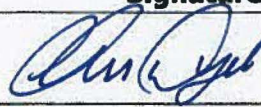
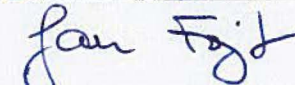
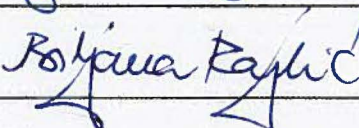




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Submission Name:	TB-6
Document Number:	285380-03-127-0047

Design Consultant:		HMM
Date	Revision	Description
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	Name, Title	Signature	Date
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Reviewed By	Jan Fojt, Ph.D.		17-DEC-12
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Project: Windsor-Essex Parkway
Document: TAF – Pedestrian Tunnels
Doc No.: 285380-03-127-0047

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1 Phase Description

1.1 Name and Location of Structures

This submission encompasses the structure described below.

Designation/Name	Tunnel Centreline	Description
TB-6	STA 9 + 926.276	Geraedts Drive Pedestrian Tunnel

1.2 Permitted Traffic Speed

Posted speeds for traffic on the roadways passing over the tunnel are:

- 50km/h on Geraedts Drive

2 Proposed Structures

2.1 Description of Structures

Pedestrian Tunnel TB-6 is a cast-in-place reinforced concrete box. Key details for this tunnel are given in the following table.

Description	Description	Length @ CL (m)	Inside Span (m)	Inside Height (m)
TB-6	Geraedts Drive Pedestrian Tunnel	20.421	4.0	3.6

Pedestrian Tunnel TB-6 under Geraedts Drive has insufficient cover to effectively distribute vehicle loading as vehicles move onto the tunnel. As such, approach slabs are required.

The inlet and outlet to TB-6 have header walls extending above the top surface of the tunnel that provide PL-2 barriers for the roadway. RSS walls are indicated for both the inlet and outlet to retain trail side slopes. These RSS walls are to be capped with a PL-2 barrier to match that over the tunnel.

2.2 Structural Types

A single barrel, cast-in-place concrete box structure was chosen for TB-6 as these are inherently resistant to sliding, and are robust and well suited to buried load bearing applications.

2.3 Foundation Type

The foundation type for TB-6 is slab-on-grade. Box structures have large load transfer surfaces, and this large surface area reduces the effective bearing pressure on the soils, which makes it possible to place a large box structure on soils that have a modest bearing capacity. A subgrade protection slab has been indicated under the tunnel as there is the potential for spoiling of the clay subgrade.

2.4 Proposed Means for Inspection and Maintenance

All interior surfaces of TB-6 will be accessible for inspection through the use of ladders. The exterior of the tunnel will not be accessible with the exception of the inlet and outlet faces, header walls, and RSS walls. Due to the nature of the loading on the tunnel, the tension faces of the top and bottom concrete slabs (which govern the design) face the interior.

2.5 Materials and Finishes

2.5.1 Concrete

Minimum compressive strength at 28 days: 30 MPa

2.5.2 Reinforcing Steel

Plain and coated reinforcing steel bars: CAN/CSA G30.18-M92; Grade 400W

2.5.3 Finishes

Concrete finishes shall comply with the applicable requirements of Project Agreement, Schedule 15-2.

3 Design/Assessment Criteria

3.1 Live Loading and Clearances

3.1.1 Design Live Loading on Tunnel Roof Slab

Design Vehicle plus dynamic load allowance due to shallow bury of tunnel to CAN/CSA S6-06.

3.1.2 Design Vehicle

CL-625-ONT Truck

3.1.3 Other Live Loading

Lateral pressure resulting from approaching wheel loads.

3.1.4 Provision for Exceptional Abnormal Loads

None

3.1.5 Any Special Loading Not Covered

None

3.1.6 Minimum Clearance Provided

Internal clear height for passage of pedestrians and cyclists:
3.6m

3.1.7 Authorities Consulted and Any Special Conditions Required

None.

3.2 List of Relevant Design Documents

Design criteria in accordance with Part 2 of Project Agreement - Schedule 15-2:

Article 1 - Highway Geometrics Design Criteria

Article 3 - Structural Design Criteria

Technical Report 285380-04-119-0109 (Geotechnical Report)

In the event of discrepancy, the hierarchy of referenced documents shall be as instructed.

4 Structural Analysis

4.1 Method of Analysis

Calculations were carried out using a FEM model of the structure to confirm the design.

In TB-6, the lower haunches normally included for a box structure of this type have been removed to increase usable width which decreases the stiffness of the lower wall-slab joint. In addition, there is <600mm cover over the tunnel. Neither of these items were covered by the Ontario Culvert Design Manual and additional analysis was required.

RSS walls will be designed by others based on recommendations in Geotechnical Report.

4.2 Calculation of Structural Stiffness

Structural stiffness was calculated according to CAN/CSA-S6-06.

4.3 Earth Pressure Coefficients

Refer to Technical Report 285380-04-119-0109 (Geotechnical Report).

5 Ground Design Considerations

5.1 Ground Conditions

Refer to Technical Report 285380-04-119-0109 (Geotechnical Report).

5.2 Geotechnical Design Parameters

Refer to Technical Report 285380-04-119-0109 (Geotechnical Report).

5.3 Differential Settlement

Refer to Technical Report 285380-04-119-0109 (Geotechnical Report).

5.4 Anticipated Ground Movements or Settlement

Refer to Technical Report 285380-04-119-0109 (Geotechnical Report).

5.5 Groundwater Conditions and Mitigative Measures

Refer to Technical Report 285380-04-119-0109 (Geotechnical Report).

5.6 Variance from Geotechnical Report Recommendations

None

6 Construction Considerations

Refer to Technical Report 285380-04-119-0109 (Geotechnical Report) for additional information on excavation, temporary cut slopes, backfilling, and frost protection.

7 Drawings and Documents

7.1 List of Drawings (included in this submission)

Drawing No.	Sheet No.	Revision	Drawing Title
285380-03-060-SEG1-6600	S6600	0	COVER SHEET and SITE PLAN
285380-03-060-SEG1-6601	S6601	0	GENERAL ARRANGEMENT
285380-04-090-SEG1-6602	S6602	0	BOREHOLE LOCATIONS AND SOIL STRATA
285380-04-091-SEG1-6603	S6603	0	SOIL STRATIGRAPHY
285380-03-061-SEG1-6605	S6604	0	REINFORCEMENT
285380-03-061-SEG1-6606	S6605	0	RSS WALLS LAYOUT
285380-03-065-SEG1-6616	S6606	0	PARAPET WALL WITH SIDEWALK AND RAILING
285380-03-065-SEG1-6615	S6607	0	PARAPET WALL - PL2 ON RSS WALL
285380-03-065-SEG1-6618	S6608	0	ARCHITECTURAL FINISH (TYPE D) FOR PL2 PARAPET WALL
285380-03-065-SEG1-6610	S6609	0	6000mm APPROACH SLAB
285380-03-066-SEG1-6617	S6610	0	STANDARD DETAILS
285380-04-094-SEG1-6613	S6611	0	CONSTRUCTION NOTES - BACKFILL AT STRUCTURES
285380-07-444-SEG1-6614	S6612	0	EMBEDDED ELECTRICAL WORK

7.2 List of Documents (included in this submission)

Document No.	Revision	Description
285380-04-119-0109	0	Geotechnical Investigation and Design Report Pedestrian Tunnel TB-6 (9+926.276, Geraedts Drive, LaSalle)

7.3 List of Reference Drawings and Documents (not included in this submission)

Not Used.

8 Checking and Review

8.1 Independent Check

Independent check is not required as per Project Agreement - Schedule 15-2, Part 2, Article 3 3.2 (c) (i).

8.2 Responsible Design Personnel

Originator: Chris Dyck, P.Eng.

Checker: Jan Fojt, Ph.D.

Reviewer: Biljana Rajlic, P.Eng.

Signed: Biljana Rajlic
Design Manager

Name: Biljana Rajlic

Engineering Qualifications: P.Eng.

Date: December 17, 2012

Professional Registration Number: 100041385

Affix Professional Seal:



Signed: Lucaio Li

Project Co Representative

Name: Lucaio Li

Date: Jan 31st, 2013

Professional Registration Number:

Affix Professional Seal: