Document Type:	**TECHNICAL APPRAISAL FORM** **Tunnels**
Submission Name:	T5 – Oakwood Tunnel
Document Number:	285380-03-127-0019

Design Consultant:		**HMM**
Date	**Revision**	**Description**
May 30, 2012	0	Issued for Construction

Issued by: Yang Eileen Li — May 30, 2012
Name — Date

Signature

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1 Project Description

This submission contains design drawings and geotechnical recommendations associated with Tunnel 5 – Oakwood Tunnel. This is the IFC submission for the structure deliverables.

1.1 Name and location of tunnel

Tunnel 5 - Oakwood Tunnel is located along the below-grade section of Highway 401 from STA. 14+510 to STA. 14+631.134. In addition to the westbound and eastbound lanes of 401, Oakwood Tunnel also accommodates the below-grade traffic of Westbound Ramp 5 (WBR5), Highway 3 Service Road 2 (HW3SR2), and Eastbound Ramp 5 (EBR5).

1.2 Permitted traffic speed (for a Tunnel give over and/or under)

On top of the tunnel, there will be landscaping and pedestrian trail with no traffic. Traffic for WBR5, HWY3SR2, HWY401 and EBR5 are accommodated below the structure.

WBR5

Highway Classification:	-
Design Speed:	Urban – 60 km/h
Posted Speed:	TBD (1)
Lanes:	1 traffic lane with 2 shoulders
Design Clearance:	Minimum 5.0 m vertical clearance
Bridge Design Vehicle:	CL-625-ONT

HWY3SR2

Highway Classification:	UAU 80
Design Speed:	80 km/h
Posted Speed:	60 km/h
Lanes:	4 traffic lanes with 2 shoulders
Design Clearance:	Minimum 5.0 m vertical clearance
Bridge Design Vehicle:	CL-625-ONT

HWY401

Highway Classification:	UFD 110
Design Speed:	110 km/h
Posted Speed:	90 km/h
Lanes:	6 traffic lanes with 4 shoulders
Design Clearance:	Minimum 5.0 m vertical clearance
Bridge Design Vehicle:	CL-625-ONT

EBR5

Highway Classification:	-
Design Speed:	Urban – 80 km/h
Posted Speed:	TBD (1)

Lanes:	1 traffic lane with 1 shoulders
Design Clearance:	Minimum 5.0 m vertical clearance
Bridge Design Vehicle:	CL-625-ONT

Notes:
(1) The posted speed will be determined by ball bank testing after construction.

2 Tunnel Details

2.1 Basic layout (Number of lanes, length, etc.)

Oakwood Tunnel is 120.6 m long and has a width varying from 118.6 m at the west limit to 121.6 m at the east limit. The tunnel has 4 piers and accommodates WBR5, Highway 3 (SR2), Highway 401 and EBR5 below grade. The layouts of these roadways are summarized in the following tables.

Basic Layout Summary

WBR5

Length	120.6 m
Clear Roadway Width	8.25 m
Alignment	Tangent
Lanes	1 – 4.75 m westbound lane
Shoulders	2.5 m wide on the north side and 1.0 m wide on the south side
Median Barrier	None
Road side Barrier	Along south shoulder

HWY3SR2

Length	120.6 m
Clear Roadway Width	20 m
Alignment	Tangent to the west of STA. 20+954.767 Spiral between STA. 20+954.767 and STA. 21+001.422 Curve to the east of STA. 21+001.422
Lanes	2 – 3.75 m westbound lanes 2 – 3.75 m eastbound lanes
Shoulders	2.5 m wide on each side
Median Barrier	None
Road side Barrier	Along north shoulder

HWY401

Length	120.6 m
Clear Roadway Width	17.25 m minimum for westbound roadway;

	17.25 m minimum for eastbound roadway
Alignment	Tangent to the west of STA. 14+554.310 Spiral to the east of STA. 14+554.310
Lanes	3 – 3.75 m westbound lanes 3 – 3.75 m eastbound lanes
Shoulders	2 outside shoulders, each with a minimum width of 3.0 m 2 median shoulders, each with a minimum width of 3.0 m
Median Barrier	Along median
Road side Barrier	Along south shoulder where pier #4 is present

EBR5

Length	120.6 m
Clear Roadway Width	7.25 m
Alignment	Curve to the west of STA. 10+000.000 Spiral to the east of STA. 10+000.000
Lanes	1 – 4.75 m eastbound lane
Shoulders	2.5 m wide on the south side
Median Barrier	None
Road side Barrier	Along north shoulder

The tunnel centerline (C.L.) is laid out perpendicularly with C.L. HWY 401 at STA. 14+570.830. The tunnel limits and three deck expansion joints are laid out by offsetting the tunnel C.L. with distances shown on the General Arrangement drawing.

Centrelines of the abutments and piers are defined as follows:

- C.L. of north abutment is a tangent line defined by 2 points: the first point is on tunnel's west limit and is 87.6 m north of C.L. HWY 401; and the second point is on tunnel's east limit and is 78.2 m north of C.L. HWY 401.
- C.L. of Pier #1 is a tangent line defined by 2 points: the first point is on tunnel's west limit and is 72.1 m north of C.L. HWY 401; and the second point is on tunnel's east limit and is 62.7 m north of C.L. HWY 401.
- C.L. of Pier #2 is a tangent line defined by 2 points: the first point is on tunnel's west limit and is 36.1 m north of C.L. HWY 401; and the second point is on tunnel's east limit and is 26.7 m north of C.L. HWY 401.
- C.L. of Pier #3 follows C.L. HWY 401.
- C.L. of Pier #4 is set by translating C.L. Pier #3 south by 20.3 m.
- C.L. of south abutment consists of 2 tangent lines defined by 3 points. The first point is on tunnel's west limit and is 31 m south of C.L. HWY 401; the second point is an intermediate point on C.L. of tunnel's east expansion joint, and is 37.9 m south of C.L. HWY 401; and the third point is on tunnel's east limit and is 43.42 m south of C.L. HWY 401.

2.2 Restrictions to traffic

Not applicable.

3 Brief Description of Tunnel, Traffic and Tunnel Geometry

3.1 Structural form of Tunnel

Oakwood Tunnel is a multi-span deck-on-girder structure designed to accommodate the below-grade sections of Highway 401, Highway 3 (SR2), Westbound Ramp 5, and Eastbound Ramp 5. The superstructure is divided into four segments by three deck expansion joints parallel to the girders, which are located 32.95 m, 66.25 m, and 91.95 m, respectively, from the structure's west limit. The west two segments of the tunnel have 4 spans, and the east two segments have 5 spans with the addition of one pier between EBR5 and HWY401. Girders are at approximately 4 degree skew angle with the abutments. The tables below provide summaries of the general arrangement.

Structure Summary

Structural Type:	Prestressed concrete NU girders and semi-integral abutments.
Span Arrangement:	▪ Multi-span structure with 4 spans between tunnel west limit and middle deck expansion joint, and 5 spans between middle deck expansion joint and tunnel east limit; ▪ For clarity, spans are labeled as shown in Figure 1. ▪ Span lengths are measured along tunnel centerline: Span I measures 15.5 m; Span II measures 36.0 m; Span III varies from 36.1 m to 26.7 m; Span IV varies from 31 m to 35.9 m; Span V measures 20.3 m; Span VI varies from 15.6 m to 23.1 m. ▪ Between west limit and the west expansion joint, NU1900 girders are spaced at 2.8 m with 1.1 m exterior overhang (under parapet wall) and 1.05 m interior overhang (under expansion joint); ▪ Between the west and middle expansion joint, NU1900 girders are spaced at 2.4 m with 1.05 m interior overhangs; ▪ Between east expansion joint and the structure's east limit, NU1900 girders are

	spaced at 2.95 m with 1.05 m exterior and interior overhangs.
Foundation Type:	
North Abutment	Semi-integral abutment supported on HP 310x110 steel piles
South Abutment	Semi-integral abutment supported on HP 310x110 steel piles
Piers	Pier footings supported on HP 310 x 110 steel piles
Span Articulation:	Semi-integral abutment support at two ends with intermediate pier supports; Three expansion joints parallel to girders are provided on the deck along length of the tunnel.
Deck:	235 mm deck comprising 90 mm precast panels and cast-in-place concrete topping; 1.8m tall parapet wall at the each side

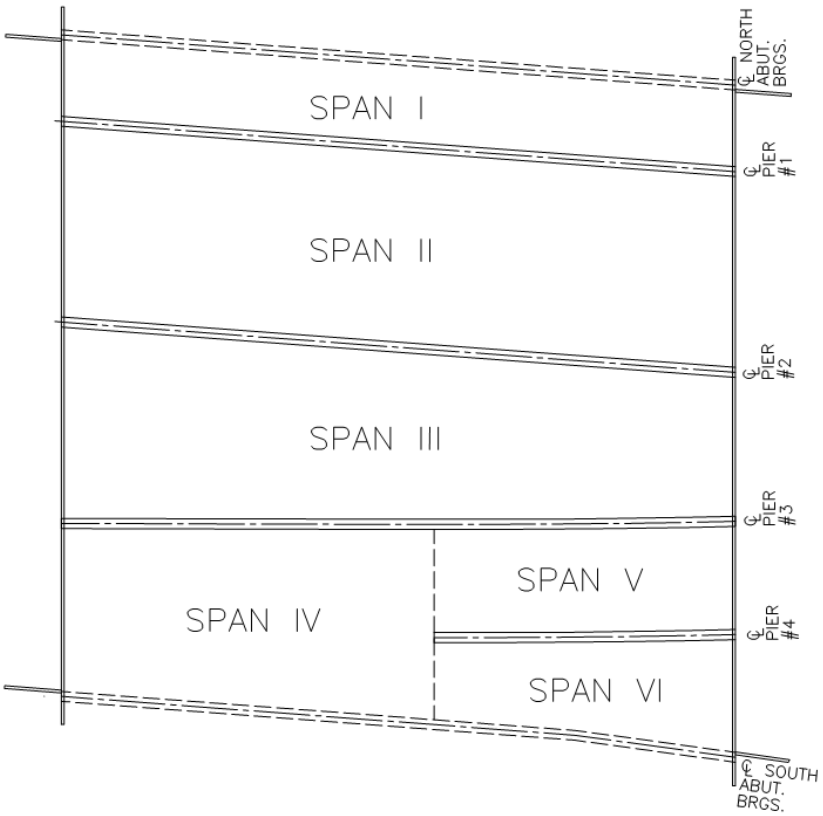

Figure 1 T-5 Plan

The expansion joints in tunnel deck are required because the tunnel superstructure is expected to expand and/or contract immediately after construction and during its service life due to creep, shrinkage and thermal movement. Dividing the tunnel superstructure into segments using expansion joints significantly reduces the demand on the bearings caused by these movements, and reduces bending demand on piles perpendicular to the girder center lines, thus resulting in a more efficient design. Most of the strip seals are to be installed 1.0 m below backfill. They are also covered by a metal plate or board for further protection from vertical live load/impact. The expansion joints are not expected to require frequent maintenance. Inspection (e.g. for signs of leakage) can be undertaken from beneath the deck using a lifting platform or similar. The replacement procedure for expansion joints is expected to be similar to that of replacing buried utilities on top of tunnels. For joints exposed to traffic, appropriate standard joints have been specified with input from suppliers.

3.2 Structural form of portal structures

Not applicable.

3.3 Traffic and geometry

3.3.1 Horizontal and vertical alignment of Tunnel and Tunnel approaches

Tunnel:
Horizontal alignment: Tangent from STA. 14+510 to STA. 14+554, spiral from STA. 14+554 to STA. 14+631 of Highway 401
Vertical alignment: -0.5% slope from STA. 14+510 to STA. 14+631 of Highway 401
Above Tunnel: Pedestrian trail

3.3.2 Cross-section (include spare provided for any mechanical and electrical equipment)

Mechanical and electrical arrangements will be provided at next submission. Tunnel satisfies 5.00 m minimum vertical clearance by providing a minimum of 5.21 m vertical clearance.

3.3.3 Standards used (include design traffic flows and speeds and any proposed departures from standards)

Design Criteria in accordance with Part 2 of Project Agreement – Schedule 15-2:
Article 1 – Highway Geometrics Design Criteria
Article 3 – Structural Design Criteria
Article 4 – Tunnel Design Criteria
Article 5 – Geotechnical and Foundation Design Criteria
Referenced Documents as specified in these Articles following the order of precedence as instructed.

No deviation from the standards used including design traffic flows and speeds.

3.3.4 Accommodation of mechanical and electrical services in Tunnel

Mechanical and electrical arrangements are as shown on drawings.

3.3.5 Minimum headroom, horizontal clearances

Minimum headroom provided is 5.21 m. Minimum horizontal clearances provided between the traffic carriageway and the face of the structure is 7.32 m for WBR5, 11.44 m for HWY3SR2, 12.04 m for HWY401, and 7.04 m for EBR5.

3.4 Proposed arrangements for inspection and maintenance

All exposed features are inspectable through the use of an inspection platform.

3.5 Provision to be made in the Tunnel layout for emergency communication and escape facilities, fire, etc.

Emergency communication details are shown on ATMS New Construction drawings which is not included in this submission.

No escape facilities will be provided.

3.6 Landscaping above Tunnel and protection of Tunnel Roof

Landscaping above tunnel is shown on Landscape Construction drawings which is not included in this submission. Tunnel has been designed with 0.85 m soil layer on top deck to accommodate the requirement for drainage and landscaping.

3.7 Finishes

Concrete finishes on exterior of the parapet wall will have grassland pattern. All remaining finishing is specified in the General Notes, Doc No. 285380-03-060-SEG2-2503.

4 Design Assessment Criteria

4.1 Live Loading

4.1.1 Loading relating to normal traffic under applicable code loading and regulation

Oakwood tunnel carries landscaping and pedestrian trail with no roadway on top of the structure. The tunnel is thus designed for pedestrian load per CSA S6-06 and S6S1-10 (Canadian Highway Bridge Design Code 2006 and Supplement 2010), or a vehicle load equivalent to one individual CL-625-ONT truck placed anywhere on the fill area.

4.1.2 Design vehicle

The tunnel is designed to carry one individual CL-625-ONT truck placed anywhere on the fill area.

4.1.3 Provision for exceptional abnormal loads

Not applicable.

4.1.4 Any special loading not covered above

Not applicable.

4.1.5 Heavy or high load route requirements and arrangements being made to preserve the route and any provisions for future heavier loads or future widening

Not applicable.

4.1.6 Authorities consulted or any special conditions required

Not applicable.

5 Structural Analysis

5.1 Methods of analysis proposed

T5 has been analysed in accordance with CSA S6-06 and S6S1-10 (Canadian Highway Bridge Design Code 2006 and Supplement 2010). Software design aids include RM Bridge V8i version 08.09.90.01, Canadian Bridge Analysis System (CANBAS) version 2.0.1, STAAD Pro 2007 version 20.07.02.15 and Microsoft Office Excel 2007.

Due to the variation in number of spans and span lengths along the tunnel, the structure is analyzed in three sections. Section T5W consists of Segment A (refer to DWG. S2501 for segment layout); section T5C consists of Segment B; and section T5E consists of segment C and D. The girder spacing and prestressing design of these three sections are made different to optimize the design.

5.2 Assumptions of structural elements (strength, stiffness, etc)

5.2.1 Cast-In-Place Concrete

Minimum compressive strength at 28 days: 30MPa (substructure)

Minimum compressive strength at 28 days: 40MPa (deck)

5.2.2 Precast Prestressed Concrete

Minimum compressive strength at transfer: 42MPa (girders)

Minimum compressive strength at 28 days: 60MPa (girders)

Minimum compressive strength at transfer: 24MPa (deck panels)

Minimum compressive strength at 28 days: 40MPa (deck panels)

5.2.3 Reinforcing Steel

Plain and coated reinforcing steel bars: CAN/CSA G30.18-M92; Grade 500W for columns only, and Grade 400W for all other elements

Stainless steel reinforcing bars: Type 316LN or Duplex 2205 or Type XM-28; Grade 500

5.2.4 Prestressing Steel

Strands shall be low-relaxation, size designation 11 in precast panels and size designation 15 in precast girders, Grade 1860 in accordance with CSA Standard G279.

5.2.5 Structural Stiffness

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

5.3 Proposed earth pressure coefficient (K_a, K_o, or K_p)

Refer to Geotechnical Investigation and Design Report prepared by AMEC Earth and Environmental, dated September 21, 2011

5.4 Proposed fire design including protection of structure and cable

For proposed fire design refer to the following fire protection documents:

- Tunnel Structural Fire Assessment, Doc. No. 285380-03-126-0045;
- Tunnel Structural Fire Assessment – Deck Slab, Doc. No. 285380-03-126-0049;
- Tunnel Fire Design Criteria, Doc. No. 285380-03-109-0004.

Only non-combustible materials are used in tunnel for electrical and ATMS works.

6 Ground Conditions

6.1 Ground Conditions

Refer to Geotechnical Investigation and Design Report prepared by AMEC Earth and Environmental, dated September 21, 2011

6.2 Geotechnical Design Parameters

Refer to Geotechnical Investigation and Design Report prepared by AMEC Earth and Environmental, dated September 21, 2011

6.3 Differential Settlement

Refer to Geotechnical Investigation and Design Report prepared by AMEC Earth and Environmental, dated September 21, 2011

6.4 Anticipated Ground Movements or Settlement

Refer to Geotechnical Investigation and Design Report prepared by AMEC Earth and Environmental, dated September 21, 2011

6.5 Groundwater Conditions and Mitigative Measures

Refer to Geotechnical Investigation and Design Report prepared by AMEC Earth and Environmental, dated September 21, 2011

6.6 Variance from Geotechnical Memo Recommendations

Not applicable.

7 Drainage and Waterproofing

7.1 Details of proposed/existing drainage

Refer to Highway and Roadway Drainage Design Report, Doc No. 285380-70-119-0001 for Phase 1 and Phase 2.

7.1.1 Ground water seepage and run off

Refer to Highway and Roadway Drainage Design Report, Doc No. 285380-70-119-0001 for Phase 1 and Phase 2.

7.1.2 Accidental spillage, water carried in by vehicles

Drainage structures have been placed along the tunnel to collect runoff from vehicles and any accidental spills. These liquids would then be conveyed to the spill containment units located upstream of each pumping station. See Highway New Construction Drawings for more details.

7.1.3 Fire main burst

The runoff from a fire main burst would be less than the 100yr storm flow, which the storm system is designer for. The flow would be collected within two or three inlets. Watermains crossing Highway 401and Highway 3 will be installed in steel casings per MTO requirements. Casing material will be stronger than the watermain material to be used. Additionally, the casing void (area between outside of watermain pipe and casing pipe) will be fill with cement based grout. Grouting the void area will provide added strength to the pipe system crossing the Highways, and minimize the potential for watermain breaks underneath a travel lane. Should a break occur under the travelled portion of the Highway, the casing will direct water flow to the shoulder areas where the subdrains and catchbasins will direct the water into the storm system. Water valves are placed along the watermain along Highway 401. This will permit the watermain to be isolated in the area of a break. Once the valves are closed, the water flow will be shut off.

7.1.4 Tunnel washing

The runoff from tunnel washing would be less than the 100yr storm flow, which the storm system is designer for. The flow would be collected within two or three inlets. Watermains crossing Highway 401and Highway 3 will be installed in steel casings per MTO requirements. Casing material will be stronger than the

watermain material to be used. Additionally, the casing void (area between outside of watermain pipe and casing pipe) will be fill with cement based grout. Grouting the void area will provide added strength to the pipe system crossing the Highways, and minimize the potential for watermain breaks underneath a travel lane. Should a break occur under the travelled portion of the Highway, the casing will direct water flow to the shoulder areas where the subdrains and catchbasins will direct the water into the storm system. Water valves are placed along the watermain along Highway 401. This will permit the watermain to be isolated in the area of a break. Once the valves are closed, the water flow will be shut off.

7.2 Details of proposed waterproofing

Refer to Tunnel Watertightness REV D, Doc No. 285380-03-126-0039.

7.3 List special requirements of local drainage authority

None.

8 Tunnel Support System and Method of Construction

8.1 Give details of predicted settlements on adjacent structures

Structural form as described on Section 3.1 is one of the effective support system commonly used to carry roadway above for highway underpass. This support system is also cable of satisfying the design requirements for permanent conditions of the WEP tunnels.

Refer to Geotechnical Investigation and Design Report prepared by AMEC Earth and Environmental, dated September 21, 2011 for the basic of permanent ground treatment design.

Design for temporary conditions is not addressed in this submission.

8.2 State methods to be adopted to monitor and control the effects of tunnel construction to ensure compliance with any criteria imposed to limit surface movements or vibration (if applicable)

Permanent design is based on the Construction Sequence provided on the Foundation Plan, Abutment Layout and Ground Improvements Plan. (Construction methodology, staging and temporary works design are not addressed in this submission.)

8.3 Give details of predicted settlements on adjacent structures

Refer to Geotechnical Investigation and Design Report prepared by AMEC Earth and Environmental, dated September 21, 2011 for anticipated deformation of the ground around the structure.

8.4 State methods to be adopted to monitor and control the effects of Tunnel construction to ensure compliance with any criteria imposed to limit surface movements or vibration (if applicable).

A program of site instrumentation and monitoring will be developed and implemented during construction, but is not part of this submission.

9 Checking

9.1 Independent Check

Independent check is required as per Project Agreement – Schedule 15-2, Part 2, Article 3 3.2 (c) (i).

Independent Checking Team: INTERNATIONAL BRIDGE TECHNOLOGIES.

9.2 Responsible Design Personnel

Originator: Yang Eileen Li

Checker: Matthias Yu, MIStructE, C.Eng., P.Eng. (British Columbia)

Reviewer: Biljana Rajlic, P.Eng.

10 Drawings and Documents

10.1 List of Drawings (included in this submission):

Drawing No.	Revision	Drawing Name
285380-03-060-SEG2-2500	0	Cover Sheet, Site Plan and Key Plan
285380-03-060-SEG2-2501	0	General Arrangement
285380-03-060-SEG2-2502	0	General Arrangement - Sections
285380-03-060-SEG2-2503	0	General Notes
285380-04-090-SEG2-2504	0	Borehole Locations & Soil Strata
285380-04-091-SEG2-2505	0	Soil Stratigraphy
285380-03-061-SEG2-2506	0	Foundation Layout
285380-03-061-SEG2-2507	0	Foundation Details

285380-03-060-SEG2-2508	0	Ground Improvements - Plan
285380-03-061-SEG2-2509	0	Abutment Layout
285380-03-061-SEG2-2510	0	Abutment Details
285380-03-061-SEG2-2511	0	Abutment Reinforcement
285380-03-061-SEG2-2512	0	RSS Wall Layout
285380-03-061-SEG2-2513	0	RSS Wall Details
285380-03-061-SEG2-2514	0	Pier Layout
285380-03-061-SEG2-2515	0	Pier Details
285380-03-061-SEG2-2516	0	Pier Reinforcement
285380-03-062-SEG2-2517	0	Bearing Layout and Details
285380-03-063-SEG2-2518	0	Prestressed Girders Layout
285380-03-063-SEG2-2519	0	Prestressed Girders I - Span I
285380-03-063-SEG2-2520	0	Prestressed Girders II - Span II
285380-03-063-SEG2-2521	0	Prestressed Girders III - Span III
285380-03-063-SEG2-2522	0	Prestressed Girders IV - Span IV
285380-03-063-SEG2-2523	0	Prestressed Girders V - Span V
285380-03-063-SEG2-2524	0	Prestressed Girders VI - Span VI
285380-03-063-SEG2-2525	0	Girder Plate Details
285380-03-064-SEG2-2526	0	Abutment Diaphragm Layout and Reinforcement
285380-03-064-SEG2-2527	0	Pier Diaphragm Layout and Reinforcement
285380-03-064-SEG2-2528	0	Interior Precast Panels
285380-03-064-SEG2-2529	0	Expansion Joint Precast Deck Panels
285380-03-064-SEG2-2530	0	Deck Layout and Reinforcement
285380-03-064-SEG2-2531	0	Deck Details
285380-03-065-SEG2-2532	0	Parapet Wall Finish (Grassland Pattern)
285380-03-061-SEG2-2553	0	Light/Signal/Communications Foundation
285380-03-065-SEG2-2534	0	Fence Details
285380-03-065-SEG2-2535	0	Details of Concrete Slope Paving
285380-03-066-SEG2-2536	0	Standard Details
285380-07-444-SEG2-2537	0	Embedded Electrical Work I
285380-07-444-SEG2-2538	0	Embedded Electrical Work II
285380-07-444-SEG2-2539	0	Embedded Electrical Work III
285380-07-444-SEG2-2540	0	Embedded Electrical Work IV
285380-03-060-SEG2-2547	0	Ground Improvements - Sections I
285380-03-060-SEG2-2548	0	Ground Improvements - Sections II
285380-03-060-SEG2-2549	0	Ground Improvements - Sections III
285380-04-094-SEG2-2550	0	Construction Notes - Backfill at Structures
285380-04-094-SEG2-2551	0	Construction Notes - Lightweight Fill Material
285380-04-094-SEG2-2552	0	Construction Notes - Expanded Polystyrene

285380-03-080-SEG2-2554	0	Fire Suppression Plan
285380-03-080-SEG2-2555	0	Fire Suppression Profile - HWY 401
285380-03-080-SEG2-2556	0	Fire Suppression Profile - HWY 3 (SR2)
285380-03-080-SEG2-2557	0	Fire Suppression Details - HWY 401
285380-03-080-SEG2-2558	0	Fire Suppression Details - HWY 3 (SR2)
285380-07-067-SEG2-2557	0	Luminaire Structural Support Option 1
285380-07-067-SEG2-2558	0	Luminaire Structural Support Option 2
285380-07-067-SEG2-2559	0	Wireway Structural Support

10.2 List of Documents (included in this submission):

Document No.	Revision	Document Name
285380-04-119-0010	0	Geotechnical Investigation and Design Report
285380-03-126-0039	D	Tunnel Watertightness Technical Memorandum
285380-03-127-0019	0	Technical Appraisal Form

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

See Appendix A.

The above design and construction proposals are submitted for review

Signed: Biljana Rajlic

Design/Construction Manager

Name: Biljana Rajlic

Engineering Qualifications: P.Eng.

Date: MAY 30, 2012

Professional Registration Number: 100041385

Affix Professional Seal

Signed: R. Noorbakhsh

Project Co Representative

Name: Roya Noorbakhsh

Date: 27 July 2012

Professional Registration Number: .....

Affix Professional Seal

Appendix A – Referenced Drawings and Documents

Referenced Drawing(s)

Drawing No.	Revision	Drawing Name

Certificate(s)

Certificate No.	Revision	Certificate Name

Special Provision(s)

Document No.	Revision	Document Name
285380-70-119-0001	C	Highway and Roadway Drainage Design Report for Phase 1 and Phase 2
285380-83-119-0013	B	Tunnel Top Soil – Proposed Soil Profiles and Corresponding Unit Weight
285380-03-126-0045	D	Tunnel Structural Fire Assessment
285380-03-126-0049	A	Tunnel Structural Fire Assessment – Deck Slab
285380-03-109-0004	0	Tunnel Design Criteria