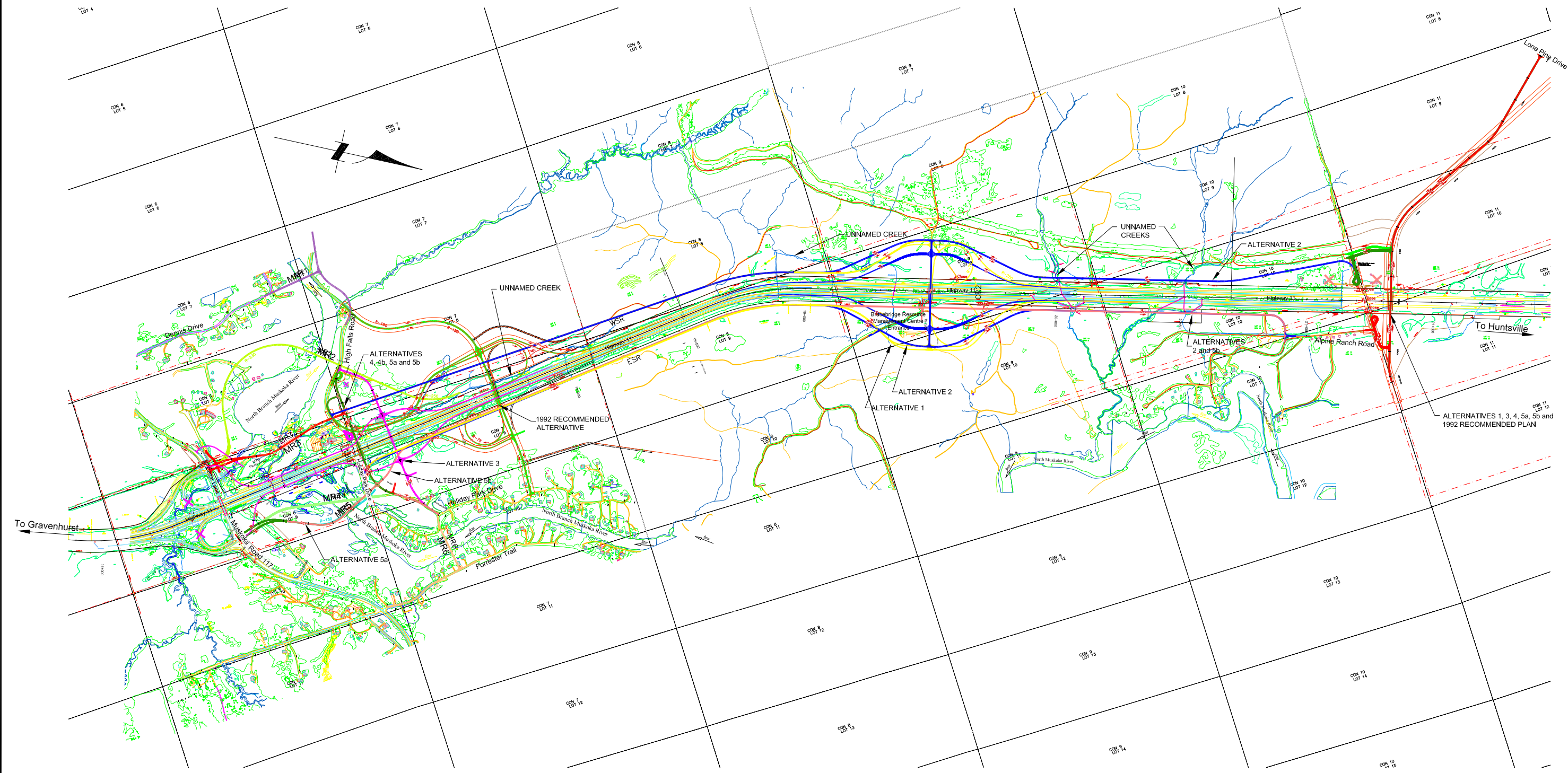


HIGHWAY 11  
G.W.P. 322 - 00 - 00



FIGURE  
2





REFERENCE: THIS DRAWING WAS PREPARED FROM STANTEC CONSULTING LIMITED DRAWING - 716\_design\_alternatives.dwg - DOWNLOADED FROM THEIR FTP SITE ON APRIL 14, 2010.

**LEGEND:**

**NORTH BRANCH MUSKOKA RIVER ALTERNATIVES**

MR1	MR5
MR2	MR6
MR3	
MR4	

**INTERCHANGE ALTERNATIVES**

ALTERNATIVE - 1	ALTERNATIVE - 5a
ALTERNATIVE - 2	ALTERNATIVE - 5b
ALTERNATIVE - 3	1992 RECOMMENDED
ALTERNATIVE - 4	

GEOCRES No. : 31E-304

NOTES:

1. BEDROCK OUTCROPS SHOWN ON PLAN ARE BASED ON EXISTING CONSTRUCTION DATA, SITE RECONNAISSANCE AND AERIAL PHOTOGRAPHS. THE SYMBOLS ON THE PLANS INDICATE THE LOCAL PRESENCE OF THE BEDROCK UNIT AND DO NOT REPRESENT THE FULL EXTENT OF EACH ROCK OUTCROP.
2. THE EXTENT OF SWAMPS, WATER BODIES AND FILL AREAS IS AS INTERPRETED FROM SITE RECONNAISSANCE, LONGITUDINAL PROFILES AND AERIAL PHOTOGRAPHS. THE AREAL EXTENTS SHOWN ON THE PLANS REPRESENT ESTIMATES ONLY AND ACTUAL AREAS MAY VARY FROM THOSE SHOWN.
3. ESTIMATED DEPTH TO COMPETENT GROUND AND OR BEDROCK IN SWAMPS IS BASED ON GEOLOGICAL EVIDENCE, DESKTOP LITERATURE SEARCH DATA AND LIMITED SITE RECONNAISSANCE INFORMATION AND MAY VARY SUBSTANTIALLY WITHIN THE LIMITS OF THE SWAMP.
4. THE GEOLOGIC UNIT SYMBOLS SHOWN ON THE PLANS REPRODUCE THOSE SHOWN ON GEOLOGIC MAPPING OF THE AREA AND ARE ONLY A GENERAL REPRESENTATION OF BEDROCK AND SOIL UNITS.
5. THE PLANS ARE AN ENCLOSURE TO THE ACCESS ALTERNATIVE SELECTION STUDY PREPARED BY PETO MACCALLUM LTD. THE DATA ON THESE PLANS MUST BE READ IN CONJUNCTION WITH THE REPORT.
6. THE DETAIL SHOWN ON THE PLAN IS CONSIDERED APPROPRIATE FOR ACCESS ALTERNATIVE SELECTION PURPOSES. WHEN THE PREFERRED ACCESS ALTERNATIVE HAS BEEN SELECTED, A SUBSURFACE INVESTIGATION SHOULD BE UNDERTAKEN TO DELINEATE THE STRATIGRAPHIC CONDITIONS ON A SITE SPECIFIC BASIS FOR PRELIMINARY AND DETAILED DESIGN PURPOSES.

LEGEND:

HIGHWAY 11 (EXISTING)

NORTH BRANCH MUSKOKA RIVER CROSSING ALTERNATIVES

MUSKOKA RIVER CROSSING MR1

MUSKOKA RIVER CROSSING MR2

MUSKOKA RIVER CROSSING MR3

MUSKOKA RIVER CROSSING MR4

MUSKOKA RIVER CROSSING MR5

MUSKOKA RIVER CROSSING MR6

INTERCHANGE ALTERNATIVES

ALTERNATIVE - 1

ALTERNATIVE - 2

ALTERNATIVE - 3

ALTERNATIVE - 4

ALTERNATIVE - 5a

ALTERNATIVE - 5b

1992 RECOMMENDED PLAN

BEDROCK OUTCROP (R O/C)

SAND AND GRAVEL PITS

SOFT GROUND / SWAMP

10m

ANTICIPATED DEPTH TO COMPETENT MATERIAL/BEDROCK

WATER BODY

GL (D)

GLACIOLACUSTRINE (DELTA)

M (G)

GROUND MORaine

BR (N)

BEDROCK (KNOBS)

BR (V)

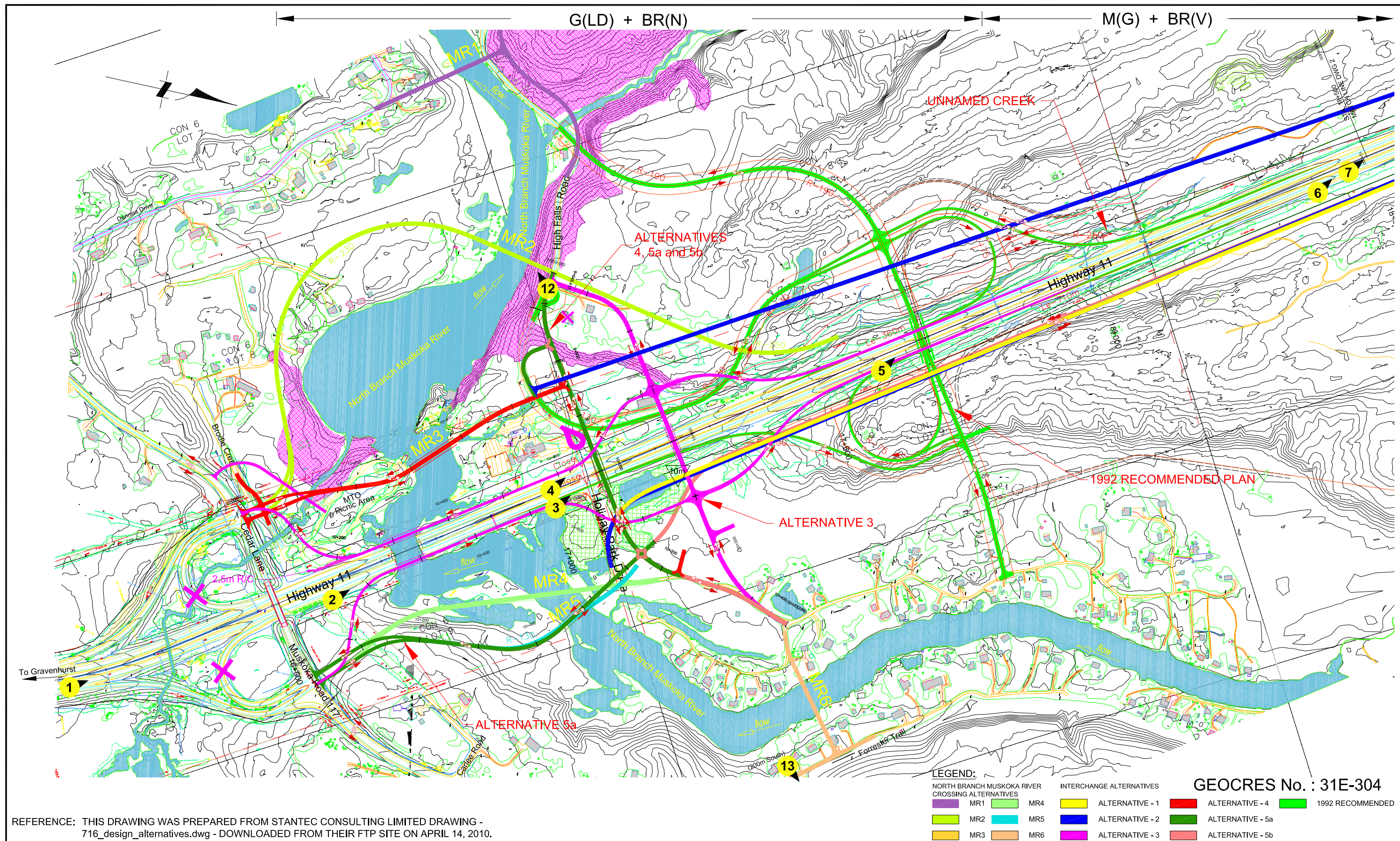
BEDROCK (VENEER OVER BEDROCK)

11

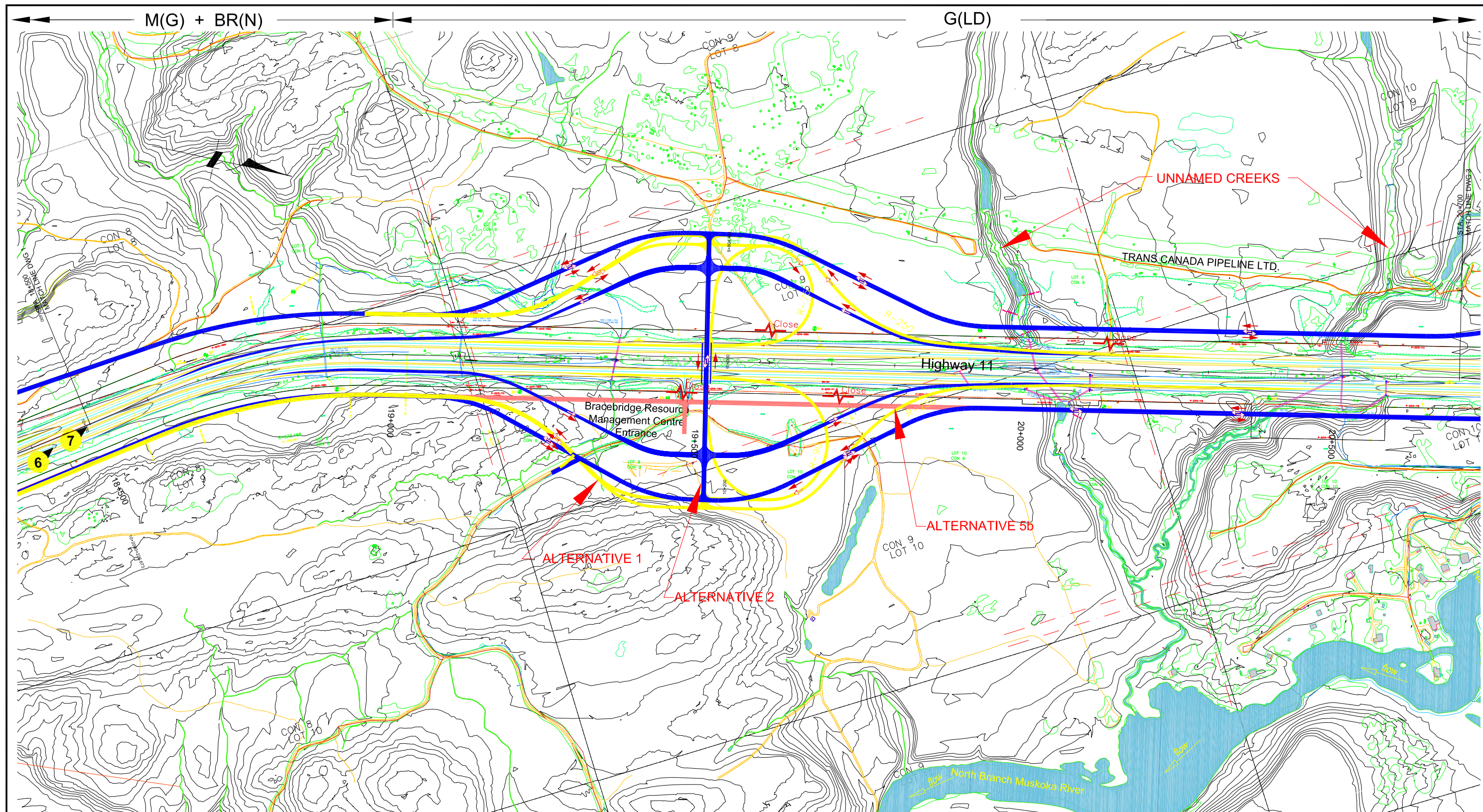
PHOTOGRAPH NUMBER  
(ARROW SHOWS DIRECTION OF VIEW)

GEOCRES No. : 31E-304









REFERENCE: THIS DRAWING WAS PREPARED FROM STANTEC CONSULTING LIMITED DRAWING -  
716\_design\_alternatives.dwg - DOWNLOADED FROM THEIR FTP SITE ON APRIL 14, 2010.

METRIC

STA. 18+500 TO 20+700 (TOWNSHIP OF MACAULAY)  
HIGHWAY 11 ACCESS REVIEW  
FROM MUSKOKA ROAD 117 / CEDAR LANE  
NORTHERLY FOR 6.3km

PLAN  
SCALE



LEGEND:

NORTH BRANCH MUSKOKA RIVER  
CROSSING ALTERNATIVES

- |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|
| MR1 | MR2 | MR3 | MR4 | MR5 | MR6 |
|-----|-----|-----|-----|-----|-----|

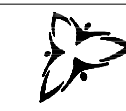
INTERCHANGE ALTERNATIVES

- |                 |                 |                 |
|-----------------|-----------------|-----------------|
| ALTERNATIVE - 1 | ALTERNATIVE - 2 | ALTERNATIVE - 3 |
|-----------------|-----------------|-----------------|

- |                 |                  |                  |
|-----------------|------------------|------------------|
| ALTERNATIVE - 4 | ALTERNATIVE - 5a | ALTERNATIVE - 5b |
|-----------------|------------------|------------------|

GEOCRES No. : 31E-304

1992 RECOMMENDED



Ontario



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Stantec Consulting Ltd.

HIGHWAY 11  
GWP No. 322-00-00

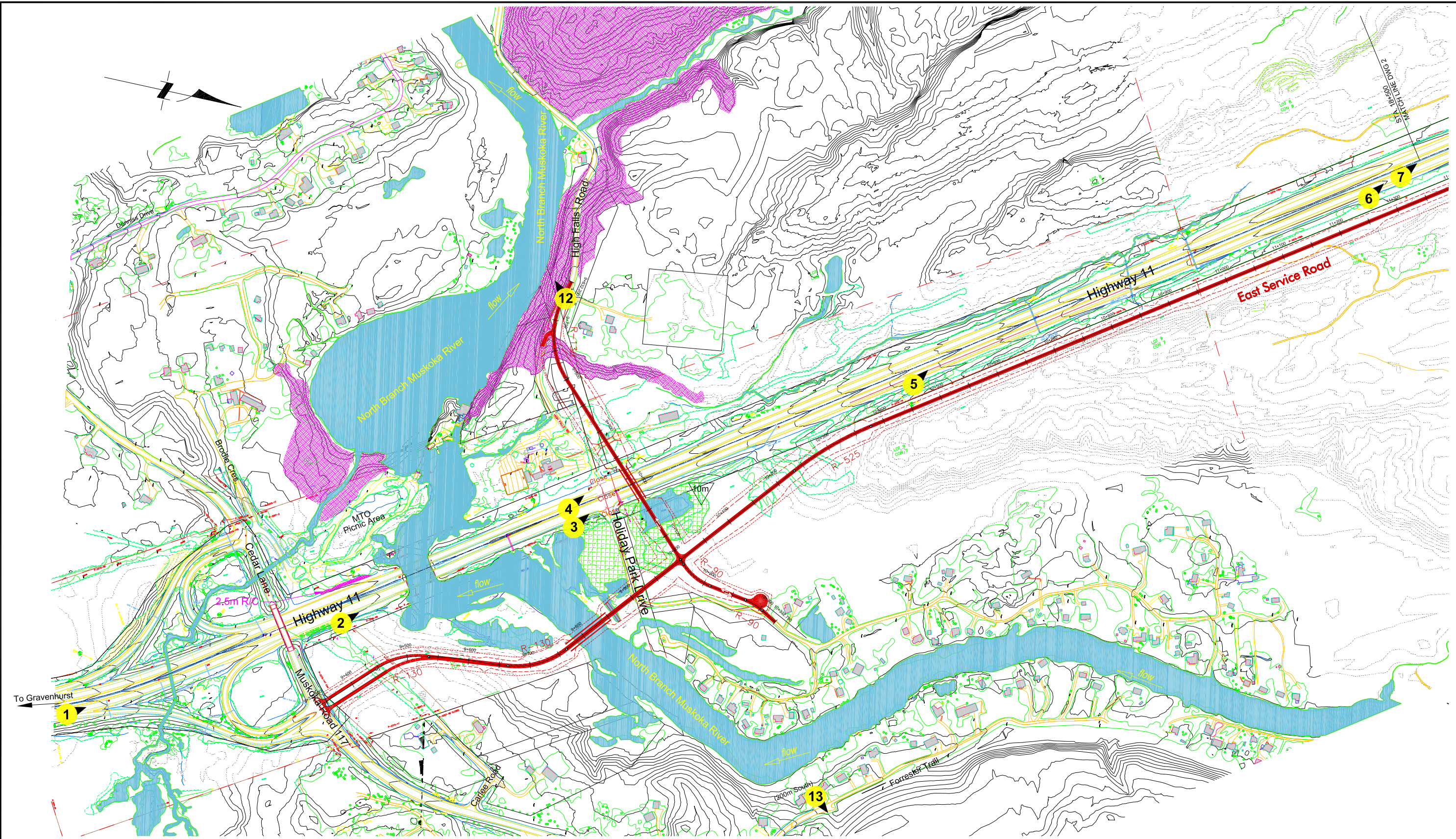


DRAWING  
B2











REFERENCE: THIS DRAWING WAS PREPARED FROM STANTEC CONSULTING LIMITED DRAWING - 716\_design\_alternatives.dwg - DOWNLOADED FROM THEIR FTP SITE ON APRIL 14, 2010.

GEOCREs No. : 31E-304

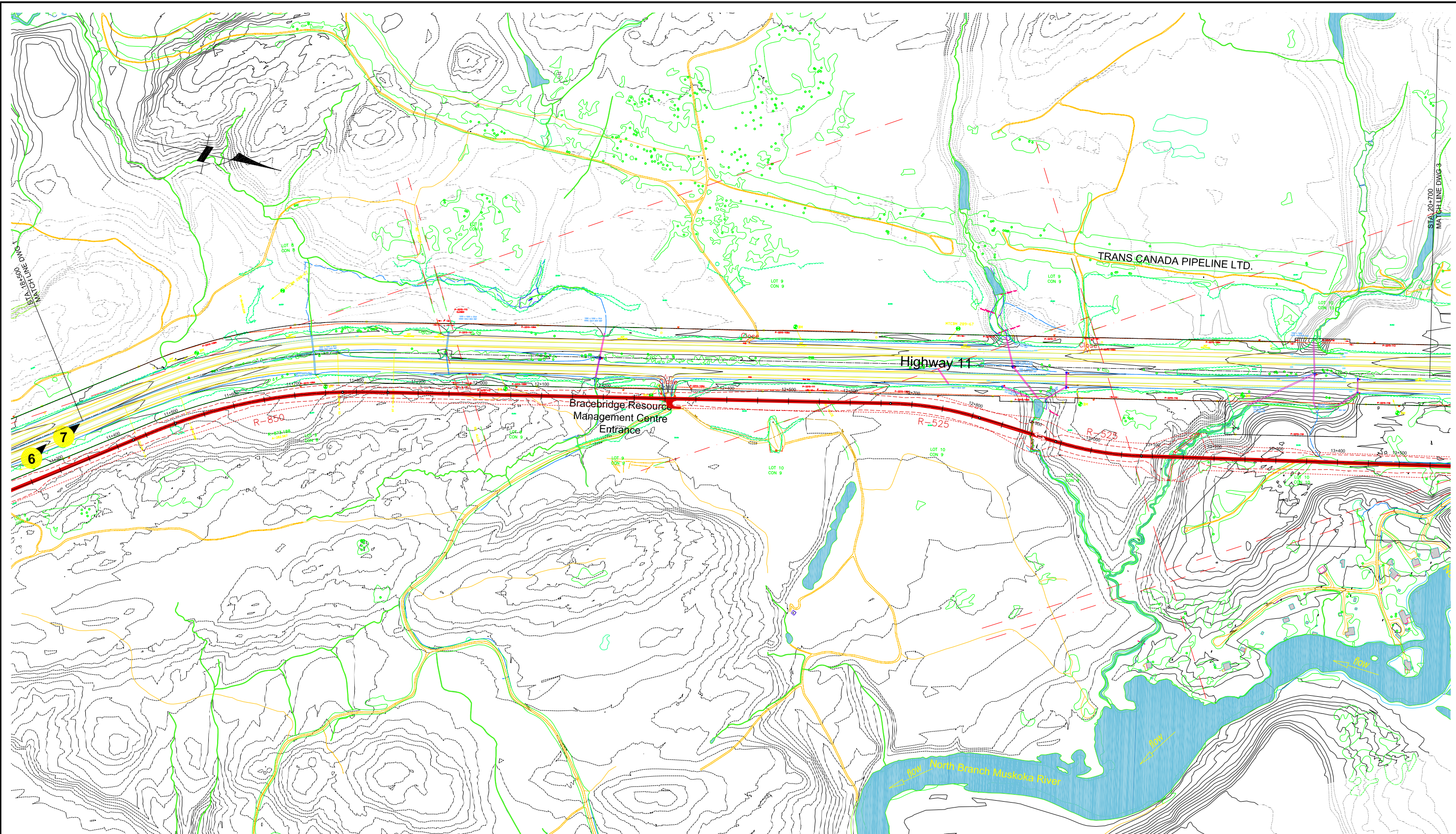
STA. 16+500 TO 18+500 (TOWNSHIP OF MACAULAY)  
HIGHWAY 11 PREFERRED ACCESS ALTERNATIVE  
FROM MUSKOKA ROAD 117 / CEDAR LANE  
NORTHERLY FOR 6.3km

METRIC



 Stantec Consulting Ltd.	
HIGHWAY 11 GWP No. 322-00-00	DRAWING C1





REFERENCE: THIS DRAWING WAS PREPARED FROM STANTEC CONSULTING LIMITED DRAWING -  
716\_design\_alternatives.dwg - DOWNLOADED FROM THEIR FTP SITE ON APRIL 14, 2010.

GEOCRES No. : 31E-304


STA. 16+500 TO 18+500 (TOWNSHIP OF MACAULAY)  
HIGHWAY 11 PREFERRED ACCESS ALTERNATIVE  
FROM MUSKOKA ROAD 117 / CEDAR LANE  
NORTHERLY FOR 6.3km


METRIC



**Ontario**

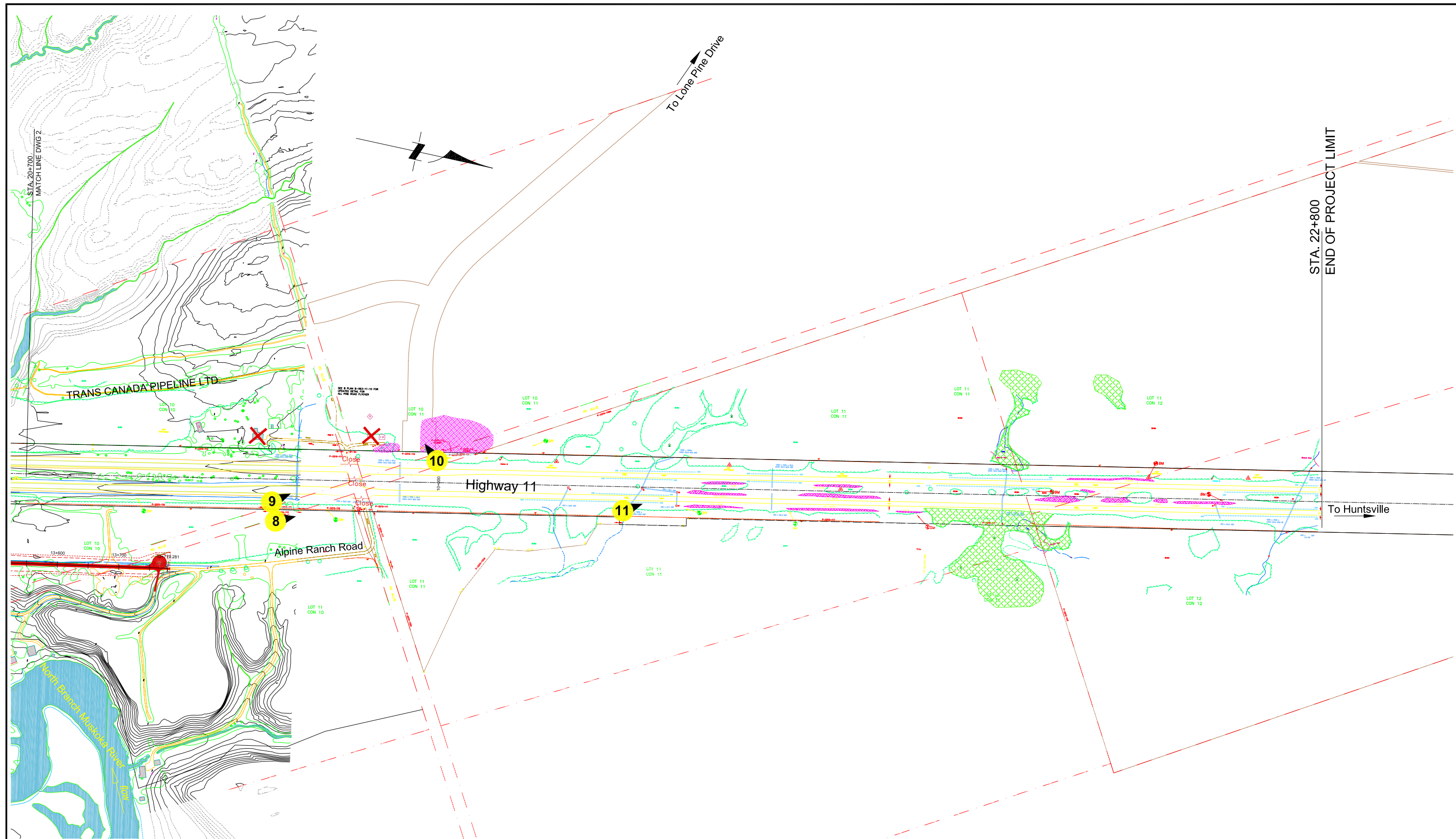
**Peto MacCallum Ltd.**  
CONSULTING ENGINEERS

**Stantec Consulting Ltd.**

**DRAWING**  
C2

HIGHWAY 11  
GWP No. 322-00-00



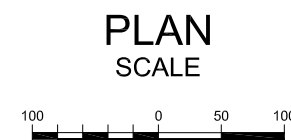


REFERENCE: THIS DRAWING WAS PREPARED FROM STANTEC CONSULTING LIMITED DRAWING -  
716\_design\_alternatives.dwg - DOWNLOADED FROM THEIR FTP SITE ON APRIL 14, 2010.

GEOCRES No. : 31E-304

STA. 16+500 TO 18+500 (TOWNSHIP OF MACAULAY)  
HIGHWAY 11 PREFERRED ACCESS ALTERNATIVE  
FROM MUSKOKA ROAD 117 / CEDAR LANE  
NORTHERLY FOR 6.3km

METRIC



HIGHWAY 11  
GWP No. 322-00-00



DRAWING  
C3



## **APPENDIX A**

### List of Reference Documents



## APPENDIX A

### LIST OF REFERENCE DOCUMENTS

HIGHWAY 11 ACCESS REVIEW  
FROM MUSKOKA ROAD 117/CEDAR LANE NORTHERLY FOR 6.3 KM  
TOWNSHIP OF MACAULAY, TOWN OF BRACEBRIDGE  
DISTRICT MUNICIPALITY OF MUSKOKA, ONTARIO  
GWP NO. 322-00-00

#### A. **Geological Maps**

- Ontario Geological Survey 1979, Southern Ontario Engineering Geology Terrain Study, Data Base Map, Muskoka, Map 5504, 31E/3, Scale 1 : 100 000
- Ontario Base Maps, Maps 10 17 6300 49900 and 10 17 6300 49950, Ministry of Natural Resources, Map Air Photography 1986, Published 2003
- Bedrock Geology of Ontario, Southern Sheet, Map 2544, Ministry of Northern Development and Mines, Published 1991

#### B. **Resource Documents**

- Aggregate Resources Assessment Open File Report 5417 and Map 31E/3, District Municipality of Muskoka, Bracebridge from the Ontario Geological Survey, Ministry of Natural Resources, issued 1983.
- Aggregate Resources Inventory Paper 147 and Map 2A, Towns of Bracebridge and Gravenhurst, Southern Ontario, Ontario Geological Survey, Ministry of Northern Development and Mines, issued 1990

#### C. **MTO Reports**

- Foundation Investigation report for Proposed Crossing of North Muskoka River and Highway 11 at High Falls, Township of Macaulay, Regional Municipality of Muskoka, WP 49-70-01, Geocres No. 31E-60, dated February 1972.
- Foundation Investigation Report for Highway 11 and Highway 117 Interchange, Site 42-174, District 11, Huntsville, W.P 32-77-02, Geocres No. 31E-87, dated April 1977.
- Preliminary Design Study for the Ultimate Freeway Design from Highway 169 Northerly to the North Junction of Muskoka Road 3, A Distance of 54 km, Selected Design Plates 4, 5 and 29, WP 341-87-00, dated June 1992.



**D. Well Records (See Appendix B)**

- Water Well Records provided by the Ministry of Environment from 1946 - 2009.

**E. Air Photo**

- Aerial Photographs 87-4504, 33-053 and 33-054 and 33-055
- Aerial Photographs 87-4505, 23-201 and 23-202
- Aerial Photographs 87-4506, 33-111 and 33-112



## **APPENDIX B**

### MOE Water Wells

## Well Computer Print Out Data as of September 25 2009

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TOWNSHIP CONCESSION (LOT)	UTM <sup>1</sup>	DATE <sup>2</sup> CNTR	CASING DIA <sup>4</sup>	WATER <sup>5,6</sup> DETAIL	STAT LVL/PUMP LVL <sup>7</sup> RATE <sup>8</sup> /TIME HR:MIN	WATER USE <sup>9</sup>	SCREEN INFO <sup>10</sup>	WELL # (AUDIT#) WELL TAG #	DEPTHS TO WHICH FORMATIONS EXTEND <sup>5,11</sup>
BRACEBRIDGE TOWN (MA) CON 05(004)	17 632364 4992354 <sup>L</sup>	1980/10 1366	06 06	FR 0355	057 / 015 / 1:0	DO		4204969 (82511) BLACK SILT 0010 GREY CLAY 0070 BLDR 0082 GREY GRNT 0185 GREY GRNT 0355 GRNT 0360	
BRACEBRIDGE TOWN (MA) CON 05(004)	17 632360 4992353 <sup>L</sup>	2001/08 3678	06 06	FR 0285	040 / 120 015 / 1:10	DO		4207893 (217618) GREY CLAY 0060 GREY SILT HPAN 0166 GREY ROCK 0285	
BRACEBRIDGE TOWN (MA) CON 05(004)	17 632364 4992354 <sup>L</sup>	1997/08 3665	06 06	FR 0105	043 / 100 005 / 1:0	DO	0106 04	4206697 (181906) BRWN SILT SAND 0024 GREY CLAY 0068 GREY SILT SAND 0105 BRWN SAND FGSD 0110	
BRACEBRIDGE TOWN (MA) CON 05(004)	17 632180 4992309 <sup>N</sup>	2002/07 3678	06 06	FR 0285	025 / 300 003 / 1:20	DO		4208253 (242217) BRWN GRVL 0003 GREY ROCK 0300	
BRACEBRIDGE TOWN (MA) CON 05(004)	17 632364 4992354 <sup>L</sup>	1987/10 1366	06 06	FR 0066	066 / 003 / 2:0	DO	0113 04	4203718 (19077) GREY CLAY 0058 GREY FSND 0117	
BRACEBRIDGE TOWN (MA) CON 05(004)	17 632615 4991974 <sup>N</sup>	1968/09 1102	02 02	FR 0196 FR 0150	060 / 060 010 / 2:0	DO		4200760 ( ) CLAY 0050 FSND 0096 GRNT 0196	
BRACEBRIDGE TOWN (MA) CON 05(004)	17 632615 4991974 <sup>N</sup>	1968/06 1102	02 02	FR 0147	060 / 060 010 / 2:0	DO		4200727 ( ) CLAY 0050 WHIT FSND 0096 GRNT 0150	
BRACEBRIDGE TOWN (MA) CON 05(005)	17 632965 4992424 <sup>N</sup>	1982/02 1366	06 06	FR 0350	092 / 002 / 1:30	DO		4202713 ( ) BRWN SAND CLAY 0043 BLACK GRNT 0095 GREY GRNT 0130 BLACK GRNT 0200 RED GRNT 0220 BLACK GRNT 0380	
BRACEBRIDGE TOWN (MA) CON 05(005)	17 632747 4992497 <sup>N</sup>	1989/02 1366	06 06	FR	096 / 002 / 1:0	DO		4204127 (49421) BRWN SAND 0004 GREY GRNT 0035 BLACK GRNT 0170 GRNT 0177 BLACK GRNT SOFT 0185 BLACK GRNT 0360	
BRACEBRIDGE TOWN (MA) CON 05(005)	17 632747 4992496 <sup>N</sup>	1999/04 1748	06 06	FR 0280	083 / 300 007 / 1:0	DO		4207207 (201227) BRWN CLAY SNDY DNSE 0090 GREY CLAY SLTY DNSE 0152 GREY CLAY SILT DNSE 0160 GREY GRNT 0400	
BRACEBRIDGE TOWN (MA) CON 05(006)	17 633140 4992644 <sup>L</sup>	1986/05 1748	06 06	FR 0160 UK 0275	050 / 280 001 / 1:0	DO		4203400 ( ) BRWN LOAM STNS 0008 RED GRNT 0280	
BRACEBRIDGE TOWN (MA) CON 05(006)	17 633140 4992644 <sup>L</sup>	1990/04 3678	06 06	FR 0028 FR 0305	018 / 350 003 / 1:10	DO	0024 03	4204700 (78834) BRWN SAND 0025 GREY ROCK 0350	
BRACEBRIDGE TOWN (MA) CON 05(006)	17 633215 4992224 <sup>N</sup>	1979/09 1366	06 06	FR 0315	081 / 320 001 / 1:30	DO		4202347 ( ) BRWN SAND 0032 GREY GRNT HARD 0320	
BRACEBRIDGE TOWN (MA) CON 05(006)	17 633140 4992644 <sup>L</sup>	1989/09 2550	06 06	FR	085 / 285 002 / 8:30	DO		4204391 (45987) BRWN SAND LOOS 0005 GREY CLAY SAND LOOS 0032 GREY GRNT SOFT DNSE 0400	
BRACEBRIDGE TOWN (MA) CON 05(006)	17 633140 4992644 <sup>L</sup>	1989/09 3678	06 06	FR 0070	020 / 003 / 1:5	DO		4204412 (69714) BRWN SAND 0069 BRWN GRVL 0070	



## Well Computer Print Out Data as of September 25 2009

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TOWNSHIP CONCESSION (LOT)	UTM <sup>1</sup>	DATE <sup>2</sup> CNTR <sup>3</sup>	CASING DIA <sup>4</sup>	WATER <sup>5,6</sup> DETAIL	STAT LVL/PUMP LVL <sup>7</sup> RATE <sup>8</sup> /TIME HR:MIN	WATER USE <sup>9</sup>	SCREEN INFO <sup>10</sup>	WELL # (AUDIT#) WELL TAG #	DEPTHS TO WHICH FORMATIONS EXTEND <sup>5,11</sup>
BRACEBRIDGE TOWN (MA) CON 05(006)	17 633088 4992449*	2004/07 3678	06	FR 0145	091 007 / 1:0	DO		4208950 (Z08692) A008700 BRWN SAND CLAY GRVL 0145	
BRACEBRIDGE TOWN (MA) CON 05(007)	17 633514 4992791*	1994/03 1748	06	FR	038 / 300 001 / 2:0	DO		4205912 (141013) YLLW SAND 0015 GREY LOAM 0035 RED GRNT 0400	
BRACEBRIDGE TOWN (MA) CON 05(008)	17 633806 4992590*	2004/04 1748	06	UK	013 / 004 / :0	DO		4208856 (Z01061) A000967 BRWN SAND LOAM 0011 RED GRNT 0500	
BRACEBRIDGE TOWN (MA) CON 05(009)	17 634264 4993076*	1989/03 1366	06 06	FR	106 / 012 / 2:0	DO		4204233 (49430) BRWN SAND 0002 GREY GRNT 0025 GREY GRNT 0165 GRNT 0170 BLACK GRNT 0415 BLACK GRNT 0540 RED GRNT 0550 BLACK GRNT 0575 BLACK GRNT VERY SOFT 0640	
BRACEBRIDGE TOWN (MA) CON 05(009)	17 634215 4992824*	1981/12 1366	06 06	FR 0303	055 / 009 / 1:0	IN		4202639 ( BRWN SAND 0007 BLACK GRNT 0050 RED GRNT LTCL 0060 GREY GRNT 0090 RED GRNT LTCL 0100 BLACK GRNT 0165 RED GRNT 0195 BLACK GRNT 0310	
BRACEBRIDGE TOWN (MA) CON 05(010)	17 634635 4993215*	2003/10 3678	06 06	FR 0170	006 / 105 010 / 1:10	DO		4208806 (267638) GREY CLAY 0006 BRWN SAND 0023 GREY ROCK 0180	
BRACEBRIDGE TOWN (MA) CON 05(011)	17 635010 4993362*	1999/08 3678	06 06	FR 0160	010 / 150 005 / 1:0	DO		4207339 (195854) GREY CLAY 0020 GREY GRVL SILT 0048 GREY ROCK 0160	
BRACEBRIDGE TOWN (MA) CON 05(013)	17 635762 4993651*	2002/05 7068	06 06	FR 0115	022 / 120 010 / 1:0	DO		4208479 (195183) BRWN SAND CLAY 0003 BLACK GRNT LYRD 0120	
BRACEBRIDGE TOWN (MA) CON 05(014)	17 636165 4993324*	1980/10 1366	06 06	FR 0360	063 / 045 / 1:0	DO		4202727 ( BRWN SAND 0002 GREY GRNT 0370	
BRACEBRIDGE TOWN (MA) CON 06(004)	17 631995 4993307*	1984/04 1366	06 06	FR 0120	/ 015 / :0	DO		4203237 ( BLACK GRNT 0140	
BRACEBRIDGE TOWN (MA) CON 06(004)	17 631995 4993307*	1986/04 2550	06	FR 0320 FR 0400	026 / 300 005 / 4:0	DO		4203226 ( BRWN FILL LOOS 0003 GREY GRNT SOFT DNSE 0400	
BRACEBRIDGE TOWN (MA) CON 06(004)	17 631995 4993307*	1995/08 1366	06 06	FR 0425	005 / 015 / 1:0	DO		4206303 ( BRWN GRVL FILL 0006 GREY GRNT 0440	
BRACEBRIDGE TOWN (MA) CON 06(005)	17 632376 4993448*	1997/12 3679	36	FR 0018	012 / 022 001 / 1:0	DO		4206798 (187589) BRWN SAND LOAM 0001 BRWN SAND 0003 GREY CLAY 0008 GREY CLAY FSND VERY 0022	
BRACEBRIDGE TOWN (MA) CON 06(006)	17 632761 4993593*	1988/04 1748	06	FR 0290	030 / 300 025 / 1:0	DO		4203787 (31673) YLLW SAND 0004 BLACK GRNT 0280 RED GRNT 0300	

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BRACEBRIDGE TOWN (MA CON 06(006))	17 632761 4993593 <sup>b</sup>	1987/05 1366	06 06	FR	080 / 001 / 1:0	DO		4203452 (00950)	BRWN LOAM BLDR 0001 BRWN GRVL BLDR SAND 0004 GREY GRNT 0130 WHIT QTZ 0135 BLCK GRNT 0240 GREY GRNT 0320 RED GRNT 0380 GREY GRNT 0395 BLCK GRNT 0405 GREY GRNT 0520 GREY GRNT 0560
BRACEBRIDGE TOWN (MA CON 06(006))	17 632715 4994074 <sup>a</sup>	1970/11 2512	05 05	FR 0248	050 / 100 005 / 0:30	DO		4200990 ( ) BRWN FSND 0034 GREY GRNT 0251	
BRACEBRIDGE TOWN (MA CON 06(006))	17 632465 4994024 <sup>a</sup>	1982/05 2550	06		018 / 350 / 1:0	DO		4202733 ( ) BRWN CGVL 0010 GREY GRNT SOFT DNSE 0350	
BRACEBRIDGE TOWN (MA CON 06(006))	17 632761 4993593 <sup>b</sup>	1985/09 1748	06	FR 0275	025 / 275 025 / 1:0	DO		4203133 ( ) YLLW SAND FILL LOAM 0004 BLCK GRNT 0275	
BRACEBRIDGE TOWN (MA CON 06(007))	17 633142 4993736 <sup>b</sup>	1989/05 1366	06 06	FR				4204234 (49468) BRWN SAND 0017 BRWN SAND GRVL 0035 GREY SAND VERY SLTY 0075 BRWN SAND BLDR 0099 GREY GRNT 0106 BLCK GRNT 0520 BLCK GRNT 0580 BLCK GRNT 0600	
BRACEBRIDGE TOWN (MA CON 06(007))	17 633435 4993474 <sup>a</sup>	1971/10 3732	02 02	FR 0212	042 / 042 002 / 2:0	DO		4201093 ( ) PRDG 0030 GREY SILT 0039 RED ROCK 0212	
BRACEBRIDGE TOWN (MA CON 06(007))	17 633354 4993307 <sup>a</sup>	1973/11 5461	02 02	FR 0182	037 / 120 005 / 1:10	DO		4201355 ( ) BRWN SAND 0035 GREY GRNT 0297	
BRACEBRIDGE TOWN (MA CON 06(007))	17 633142 4993736 <sup>b</sup>	1990/06 1748	06 06	FR 0200	025 / 050 / 1:0	DO		4204764 (88268) BRWN GRVL 0015 BLUE UNKN 0225	
BRACEBRIDGE TOWN (MA CON 06(007))	17 633142 4993736 <sup>a</sup>	1989/04 1366	06 06	UK				4204154 (49451) BRWN SAND 0007 GREY SAND 0028 GREY SILT GRVL 0044 BRWN SAND 0097 BLCK GRNT 0880	
BRACEBRIDGE TOWN (MA CON 06(007))	17 633415 4993274 <sup>a</sup>	1980/07 1366	06		060 / 002 / 1:15	DO		4202640 ( ) BRWN SAND 0064 BLCK GRNT 0250 RED GRNT 0400 GREY GRNT 0500	
BRACEBRIDGE TOWN (MA CON 06(007))	17 633142 4993736 <sup>a</sup>	1998/11 3679	36 30	FR 0036	036 / 037 002 / 12:0	DO		4207053 (187585) BRWN SAND LOAM 0001 BRWN SAND 0006 GREY SAND 0030 BRWN UNKN 0034 GREY SAND 0040	
BRACEBRIDGE TOWN (MA CON 06(007))	17 633405 4993594 <sup>a</sup>	1971/10 3732	02 02	FR 0300	038 / 038 006 / 2:0	DO		4201096 ( ) PRDG 0016 GREY SILT 0045 RED ROCK 0300	
BRACEBRIDGE TOWN (MA CON 06(007))	17 633142 4993736 <sup>a</sup>	1994/12 1748	06	FR 0200	021 / 300 003 / 1:0	DO		4206121 (151955) BRWN SAND 0010 GREY SAND CLAY 0055 BLCK GRNT 0070 GREY GRNT 0303	
BRACEBRIDGE TOWN (MA CON 06(007))	17 633215 4993974 <sup>a</sup>	1980/07 1366	06 06	FR 0400	032 / 002 / 1:0	DO		4202641 ( ) BRWN SAND 0019 BLCK GRNT 0100 RED GRNT 0250 GREY GRNT 0375 RED GRNT 0420	

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BRACEBRIDGE TOWN (MA CON 06(007))	17 633415 4993314 <sup>N</sup>	1970/07 2549	02 02	FR 0220	042 / 098 001 / 1:0	DO		4200923 ( ) YLLW MSND 0102 GREY GRNT 0220		
BRACEBRIDGE TOWN (MA CON 06(007))	17 633465 4993424 <sup>N</sup>	1974/10 2512	05 05	FR 0210	035 / 083 005 / 1:0	DO		4201437 ( ) BRWN SAND LOOS 0013 GREY GRNT SOFT 0217		
BRACEBRIDGE TOWN (MA CON 06(007))	17 633465 4993424 <sup>N</sup>	1970/07 2549	02 02	FR 0200	042 / 096 002 / 1:0	DO		4200922 ( ) YLLW MSND 0095 RED GRNT 0200		
BRACEBRIDGE TOWN (MA CON 06(007))	17 633435 4993474 <sup>N</sup>	1970/07 2549	02 02	FR 0210	040 / 106 001 / 1:0	DO		4200924 ( ) BRWN MSND CLAY 0042 GREY GRNT 0210		
BRACEBRIDGE TOWN (MA CON 06(007))	17 633142 4993736 <sup>L</sup>	1988/07 1366	06 06	FR 0280	021 / 020 / 1:0	DO		4203894 (36050) GREY GRNT 0122 BLACK GRNT 0150 GREY GRNT 0238 GREY GRNT 0268 RED GRNT 0278 GREY GRNT 0285 GREY GRNT 0300		
BRACEBRIDGE TOWN (MA CON 06(007))	17 633142 4993736 <sup>L</sup>	1994/12 3678	06 06	FR 0240	040 / 240 006 / 1:5	DO		4206143 (121335) BRWN SAND 0028 GREY ROCK 0240		
BRACEBRIDGE TOWN (MA CON 06(007))	17 633138 4993735 <sup>L</sup>	2003/07 2128	36	FR	009 / / :0	DO		4208562 (33806) UNKN 0015		
BRACEBRIDGE TOWN (MA CON 06(007))	17 633459 4993385 <sup>N</sup>	1973/04 5461	02 02	FR 0204	042 / 100 001 / 2:0	DO		4201256 ( ) BRWN FSND 0053 RED GRNT 0206		
BRACEBRIDGE TOWN (MA CON 06(007))	17 633142 4993736 <sup>L</sup>	1992/07 2550	06	FR 0068	036 / 060 006 / 1:0	DO		4205415 (095948) BRWN SAND LOOS 0068 BRWN CGVL WBRG 0074		
BRACEBRIDGE TOWN (MA CON 06(007))	17 633142 4993736 <sup>L</sup>	1989/01 1366	06 06	FR				4204155 (49412) BRWN SAND 0084 BRWN FSND VERY 0101 BLACK GRNT 0540 BRWN GRNT SNDY 0545		
BRACEBRIDGE TOWN (MA CON 06(007))	17 633142 4993736 <sup>L</sup>	1985/08 3678	06 06	FR 0300	030 / 005 / 1:5	DO		4204301 (64671) BRWN FSND 0100 GREY ROCK 0305		
BRACEBRIDGE TOWN (MA CON 06(007))	17 633142 4993736 <sup>L</sup>	1989/09 3678	06	FR 0098	025 / 002 / 1:5	DO		4204421 (59661) BRWN FSND 0045 BRWN GRVL 0047 BRWN FSND 0097 BRWN GRVL 0098		
BRACEBRIDGE TOWN (MA CON 06(007))	17 633142 4993736 <sup>L</sup>	1989/09 3678	06	FR 0107	025 / 004 / 1:5	DO		4204422 (64708) BRWN FSND 0045 BRWN GRVL 0047 BRWN FSND 0102 BRWN GRVL 0107		
BRACEBRIDGE TOWN (MA CON 06(007))	17 633142 4993736 <sup>L</sup>	1989/05 1748	06 06	FR 0280	025 / 002 / 1:0	DO		4204171 (62849) GREY SAND GRVL 0016 GREY GRNT 0300		
BRACEBRIDGE TOWN (MA CON 06(007))	17 633142 4993736 <sup>L</sup>	1988/07 1366	06		046 / 005 / 2:0	ST		4204022 (38858) BRWN SAND 0038 GREY GRNT 0075 GREY GRNT 0110 GREY GRNT 0120 GREY GRNT 0185 GREY GRNT HARD 0220 GREY GRNT 0230 GREN GRNT 0238 BRWN GRNT 0245 GREY GRNT 0252 BRWN GRNT 0360 UNKN 0460		

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BRACEBRIDGE TOWN (MA CON 06(008))	17 633519 4993876 <sup>L</sup>	1988/10 3679	36 48	FR 0016	016 / 028 020 / 1:30	DO CO		4204019 (41727)		BLACK LOAM 0001 BRWN SAND 0028
BRACEBRIDGE TOWN (MA CON 06(008))	17 633519 4993876 <sup>L</sup>	1999/05 3678	06 06	FR 0080	040 / 070 010 / 1:15	DO	0074 03	4207529 (208921)		BRWN FSND 0070 BRWN CSND 0080
BRACEBRIDGE TOWN (MA CON 06(008))	17 633519 4993876 <sup>L</sup>	1986/10 1366	06 06	FR	019 / / 1:0	DO		4203367 (00430)		BRWN UNKN 0001 GREY GRNT 0045 GREY GRNT 0060 WHIT GRNT 0065 GREY GRNT 0075 BLACK GRNT 0085 GREY GRNT 0100 GREY GRNT 0115 RED GRNT 0140 WHIT GRNT 0170 GREY GRNT 0300
BRACEBRIDGE TOWN (MA CON 06(008))	17 633515 4993876 <sup>L</sup>	2001/07 7068	06	FR 0100	031 / 064 011 / 7:0	DO	0113 04	4208067 (195258)		BRWN SAND GRVL 0036 GREY SAND 0071 BRWN MSND 0120
BRACEBRIDGE TOWN (MA CON 06(008))	17 633515 4993799 <sup>M</sup>	1975/07 2512	05			DO		4201522 ( )		BRWN SAND LOOS 0058 GREY CLAY GRVL LOOS 0062 GREY SILT LOOS 0063 GREY GRNT SOFT DNSE 0300
BRACEBRIDGE TOWN (MA CON 06(009))	17 633584 4994364 <sup>M</sup>	2004/09 3665						4209051 (218332)	A018172	
BRACEBRIDGE TOWN (MA CON 06(009))	17 633593 4994360 <sup>M</sup>	2004/10 3665						4209052 (220240)	A018174	
BRACEBRIDGE TOWN (MA CON 06(009))	17 633583 4994362 <sup>M</sup>	2004/08 3678	06 05	FR 0160	/ 185 004 / 1:0			4209064 (218353)	A018189	BRWN SAND GRVL 0016 GREY CLAY 0019 GREY SAND SLTY 0060 GREY GRNT 0310 RED GRNT 0315 GREY GRNT 0395
BRACEBRIDGE TOWN (MA CON 06(010))	17 634264 4994157 <sup>L</sup>	1995/08 1748	06	FR 0220	030 / 240 001 / 1:0	DO		4206263 ( )		BRWN SAND 0002 GREY CLAY 0105 BRWN SAND 0112 BLACK GRVL 0113 GREY GRNT 0280 BLACK GRNT 0300
BRACEBRIDGE TOWN (MA CON 06(010))	17 634264 4994157 <sup>L</sup>	1997/11 3678	06 06	FR 0190	030 / 185 003 / 1:0	DO		4206776 (187204)		BRWN SAND 0080 GREY ROCK 0108 GREY UNKN 0110 GREY UNKN 0190
BRACEBRIDGE TOWN (MA CON 06(010))	17 634260 4994157 <sup>L</sup>	2002/03 1312	06	FR 0095	030 / 080 025 / 1:0	DO		4208113 (212710)		SAND GRVL 0062 BLACK GRNT 0100
BRACEBRIDGE TOWN (MA CON 06(010))	17 634279 4994673 <sup>M</sup>	1973/11 2512	05 05	FR 0224	040 / 226 090 / 4:0	DO		4201349 ( )		BRWN GRVL 0027 GREY GRNT 0226
BRACEBRIDGE TOWN (MA CON 06(011))	17 634638 4994296 <sup>L</sup>	1991/10 2128	36		005 / 088 / 0:8	DO		4205337 (33814)		BLACK PEAT LOAM 0001 BRWN CLAY 0002 BRWN SAND HARD SNY 0006
BRACEBRIDGE TOWN (MA CON 06(011))	17 634638 4994296 <sup>L</sup>	2000/03 1748	06 06	FR 0290	044 / 400 007 / 2:0	DO		4207468 (204948)		YLLW SAND 0034 GREY SAND SLTY 0135 GREY GRNT 0400
BRACEBRIDGE TOWN (MA CON 06(011))	17 634655 4994784 <sup>M</sup>	1959/09 2550	05 05					4200402 ( )		MSND 0003 GRNT 0205

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BRACEBRIDGE TOWN (MA CON 06(011))	17 634638 4994296 <sup>L</sup>	1993/01 1748	06 06	FR 0140	065 / 030 / 1:0	DO		4205619 (128610) BRWN SAND 0008 BLCK GRNT 0145
BRACEBRIDGE TOWN (MA CON 06(011))	17 634634 4994296 <sup>L</sup>	2002/08 1312	06 06	FR 0295	050 / 150 100 / 1:0	DO		4208495 (251633) SAND GRVL 0028 BLCK GRNT 0250
BRACEBRIDGE TOWN (MA CON 06(011))	17 634545 4994767 <sup>*</sup>	2004/05 3678	06	FR 0020 FR 0427	/ 144 004 / 1:0	DO	0019 03	4209066 (Z08763) A008602 GREY ROCK 0445
BRACEBRIDGE TOWN (MA CON 06(011))	17 634675 4994724 <sup>*</sup>	1959/08 2550	05 05					4200401 ( ) GRNT 0050
BRACEBRIDGE TOWN (MA CON 06(012))	17 634915 4994844 <sup>*</sup>	1969/05 2512	05 05					4200783 ( ) MSND 0001 GREY GRNT 0200
BRACEBRIDGE TOWN (MA CON 06(016))	17 636525 4995025 <sup>L</sup>	1986/02 1413	06	FR 0039	012 / 021 015 / 1:30	IR	0035 04	4203159 ( ) BLCK SAND LOAM SOFT 0003 BRWN SAND DRY 0012 BRWN MSND 0040 BLCK FSND 0060 BLCK CLAY SOFT 0140 BLCK SAND SILT SOFT 0270 GREY CLAY GRNT HARD 0273
BRACEBRIDGE TOWN (MA CON 06(016))	17 636520 4995025 <sup>L</sup>	2003/10 1748	06 06	FR 0078 FR 0065	036 / 080 030 / 1:0	DO		4208663 (257120) BRWN LOAM 0002 GREY CLAY 0061 RED GRNT 0080
BRACEBRIDGE TOWN (MA CON 06(016))	17 636520 4995025 <sup>L</sup>	2004/10 1748	06	0140 0194	/ 004 / 1:0	DO		4209031 (206070) A006000 BRWN LOAM GRVL STNS 0007 RED GRNT 0195
BRACEBRIDGE TOWN (MA CON 06(016))	17 636520 4995025 <sup>L</sup>	2003/10 1748	06 06	FR 0100	028 / 098 005 / 1:0	DO		4208664 (257118) BRWN LOAM 0001 GREY CLAY 0096 BLCK SAND GRVL 0102 RED GRNT 0140
BRACEBRIDGE TOWN (MA CON 07(004))	17 631619 4994260 <sup>L</sup>	1992/11 1748	06	FR 0082	006 / 008 / 1:0	DO		4205588 (123883) BRWN FSND 0075 BLCK MGVL 0082
BRACEBRIDGE TOWN (MA CON 07(006))	17 632385 4994542 <sup>L</sup>	2003/10 7068	06 06	FR	039 / 109 005 / 6:0	DO		4208833 (260494) BRWN SAND 0020 BLCK GRNT LYRD 0340
BRACEBRIDGE TOWN (MA CON 07(007))	17 632767 4994683 <sup>L</sup>	2001/08 3678	06 06	UK 0065	010 / 050 010 / 1:10	DO	0058 04	4207892 (217637) BRWN SAND 0065
BRACEBRIDGE TOWN (MA CON 07(007))	17 632771 4994684 <sup>L</sup>	1997/12 1366	06 06	FR 0320	016 / 001 / 1:0	DO		4206812 (178341) BRWN SAND 0005 GREY SILT 0039 GREY GRNT 0400
BRACEBRIDGE TOWN (MA CON 07(007))	17 633165 4994324 <sup>*</sup>	0001		FR 0016	016 / / :0	DO		4202552 ( ) SAND 0020
BRACEBRIDGE TOWN (MA CON 07(010))	17 633865 4995424 <sup>*</sup>	1981/11 5461	02	FR 0197	018 / 090 001 / 2:0	DO		4202624 ( ) BRWN LOAM 0002 GREY GRNT 0200
BRACEBRIDGE TOWN (MA CON 07(010))	17 633865 4995574 <sup>*</sup>	1969/05 2549	02 02	FR 0093	004 / 023 002 / 1:0	DO		4200778 ( ) MSND 0021 GRNT 0093

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BRACEBRIDGE TOWN (MA CON 07(010))	17 633915 4995324*	1982/06 5461	02		005 / 028 005 / 2:0	DO		4202779 ( ) BRWN LOAM 0004 GREY GRNT 0147
BRACEBRIDGE TOWN (MA CON 07(010))	17 633895 4995104*	1996/08 2550	06		006 / 072 010 / 3:0	DO		4206461 (168260) BRWN GRVL BLDR PKCD 0164 GREY GRNT HARD DNSE 0370
BRACEBRIDGE TOWN (MA CON 07(010))	17 633765 4995274*	1977/08 5461	02	FR 0110 FR 0112	018 / 090 003 / 2:0	DO		4201920 ( ) RED GRNT 0115
BRACEBRIDGE TOWN (MA CON 07(010))	17 633895 4995104*	1992/10 1748	06	FR 0053	015 / 006 / 1:0	DO	0052 04	4205531 (123845) BRWN FSND 0052 BLACK GRNT 0055
BRACEBRIDGE TOWN (MA CON 07(010))	17 633815 4995224*	1981/07 5461	02	FR 0152 FR 0160	012 / 090 002 / 2:0	DO		4202573 ( ) RED GRNT 0165
BRACEBRIDGE TOWN (MA CON 07(010))	17 633895 4995104*	1998/06 1748	06 06	FR 0212	016 / 220 004 / 1:0	DO		4206935 (181258) BLACK LOAM MUCK STNS 0004 RED GRNT 0220
BRACEBRIDGE TOWN (MA CON 07(010))	17 633895 4995104*	1996/10 1366	06 05	FR 0230 FR 0200	018 / 008 / 1:0	DO		4206549 (161734) GREY GRNT DKCL LYRD 0260
BRACEBRIDGE TOWN (MA CON 07(010))	17 633895 4995104*	1994/07 1366	06 06	FR 0160	002 / 002 / 1:0	DO		4205983 (129350) GREY GRNT 0120 GREY GRNT 0220
BRACEBRIDGE TOWN (MA CON 07(010))	17 633765 4995484*	1968/07 2549	02 02	FR 0081	020 / 026 002 / 2:0	DO		4200712 ( ) MSND 0004 GRNT 0081
BRACEBRIDGE TOWN (MA CON 07(011))	17 634267 4995243*	2000/02 3679	30 36	UK 0011	011 / 016 004 / 2:30	DO		4207458 (202016) BRWN SAND LOAM 0001 BRWN GRVL 0003 UNKN 0008 BRWN SAND 0021
BRACEBRIDGE TOWN (MA CON 07(011))	17 634263 4995243*	2001/09 3678	06 06	FR 0295	010 / 195 005 / 1:10	DO	0037 03	4207950 (235777) BRWN SAND 0037 GREY ROCK 0300
BRACEBRIDGE TOWN (MA CON 07(011))	17 634515 4994924*	1976/09 3665	06	FR 0240	050 / 001 / :0	DO		4201688 ( ) BRWN SAND BLDR GRVL 0070 BLACK ROCK 0243
BRACEBRIDGE TOWN (MA CON 07(011))	17 634515 4995024*	1981/09 2550	06	FR 0370	060 / 168 012 / 1:0	DO		4202606 ( ) BRWN CGVL 0050 GREY GRNT HARD DNSE 0380
BRACEBRIDGE TOWN (MA CON 07(011))	17 634465 4994824*	1977/07 3665	06	UK 0137 FR 0283 FR 0075	070 / 002 / 1:0	DO		4202254 ( ) BRWN FSND FGVL DRY 0017 BRWN GRVL DRY 0025 BLACK GRNT 0325
BRACEBRIDGE TOWN (MA CON 07(011))	17 634015 4995524*	1983/07 5461	02	FR 0023 FR 0059	008 / 090 001 / 3:0	DO	0020 04	4202917 ( ) BRWN FSND 0024 RED GRNT 0310
BRACEBRIDGE TOWN (MA CON 07(012))	17 634647 4995386*	1988/10 1366	06	FR 0095	005 / 050 / 1:0	DO		4204020 (38827) BRWN SAND SLTY 0027 BRWN SAND STNS 0063 BRWN SAND STNS ROCK 0077 GREY GRNT 0082 GREY GRNT 0095 GREY GRNT 0100



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BRACEBRIDGE TOWN (MA CON 07(012))	17 634647 4995386 <sup>L</sup>	1997/08 3665	06	FR 0078	021 / 050 012 / 1:0	DO	0082 03	4206701 (181889) BRWN SAND CGRD 0019 BRWN SILT SAND 0078 BRWN SAND 0085		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634647 4995386 <sup>L</sup>	1996/02 1366	06 06	FR 0544	057 / 050 / 1:0	DO		4206402 (145887) BRWN SAND 0003 GREY GRNT LYRD 0544		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634965 4995024 <sup>*</sup>	1977/08 1366	06 06	FR 0200	030 / 003 / 1:0	DO		4202023 () PRDG 0015 GREY GRNT 0345		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634715 4995724 <sup>*</sup>	1979/06 2550	06	FR 0076	038 / 065 004 / 1:0	DO	0068 09	4202289 () GREY SAND SILT LOOS 0066 GREY SAND WREG 0076		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634655 4995744 <sup>*</sup>	1966/09 1102	02	FR 0090	018 / 002 / 2:0	DO		4200404 () FSND 0010 QSND 0094		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634647 4995385 <sup>L</sup>	1997/08 3665	06	FR 0069	020 / 065 006 / 2:30	DO	0072 03	4206699 (181884) BRWN SAND CGRD 0020 BRWN SILT SAND 0069 GREY GRVL SAND SILT 0075		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634647 4995386 <sup>L</sup>	1996/01 1366	06 06	FR 0530	051 / 040 / 1:0	DO		4206401 (145885) BRWN SAND DRY 0022 GREY GRNT 0530		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634647 4995386 <sup>L</sup>	1989/06 3678	06 06	FR 0350	010 / 001 / 1:5	DO		4204262 (64702) GREY SAND 0052 GREY ROCK 0360		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634647 4995386 <sup>L</sup>	1984/05 5461	24	FR 0180 FR 0248	030 / 090 010 / 3:0	DO		4203040 () BRWN FSND 0070 RED GRNT 0260		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634915 4995124 <sup>*</sup>	1976/10 2512	05	FR 0352	/ 362 001 / 1:0	DO		4201846 () BRWN SAND LOOS 0050 GREY GRNT HARD DNSE 0362		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634647 4995386 <sup>L</sup>	1991/04 1748	06	FR 0083	006 / 006 / 1:0	DO		4205048 (43124) BRWN MSND BLDR CGVL 0075 GREY CGVL 0083 BLCK GRNT 0085		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634452 4995941 <sup>*</sup>	1974/09 2512	05 05	FR 0095	003 / 022 020 / 1:0	DO		4201422 () BRWN SAND BLDR 0004 GREY GRNT 0097		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634582 4995709 <sup>*</sup>	2006/03 7249	06	0120	/ / :0	DO		4209579 (245021) A040450 GREY FSND 0100 RED GRVL PKD 0105 BLCK GRNT 0115 BLCK GRNT HARD 0125		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634765 4995249 <sup>*</sup>	1975/11 5461	02	FR 0086	/ / 1:0			4201592 () BRWN FSND 0035 RED GRNT 0280		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634815 4995474 <sup>*</sup>	1974/10 5461	02	FR 0110	080 / 120 / 1:30			4201443 () PRDR 0015 BRWN SAND 0065 RED GRNT 0262		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634647 4995385 <sup>L</sup>	1999/03 1748	06 06	FR	017 / 300 001 / 2:0	DO		4207185 (201215) BRWN SAND STNS CSND 0004 GREY SAND CSND 0028 GREY SAND SILTY FSND 0063 RED GRNT 0400		
BRACEBRIDGE TOWN (MA CON 07(012))	17 634615 4995774 <sup>*</sup>	1977/07 2512	05	FR 0038	010 / 022 004 / 1:0	DO	0035 09	4201905 () YLLW SAND PKD 0038 GREY SAND LOOS WREG 0045		

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BRACEBRIDGE TOWN (MA CON 07(012))	17 634647 4995386 <sup>L</sup>	1989/04 1748	06 06 06	FR 0440	/ 015 / 1:0	DO		4204172 (54690) BRWN LOAM 0001 GREY GRNT 0442	
BRACEBRIDGE TOWN (MA CON 07(012))	17 634647 4995386 <sup>L</sup>	1987/11 1366	06 06 06	FR	063 / 390 002 / 1:0	DO		4203728 (19098) BRWN LOAM BLDR 0002 GREY GRNT 0055 GREY GRNT 0080 GREY GRNT 0085 GREY GRNT 0095 GREY GRNT 0125 GREY GRNT 0210 GREY GRNT 0285 GREY GRNT 0295 GREY GRNT 0440	
BRACEBRIDGE TOWN (MA CON 07(012))	17 634643 4995385 <sup>L</sup>	2002/12 7068	06 06 06	FR 0095	031 / 120 010 / 2:0	DO	0053 04	4208482 (244146) BRWN SAND 0050 BRWN SAND GRVL LYRD 0057 BLCK GRNT LYRD 0100	
BRACEBRIDGE TOWN (MA CON 07(012))	17 634643 4995385 <sup>L</sup>	2000/09 3678	06 06 06	FR 0063	018 / 050 010 / 1:5	DO	0054 03	4207652 (217574) BRWN FSND 0042 BRWN CSND 0063	
BRACEBRIDGE TOWN (MA CON 07(012))	17 634647 4995386 <sup>L</sup>	1982/05 1748	06 06 06	FR 0079	030 / 488 003 / 1:0	DO		4204251 (62848) BRWN SAND 0035 GREY GRNT 0500	
BRACEBRIDGE TOWN (MA CON 07(012))	17 634715 4995924 <sup>*</sup>	1980/10 2550	06	FR 0079	040 / 064 015 / 1:0	DO		4202481 ( ) BRWN SAND LOOS 0040 GREY SAND CLAY WBRG 0060 YLLW SILT SNDY STKY 0076 BRWN CGVL WBRG 0079	
BRACEBRIDGE TOWN (MA CON 07(013))	17 635022 4995528 <sup>L</sup>	2001/08 3678	06 06 06	FR 0300	020 / 280 001 / 1:10	DO		4207894 (217638) BRWN SAND CLAY 0012 GREY GRNT 0305	
BRACEBRIDGE TOWN (MA CON 07(013))	17 635026 4995528 <sup>L</sup>	1985/07 5461	02	FR 0170 FR 0189	016 / 090 002 / 3:0	DO		4203229 ( ) BRWN LOAM 0001 GREY GRNT 0191	
BRACEBRIDGE TOWN (MA CON 07(013))	17 635026 4995528 <sup>L</sup>	1998/10 3678	06 06 06	FR 0030 FR 0200	020 / 280 002 / 2:20	DO	0030 03	4207046 (195910) BRWN SAND 0030 BRWN GRNT 0092 GREY GRNT 0285	
BRACEBRIDGE TOWN (MA CON 07(014))	17 635401 4995670 <sup>L</sup>	1998/02 1366	06 05 06	FR 0330	015 / 001 / 1:0	DO		4206849 (190704) BLCK LOAM 0001 GREY GRNT 0400	
BRACEBRIDGE TOWN (MA CON 07(015))	17 634795 4995214 <sup>*</sup>	1971/07 2512	05	FR 0053	028 / 050 005 / 2:0	DO	0053 07	4201045 ( ) GREY MSND 0020 RED CSND 0040 GREY MSND 0053 BRWN CSND 0060	
BRACEBRIDGE TOWN (MA CON 07(016))	17 635932 4996018 <sup>*</sup>	2004/09 3678	06	FR 0062	/ 029 004 / 1:0	DO	0060 03	4209117 (218364) A018208 GREY CLAY 0050 BRWN SAND GRVL 0065	
BRACEBRIDGE TOWN (MA CON 07(016))	17 636153 4995963 <sup>L</sup>	1989/04 4644	36	FR 0015	018 / 110 / 15:0	DO		4204152 (19383) RED SAND 0015 BLUE CLAY 0030	
BRACEBRIDGE TOWN (MA CON 07(016))	17 636153 4995963 <sup>L</sup>	1998/10 3678	06 06 06	FR 0390	035 / 400 003 / 1:40	DO		4207005 (195905) BRWN SAND 0019 GREY GRNT 0405	
BRACEBRIDGE TOWN (MA CON 07(016))	17 636153 4995963 <sup>L</sup>	1990/09 3665	06 06 06	FR 0480	040 / 002 / 2:0	DO		4204881 (87641) GREY GRNT 0485	
BRACEBRIDGE TOWN (MA CON 07(016))	17 636105 4995724 <sup>*</sup>	1971/06 2512	05 05 06	FR 0142 FR 0230	015 / 300 001 / 1:0	DO		4201031 ( ) GREY CLAY 0029 GREY GRNT 0300	



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BRACEBRIDGE TOWN (MA CON 07(016))	17 636153 4995963 <sup>L</sup>	1990/08 3678	06 06	FR 0370	025 / 460 215 / 1:10	DO		4204786 (69743) BRWN SAND 0022 BRWN GRVL 0030 GREY ROCK 0460		
BRACEBRIDGE TOWN (MA CON 07(016))	17 636149 4995963 <sup>L</sup>	2003/08 1748	06 06		008 / 300 005 / 1:0	DO		4208595 (257184) BRWN LOAM STNS 0004 GREY CLAY GRVL 0006 RED GRNT 0400		
BRACEBRIDGE TOWN (MA CON 07(016))	17 636115 4995774 <sup>*</sup>	1974/11 5461	02 02	FR 0112 FR 0181	023 / 120 001 / 2:0	DO		4201442 ( ) GREY CLAY 0005 RED GRNT 0195		
BRACEBRIDGE TOWN (MA CON 07(016))	17 636153 4995963 <sup>L</sup>	1997/08 3665	06 06	FR 0051 FR 0261	012 / 295 001 / 1:30	DO		4206698 (176665) GREY CLAY 0041 BRWN SAND SILT FGRD 0049 BRWN GRVL SAND SILT 0050 GREY GRNT 0305		
BRACEBRIDGE TOWN (MA CON 07(016))	17 636153 4995963 <sup>L</sup>	1988/11 3679	36	FR 0029	018 / 029 002 / 1:0	DO		4204021 (41718) BLACK LOAM 0002 GREY CLAY 0029 BLDR		
BRACEBRIDGE TOWN (MA CON 07(016))	17 636235 4995474 <sup>*</sup>	1983/09 2550	05 05	FR 0280	028 / 292 / 1:0	DO		4200405 ( ) CLAY 0040 MSND BLDR 0046 GREY GRNT 0292		
BRACEBRIDGE TOWN (MA CON 07(016))	17 636153 4995963 <sup>L</sup>	1990/10 1366	06 06	FR	048 / 001 / 1:0	DO		4206382 (82509) BRWN SAND FILL 0004 BLACK SILT 0016 GREY GRNT 0070 GREY GRNT 0560		
BRACEBRIDGE TOWN (MA CON 07(016))	17 636115 4995824 <sup>*</sup>	1979/09 1366	06 06	FR 0175	115 / 260 001 / 2:0	DO		4202348 ( ) BRWN SAND BLDR PKD 0004 GREY GRNT HARD 0260		
BRACEBRIDGE TOWN (MA CON 07(016))	17 636153 4995963 <sup>L</sup>	1996/08 3679	48 30	FR 0014	014 / 020 005 / 7:30	DO		4206465 (174325) BRWN LOAM 0001 BRWN CLAY 0016 GREY SAND STNS 0020		
BRACEBRIDGE TOWN (MA CON 08(007))	17 630424 4994612 <sup>*</sup>	2006/06 1748	06	FR 0260	018 / 145 004 / 1:0	DO		4209633 (237359) A034029 BRWN LOAM STNS 0032 GREY GRNT 0400		
BRACEBRIDGE TOWN (MA CON 08(011))	17 633918 4996190 <sup>L</sup>	2002/04 2550	06	UK 0130	025 / 130 015 / 1:0	DO		4208172 (236326) BRWN SAND GRVL HARD 0017 GREY GRNT SOFT 0143		
BRACEBRIDGE TOWN (MA CON 08(011))	17 633815 4996099 <sup>*</sup>	1958/07 2550	05 05	FR 0053	022 / 036 010 / 1:0	DO		4200406 ( ) MSND 0005 GRNT 0053		
BRACEBRIDGE TOWN (MA CON 08(012))	17 634304 4996334 <sup>L</sup>	1993/11 3665	06 06	FR 0290	019 / 175 003 / 3:0	DO		4205845 (134335) BRWN SAND 0020 BRWN GRVL STNS 0032 RED GRNT 0061 GREY GRNT 0216 RED GRNT 0325		
BRACEBRIDGE TOWN (MA CON 08(012))	17 634665 4996024 <sup>*</sup>	1981/04 1366	06 06	FR 0220 FR 0150	035 / 225 004 / 1:0	DO		4202541 ( ) GREY SAND 0032 RED GRNT 0100 GREY GRNT 0175 BLACK GRNT 0225		
BRACEBRIDGE TOWN (MA CON 08(012))	17 634365 4996124 <sup>*</sup>	1975/11 2512	05	FR 0115	003 / 003 025 / 1:0	DO		4201596 ( ) BRWN SAND LOOS 0018 GREY GRNT SOFT 0115		
BRACEBRIDGE TOWN (MA CON 08(012))	17 634490 4995999 <sup>*</sup>	1975/11 2512	05	FR 0064	039 / 045 006 / 1:0	DO		4201597 ( ) SAND LOOS LTCL 0026 RED GRNT HARD DNSE 0074		

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BRACEBRIDGE TOWN (MA) CON 08 (012)	17 634304 4996334 <sup>L</sup>	1997/06 3665	06 06	FR 0280	042 / 300 001 / 1:0	DO		4206669 (172169) BRWN SAND 0043 GREY SILT SAND GRVL 0051 RED GRNT 0092 GREY GRNT 0305	
BRACEBRIDGE TOWN (MA) CON 08 (012)	17 634304 4996334 <sup>L</sup>	1995/06 3665	06 06	FR 0031	009 / 017 015 / 3:0	DO	0029 06	4206286 ( ) BRWN SAND 0012 BRWN SNDS 0020 RED GRNT FCRD 0045	
BRACEBRIDGE TOWN (MA) CON 08 (012)	17 634365 4996074 <sup>W</sup>	1969/07 2512	05	FR 0052	010 / 053 006 / 1:0	DO	0053 05	4200815 ( ) GREY QSNDR 0046 BRWN MSND 0052 BRWN CSND 0058	
BRACEBRIDGE TOWN (MA) CON 08 (012)	17 634515 4995889 <sup>W</sup>	1974/09 2517	05 05	FR 0116	005 / 014 030 / 1:0	DO		4201423 ( ) GREY GRNT 0116	
BRACEBRIDGE TOWN (MA) CON 08 (012)	17 634304 4996334 <sup>L</sup>	1989/09 2550	06	FR 0147	007 / 160 015 / 1:0	DO		4204434 (47005) GREY GRNT MGRD HARD 0180	
BRACEBRIDGE TOWN (MA) CON 08 (013)	17 634688 4996476 <sup>L</sup>	1991/05 1748	06	FR 0032	004 / 025 / 1:0	DO	0025 04	4205049 (103871) BRWN SAND 0032	
BRACEBRIDGE TOWN (MA) CON 08 (013)	17 634765 4996174 <sup>W</sup>	1974/09 2512	05 05	SA 0047	015 / 038 015 / 1:0	DO		4201424 ( ) GREY SAND LOOS 0020 GREY SAND BLDR LOOS 0027 GREY GRNT SOFT LYRD 0052	
BRACEBRIDGE TOWN (MA) CON 08 (013)	17 634815 4996174 <sup>W</sup>	1977/07 1366	06 06	UK 0025	020 / 045 005 / 1:0	DO		4202024 ( ) BRWN SAND 0006 GREY GRNT 0050	
BRACEBRIDGE TOWN (MA) CON 08 (013)	17 634590 4996399 <sup>W</sup>	1975/08 2512	05	FR 0031 FR 0057	040 / 057 003 / 1:0	DO		4201557 ( ) BRWN PSND LOOS 0025 GREY GRNT SOFT 0061	
BRACEBRIDGE TOWN (MA) CON 08 (013)	17 634688 4996476 <sup>L</sup>	1989/08 1748	06 06	FR 0050	035 / 012 / 1:0	DO		4204330 (67051) BRWN SAND 0008 GREY GRNT 0060	
BRACEBRIDGE TOWN (MA) CON 08 (013)	17 634665 4996174 <sup>W</sup>	1977/08 2512	05	FR 0118	020 / 115 004 / 1:0	DO		4201936 ( ) BRWN SAND LOOS 0023 GREY GRNT HARD DNSE 0120	
BRACEBRIDGE TOWN (MA) CON 08 (013)	17 634715 4996024 <sup>W</sup>	1979/05 2550	06	FR 0195	020 / 240 001 / 1:0	DO		4202300 ( ) BRWN SAND LOOS 0035 GREY GRNT HARD DNSE 0240	
BRACEBRIDGE TOWN (MA) CON 08 (013)	17 634765 4996124 <sup>W</sup>	1976/11 2512	05			DO		4201849 ( ) BRWN SAND LOOS 0029 GREY GRNT HARD LYRD 0322	
BRACEBRIDGE TOWN (MA) CON 08 (013)	17 634715 4996174 <sup>W</sup>	1974/11 2512	05 05	FR	020 / 250 / 1:0	DO		4201454 ( ) BRWN GRVL LOOS 0003 BLACK LOAM LOOS 0005 GREY GRNT HARD LOOS 0250	
BRACEBRIDGE TOWN (MA) CON 08 (016)	17 635789 4996901 <sup>L</sup>	1996/04 3678	06 06	FR 0296	020 / 305 006 / 1:5	DO		4206439 (139611) BRWN SAND 0004 GREY ROCK 0021 BLACK ROCK FCRD 0022 GREY ROCK 0051 BLACK ROCK FCRD LYRD 0059 GREY ROCK 0296 ROCK SOFT 0298 GREY ROCK 0305	
BRACEBRIDGE TOWN (MA) CON 08 (016)	17 635789 4996901 <sup>L</sup>	1989/08 1366	06 06	FR 0075	010 / 020 / 1:0	ST		4204337 (58622) BRWN SAND GRVL 0002 BLACK GRNT 0075 BLACK GRNT 0100	

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BRACEBRIDGE TOWN (MA CON 08(016)	17 635789 4996901 <sup>1</sup>	1997/06 3803	06	FR 0050 FR 0100	018 / 200 / 2:0	DO		4206672 (176988) BRWN SAND ROCK 0002 GREY GRNT 0310	
BRACEBRIDGE TOWN (MA CON 08(016)	17 635789 4996901 <sup>1</sup>	1988/03 1312	06 06	FR 0070	/ 131 004 / 1:0	DO		4203761 (247114) BRWN LOAM 0003 RED GRNT 0135	
BRACEBRIDGE TOWN (MA CON 08(016)	17 635785 4996901 <sup>1</sup>	2003/10 3678	06 06	FR 0320	012 / 245 004 / 1:10	DO		4208804 (267636) BRWN SAND GRVL 0012 GREY ROCK 0325	
BRACEBRIDGE TOWN (MA CON 09(005)	17 631272 4996290 <sup>1</sup>	1988/11 1748	06	FR 0290 FR 0040	002 / 300 001 / 1:0	DO		4204018 (50281) BRWN SAND 0003 GREY GRNT 0300	
BRACEBRIDGE TOWN (MA CON 10(005)	17 630924 4997239 <sup>1</sup>	1990/03 1366	06 06	FR	140 / 001 / 1:0	DO		4204756 (58944) BRWN LOAM 0002 BLACK GRNT 0015 GRNT 0030 BLACK GRNT 0055 GREY GRNT 0130 BLACK GRNT 0190 GREY GRNT 0220 BLACK GRNT 0500	
BRACEBRIDGE TOWN (MA CON 10(007)	17 631693 4997520 <sup>1</sup>	1993/12 1748	06	FR 0090 FR 0380	014 / 300 004 / 3:0	DO		4205858 (140994) BRWN LOAM 0002 GREY GRNT 0400	
BRACEBRIDGE TOWN (MA CON 10(007)	17 631693 4997520 <sup>1</sup>	1990/06 1748	06 06	FR 0150	010 / 002 / 1:0	DO		4204763 (88246) BRWN SAND GRVL 0007 GREY GRNT 0165	
BRACEBRIDGE TOWN (MA CON 10(010)	17 632815 4998274 <sup>1</sup>	1983/09 1366	06 06	SA 0340	006 / 007 / 1:0	DO		4202959 ( ) BRWN SAND 0004 GREY GRNT 0140 BLACK GRNT 0200 GREY GRNT 0360	
BRACEBRIDGE TOWN (MA CON 10(010)	17 632915 4997924 <sup>1</sup>	1969/10 5461	02 02	FR 0154	010 / 027 001 / 2:0	DO		4200842 ( ) RED GRNT 0165	
BRACEBRIDGE TOWN (MA CON 10(011)	17 633115 4998074 <sup>1</sup>	1977/10 5461	02	FR 0160 FR 0164	022 / 090 002 / 2:0	DO		4201974 ( ) RED GRNT 0165	
BRACEBRIDGE TOWN (MA CON 10(011)	17 633215 4998424 <sup>1</sup>	1970/07 5461	02 02	FR 0083	013 / 045 001 / 1:0	CO		4200920 ( ) BRWN MSND 0014 RED GRNT 0083	
BRACEBRIDGE TOWN (MA CON 10(011)	17 633236 4998083 <sup>1</sup>	1998/07 1748	06 06	FR 0150	020 / 160 003 / 1:0	CO		4206934 (181257) BRWN SAND GRVL 0006 RED GRNT 0160	
BRACEBRIDGE TOWN (MA CON 11(007)	17 631325 4998468 <sup>1</sup>	1988/10 3679	36	FR 0024	024 / 026 002 / 1:15	DO		4204066 (41719) LOAM SAND 0001 RED SAND 0005 BRWN SAND 0025 GREY SAND 0035 SAND	
BRACEBRIDGE TOWN (MA CON 11(008)	17 631614 4990571 <sup>1</sup>	2004/05 3678	06 05	FR 0154	/ 125 004 / 1:0	DO		4208952 (208754) A008603 BRWN GRVL SAND 0007 GREY ROCK 0205	
BRACEBRIDGE TOWN (MA CON 11(010)	17 632474 4998883 <sup>1</sup>	2001/09 1748	06 06	FR 0320	028 / 340 003 / 1:0	DO		4207879 (234648) BRWN SAND GRVL 0009 RED GRNT 0340	
BRACEBRIDGE TOWN (MA CON 11(010)	17 632477 4998882 <sup>1</sup>	1984/10 3665	06	FR 0090	037 / 002 / 2:0	DO	0086 05	4203050 ( ) BRWN SAND 0080 GREY SAND 0093	

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BRACEBRIDGE TOWN (MA CON 11(010))	17 632735 4998543*	1965/05 1102	02 02	FR 0101	-003 / / 10	CO		4200409 ( ) MSND 0004 GRNT 0103	
BRACEBRIDGE TOWN (MA CON 12(014))	17 633756 5001673*	2005/05 3678	05 06	FR 0066	010 / 018 004 / 1:0	DO	0060 03 0063 03	4209659 (Z44772) A040174 BRWN SAND 0015 GREY CLAY 0035 GREY CSND 0066	
BRACEBRIDGE TOWN (MA CON 12(016))		2004/10 1748	06		044 / 094 004 / 1:0	DO		4206320 (163279) BRWN SAND 0001 GREY GRNT 0305 BLCK GRNT 0310 GREY GRNT 0323 4209005 (Z06091) A006010 BRWN ROCK STNS 0013 RED GRNT 0220	
BRACEBRIDGE TOWN (MA CON 13(004))	17 629431 4999947*	1989/11 2550	06	FR 0238	042 / 220 020 / 1:0	DO		4204501 (47013) BRWN SAND LOOS 0003 GREY GRNT SOFT DNSE 0240	
BRACEBRIDGE TOWN (MA CON 13(010))	17 631503 5001169*	2004/08 3678	06	FR 0180	/ 069 004 / 1:0	DO		4209061 (Z15608) A015529 BRWN SAND 0004 GREY ROCK 0225	
BRACEBRIDGE TOWN (MA CON 13(010))	17 631704 5000790*	1991/09 1748	06 06	FR 0290	/ 200 / 1:0	DO		4205216 (109006) BRWN FSND 0007 BLCK GRNT 0290	
BRACEBRIDGE TOWN (MA CON 13(011))	17 632092 5000938*	1991/06 1748	06 06	FR 0080 FR 0100	030 / 015 / 1:0	DO		4205047 (107339) BRWN FSND BLDR GRVL 0023 BLCK GRNT 0105	
BRACEBRIDGE TOWN (MA CON 13(014))	17 633224 5001367*	2003/10 2550	06	UK 0187	080 / 180 020 / 1:0	DO		4208672 (264402) RED GRNT SOFT 0200	
BRACEBRIDGE TOWN (MA CON 13(015))	17 633602 5001514*	1988/10 1748	06	FR 0135	030 / 140 010 / 1:0	DO		4204137 (45516) BRWN LOAM 0001 GREY GRNT 0140	
BRACEBRIDGE TOWN (MA CON 13(016))	17 633802 5001979*	2004/05 3678	06	FR 0308	/ 195 004 / 1:0	DO		4208949 (Z08771) A008627 BLCK LOAM 0002 GREY ROCK 0405	
BRACEBRIDGE TOWN (MA 05(004))	17 631984 4992630*	2006/10 3678	06	FR 0310	020 / 028 004 / 1:0	DO		4209826 (Z31107) A045408 BRWN SAND 0012 GREY ROCK 0445	
BRACEBRIDGE TOWN (MA 05(006))	17 632890 4992739*	2007/05 3678	06 05 05	FR	060 / 004 / 1:0	DO		7043848 (Z55859) A048587 BRWN SAND 0039 GREY ROCK 0440	
BRACEBRIDGE TOWN (MA 05(011))	17 635242 4992954*	2005/08 6763	02	FR 0673	010 / / 1:0	DO		7042482 (Z27204) A026145 BRWN LOAM SAND SOFT 0013 GREY GRNT HARD 0656 BLCK GRNT 0689 GREY GRNT 1017	
BRACEBRIDGE TOWN (MA 05(012))		1987/08 1366	06 06	FR 0095	030 / 010 / 1:0	DO		4203557 (15087) BRWN FSND 0006 GREY GRNT 0030 GREY GRNT 0060 GREY GRNT 0090 RED GRNT 0105 GREY GRNT 0120	
BRACEBRIDGE TOWN (MA 06(010))	17 634526 4993826*	2007/08 6998	06	FR 0322	017 / 094 004 / 1:0	DO		7048847 (Z72207) A059075 BRWN SAND SOFT 0013 GREY GRNT HARD 0322	

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TOWNSHIP CONCESSION (LOT)	UTM <sup>1</sup>	DATE <sup>2</sup> CNTR <sup>3</sup>	CASING DIA <sup>4</sup>	WATER <sup>5,6</sup> DETAIL	STAT LVL/PUMP LVL <sup>7</sup> RATE <sup>8</sup> /TIME HR:MIN	WATER USE <sup>9</sup>	SCREEN INFO <sup>10</sup>	WELL # (AUDIT#) WELL TAG #	DEPTHS TO WHICH FORMATIONS EXTEND <sup>5,11</sup>
BRACEBRIDGE TOWN (MA 06 (011))	17 633589 4994363*	2007/03 3413	02 02	FR 0338	033 / 103 002 / 1:0	DO	0164 36	7042176 (Z59978) A053447 BRWN GRVL 0056 BRWN SAND SILT MUCK 0131 BRWN FSND MSND 0200 RED GRVL 0269	
BRACEBRIDGE TOWN (MA 06 (011))	17 634500 4994680*	2005/08 1748	06	FR 0338	073 / 075 004 / 1:0	DO		4209321 (Z28918) A027004 BRWN LOAM CLAY 0010 GREY GRNT 0340	
BRACEBRIDGE TOWN (MA 06 (011))	17 633588 4994362*	2007/03 3413						7042661 (Z59984) A053446	
BRACEBRIDGE TOWN (MA 07 (005))	17 632038 4993997*	2006/11 3678	06	FR	050 / 194 004 / 1:0	DO		4209874 (Z55820) A048593 GREY CLAY 0080 GREY SILT 0205 GREY GRNT 0340	
BRACEBRIDGE TOWN (MA 07 (006))	17 633421 4993392*	2005/07 3678	06	FR 0170	055 / 004 / 1:0	DO		4209313 (Z30898) A028930 BRWN SAND GRVL 0040 GREY HPAN 0045 GREY ROCK 0220	
BRACEBRIDGE TOWN (MA 07 (013))	17 635015 4995053*	2004/03 6763	06	FR	004 / 141 002 / 2:0	DO		4209133 (Z24983) A024288 GREY GRNT HARD 0200 RED GRNT SOFT 0208 GREY GRNT HARD 0233 BLACK GRNT MGRD 0279 RED GRNT SOFT 0295 GREY GRNT HARD 0307	
BRACEBRIDGE TOWN (MA 07 (016))	17 635955 4995886*	2006/07 3678	06	FR 0135 0175	020 / 222 004 / 1:6	DO		4209690 (Z50810) A040161 GREY CLAY 0048 GREY ROCK 0400	
BRACEBRIDGE TOWN (MA 07 (016))	17 636096 4995664*	2005/05 3678	16 13	FR 0021	008 / 069 020 / 1:0	DO		4209221 (Z20280) A020057 BRWN SAND GREY BLDR BRWN GRVL GREY ROCK	
BRACEBRIDGE TOWN (MA 07 (016))	17 635856 4996241*	2006/11 3678	06	FR 0438	008 / 016 004 / 1:0	DO		4209879 (Z55818) A048595 GREY ROCK 0440	
BRACEBRIDGE TOWN (MA 07 (016))	17 635884 4996186*	2003/12 6763	06	FR	001 / 449 002 / 3:0	DO		4209129 (Z24984) A024289 GREY GRNT HARD 0351 BLACK GRNT MGRD 0358 RED GRNT HARD 0415 RED GRNT SOFT 0425 GREY GRNT HARD 0451	
BRACEBRIDGE TOWN (MA 08 (013))	17 630452 4993820*	2008/05 6998	06	FR 0072 FR 0089	017 / 032 006 / 1:0	DO		7105505 (Z57497) A059049 BRWN LOAM STNS SOFT 0003 BRWN SAND GRVL SOFT 0005 GREY GRNT HARD 0100	
BRACEBRIDGE TOWN (MA 08 (013))	17 634644 4996234*	2004/11 2550	06		015 / 200 010 / 3:0	DO		4209143 (Z233560) A020748 BRWN SAND 0016 GREY GRNT 0264	
BRACEBRIDGE TOWN (MA 10 (005))	17 630861 4997527*	2005/09 3678	06		020 / 164 004 / 1:0	DO		4209404 (Z30991) A028822 GREY CLAY 0030 GREY GRNT 0220 RED GRNT 0305	
BRACEBRIDGE TOWN (MA 10 (006))	17 631016 4997658*	2007/10 3678	00	FR	020 / 163 004 / 1:0	DO		7051441 (Z68314) A065649 GREY CLAY 0020 GREY ROCK 0280 RED ROCK 0300	
BRACEBRIDGE TOWN (MA 11 (007))	17 631254 4998101*	2005/08 3678	06	FR 0030	020 / 163 004 / 1:0	DO		4209347 (Z30940) A028795 BRWN SAND 0008 GREY ROCK 0405	
BRACEBRIDGE TOWN (MA 12 (014))	17 633936 5000926*	2005/10 3678	06 05	FR 0065	010 / 018 004 / 1:0	DO	0061 03	4209503 (Z31037) A028845 BRWN SAND 0020 GREY SAND 0040 BRWN SAND 0065	

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TOWNSHIP CONCESSION (LOT)	UTM <sup>1</sup>	DATE <sup>2</sup> CNTR <sup>3</sup>	CASING DIA <sup>4</sup>	WATER <sup>5,6</sup> DETAIL	STAT LVL/PUMP LVL <sup>7</sup> RATE <sup>8</sup> /TIME HR:MIN	WATER USE <sup>9</sup>	SCREEN INFO <sup>10</sup>	WELL # (AUDIT#)	DEPTHS TO WHICH FORMATIONS EXTEND <sup>5,11</sup>	WELL TAG #
BRACEBRIDGE TOWN (MA 12(014)	17 633851 5001119 <sup>w</sup>	2005/10 3678	06 05	FR 0064	010 / 011 004 / 1:0	DO	0060 03	4209502 (Z31038) A028844	GREY SAND 0016 BRWN SAND 0045 GREY SAND 0050 BRWN SAND 0064	
BRACEBRIDGE TOWN (MA 12(014)	17 633825 5001558 <sup>w</sup>	2005/10 3678	05 06	FR 0065	010 / 018 004 / 1:0	DO	0061 03	4209501 (Z31035) A028847	GREY SAND 0020 BRWN SAND 0040 GREY SAND 0065	
BRACEBRIDGE TOWN (MA 12(014)	17 633693 5001718 <sup>w</sup>	2006/09 3678	06 05	FR 0120	010 / 004 / 1:0	DO		4209806 (Z50785) A045386	BRWN SAND 0050 GREY GRNT 0075 RED GRNT 0120	
BRACEBRIDGE TOWN (MA 12(014)	17 633785 5001589 <sup>w</sup>	2006/06 3678	06 05	FR 0066	010 / 018 004 / 1:0	DO	0060 06	4209716 (Z44802) A040135	BRWN SAND 0025 GREY SAND 0066	



## Notes:

1. UTM in Zone, Easting, Northing and Datum is NAD83; L: UTM estimated from Centroid of Lot; W: UTM not from Lot Centroid
2. Date Work Completed
3. Well Contractor Licence Number
4. Casing diameter in inches
5. Unit of Depth in Feet
6. See Table 4 for Meaning of Code
7. STAT LVL: Static Water Level in Feet ; PUMP LVL: Water Level After Pumping in Feet
8. Pump Test Rate in GPM, Pump Test Duration in Hour : Minutes
9. See Table 3 for Meaning of Code
10. Screen Depth and Length in feet
11. See Table 1 and 2 for Meaning of Code

1. Core Material and Descriptive Terms									
Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
BLDR	BOULDERS	FCRD	FRACTURED	IRFM	IRON FORMATION	PORS	POROUS	SOFT	SOFT
BSLT	BASALT	FGRD	FINE-GRAINED	LIMY	LIMY	PRDG	PREVIOUSLY DUG	SPST	SOAPSTONE
CGRD	COARSE-GRAINED	FGVL	FINE GRAVEL	LMSN	LIMESTONE	PRDR	PREV. DRILLED	STKY	STICKY
CGVL	COARSE GRAVEL	FILL	FILL	LOAM	TOPSOIL	QRTZ	QUARTZITE	STNS	STONES
CHRT	CHERT	FLDS	FELDSPAR	LOOS	LOOSE	QSND	QUICKSAND	STNY	STONEY
CLAY	CLAY	FLNT	FLINT	LTCL	LIGHT-COLOURED	QRTZ	QUARTZ	THIK	THICK
CLN	CLEAN	FOSS	FOSILIFEROUS	LYRD	LAYERED	ROCK	ROCK	THIN	THIN
CLYY	CLAYEY	FSND	FINE SAND	MARL	MARL	SAND	SAND	TILL	TILL
CMTD	CEMENTED	GNIS	GNEISS	MGRD	MEDIUM-GRAINED	SHLE	SHALE	UNKN	UNKNOWN TYPE
CONG	CONGLOMERATE	GRNT	GRANITE	MGVL	MEDIUM GRAVEL	SHLY	SHALY	VERY	VERY
CRYS	CRYSTALLINE	GRSN	GREENSTONE	MRBL	MARBLE	SHRP	SHARP	WBRG	WATER-BEARING
CSND	COARSE SAND	GRVL	GRAVEL	MSND	MEDIUM SAND	SHST	SCHIST	WDFR	WOOD FRAGMENTS
DKCL	DARK-COLOURED	GRWK	GREYWACKE	MUCK	MUCK	SILT	SILT	WTHD	WEATHERED
DLMT	DOLOMITE	GVLY	GRAVELLY	OBDN	OVERBURDEN	SLTE	SLATE		
DNSE	DENSE	GYPG	GYPSUM	PCKD	PACKED	SLTY	SILTY		
DRTY	DIRTY	HARD	HARD	PEAT	PEAT	SNDG	SANDSTONE		
DRY	DRY	HPAN	HARDEPAN	PGVL	PEA GRAVEL	SNDY	SANDY		

2. Core Color	
Code	Description
WHIT	WHITE
GREY	GREY
BLUE	BLUE
GRN	GREEN
YLLW	YELLOW
BRWN	BROWN
RED	RED
BLCK	BLACK
BLGY	BLUE-GREY

3. Water Use		
Code	Description	Code Description
DO	Domestic	OT Other
ST	Livestock	TH Test Hole
IR	Irrigation	DE Dewatering
IN	Industrial	MO Monitoring
CO	Commercial	
MN	Municipal	
PS	Public	
AC	Cooling And A/C	
NU	Not Used	

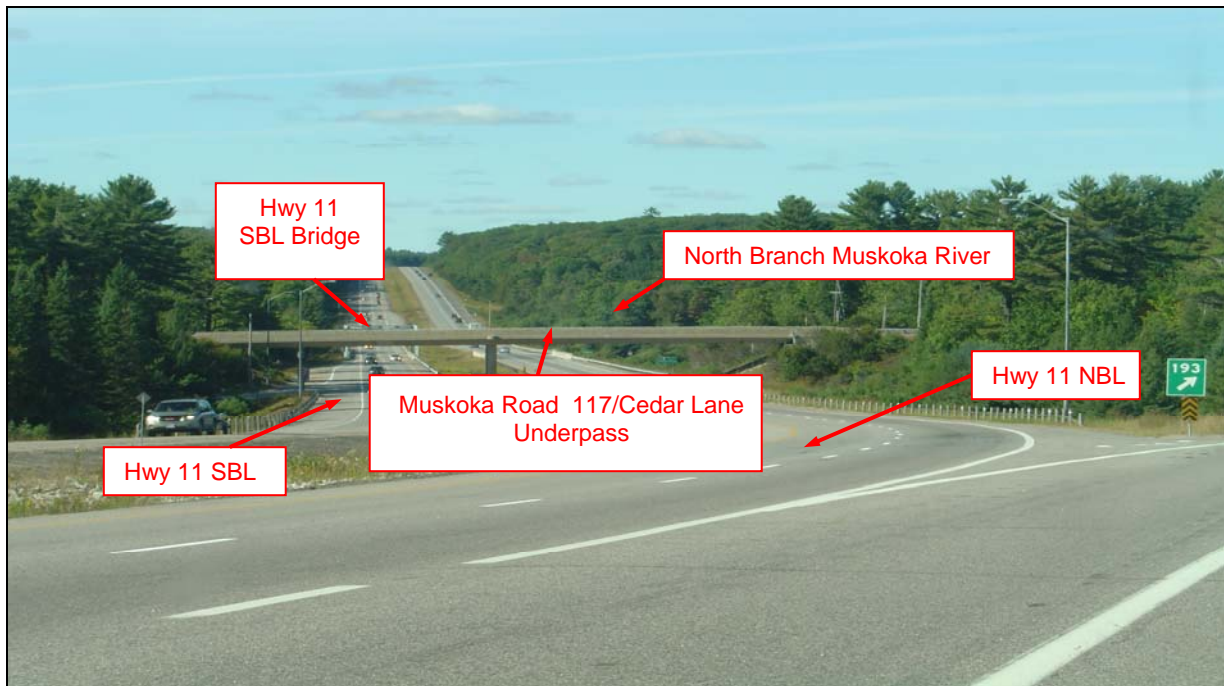
4. Water Detail		
Code	Description	Code Description
FR	Fresh	GS Gas
SA	Salty	IR Iron
SU	Sulphur	
MN	Mineral	
UK	Unknown	



## **APPENDIX C**

Site Photographs 1 to 13





**Photograph 1:** Viewing north from east side of Highway 11 S-E Ramp to Muskoka Road 117, Highway Corridor rises about 30 m from North Branch Muskoka River crossing to Sta. 18+300 (September 9, 2009)



**Photograph 2:** Viewing north from about Sta. 16+600. Bedrock are visible in Riverbed Highway 11 SBL (November 12, 2009)

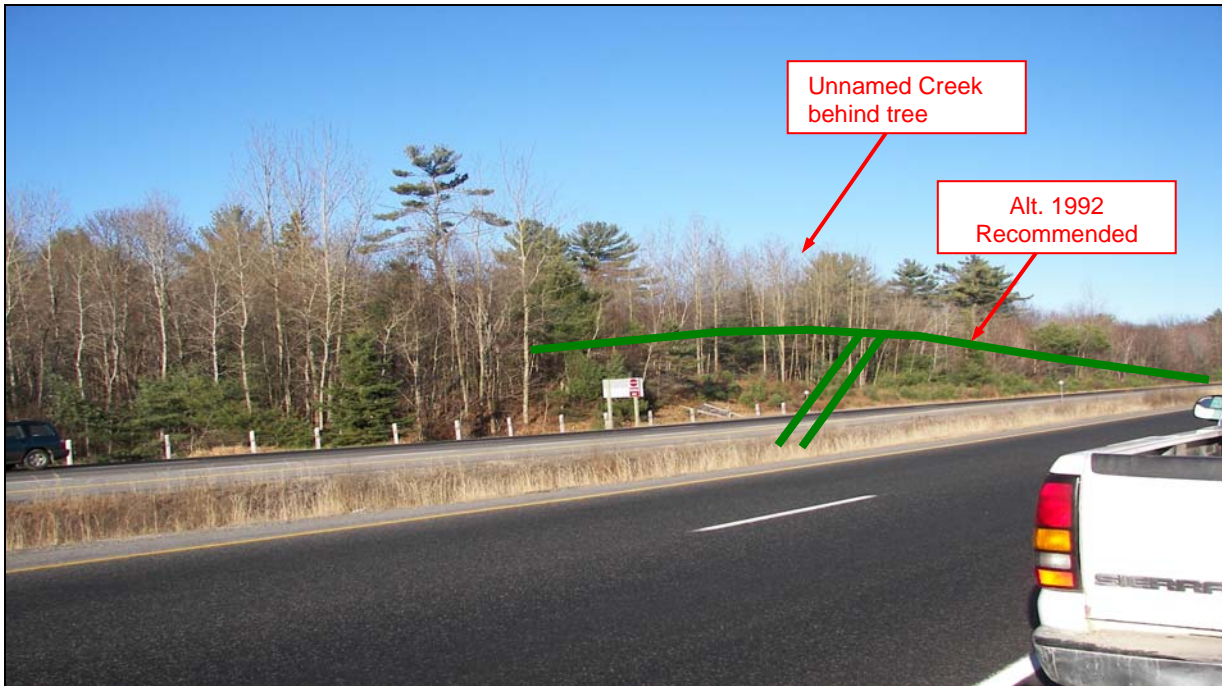


**Photograph 3:** Viewing north east from about 100 south of flood plan on east side of Holiday Park Drive (November 12, 2009)



**Photograph 4:** Viewing north from about Sta. 17+000 Highway 11 NBL shoulder. Proposed High Falls Road/Holiday Park Drive Underpass (November 12, 2009)





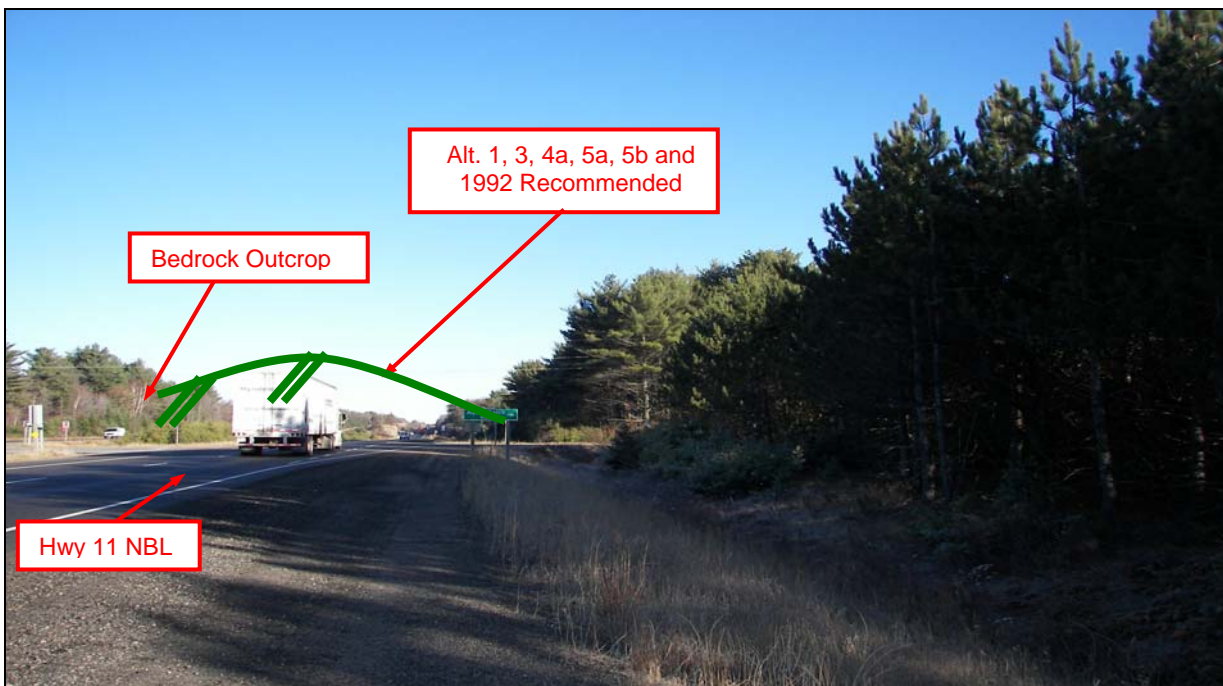
**Photograph 5:** Viewing northwest from about Sta. 17+600 NBL shoulder. Proposed 1992 recommended interchange location. Unnamed Creek flows north to south direction behind trees (Valley about 10 m deep). (November 12, 2009)



**Photograph 6:** Viewing northwest from about Sta. 18+400 NBL shoulder. (November 12, 2009)



**Photograph 7:** Viewing north from about Sta. 18+460. Hilly terrain with isolated bedrock exposures on right behind tree line. (November 12, 2009)



**Photograph 8:** Viewing north from about Sta. 21+100 NBL shoulder. Proposed Alpine Ranch Road underpass location. (November 12, 2009)





**Photograph 9:** Viewing northwest from Sta. 21+100 NBL shoulder. Alpine Ranch Road extension behind tree line. (November 12, 2009)



**Photograph 10:** Close-up view of proposed Alpine Ranch Road underpass west abutment. (September 9, 2009)



**Photograph 11:** Viewing north from about Sta. 21+650 NBL. Bedrock cuts in distance (November 12, 2009)



**Photograph 12:** Viewing south from north shoulder of High Fall Road and about 400 west of High Falls Road/Highway 11 at grade crossing. (September 9, 2009)





**Photograph 13:** Viewing east from Forrester Trail west shoulder. Eroded earth slopes are noted along Forrester Trails. (September 9, 2009)