



Document Type:	TECHNICAL APPRAISAL FORM Tunnels
Submission Name:	T10A - Hearthwood Tunnel (Highway 401)
Document Number:	285380-03-127-0024

Design Consultant:		HMM
Date	Revision	Description
Oct. 23, 2012	0	Issued for Construction

Issued by: Liang Guo
Name

Oct. 23, 2012
Date



Signature

This document has been prepared for the titled project or named part thereof and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of HMM being obtained. HMM accepts no responsibility or liability for the consequence of this document being used for a purpose other than the purposes for which it was commissioned. Any person using or relying on the document for such other purpose agrees, and will by such use or reliance be taken to confirm his agreement to indemnify HMM for all loss or damage resulting therefrom. HMM accepts no responsibility or liability for this document to any party other than the person by whom it was commissioned.

To the extent that this report is based on information supplied by other parties, HMM accepts no liability for any loss or damage suffered by the client, whether contractual or tortious, stemming from any conclusions based on data supplied by parties other than HMM used by HMM in preparing this report.

Project: Windsor-Essex Parkway
Document: T10A – Hearthwood Tunnel (Highway 401)
Doc No.: 285380-03-127-0024

Date: Oct. 23, 2012
Rev: 0
Page No.: 1 of 17

This page is intentionally left blank

TABLE OF CONTENTS

1	PROJECT DESCRIPTION	5
1.1	NAME AND LOCATION OF TUNNEL	5
1.2	PERMITTED TRAFFIC SPEED	5
2	TUNNEL DETAILS.....	5
2.1	BASIC LAYOUT.....	5
2.2	RESTRICTIONS TO TRAFFIC	6
3	BRIEF DESCRIPTION OF TUNNEL, TRAFFIC AND TUNNEL GEOMETRY	6
3.1	STRUCTURAL FORM OF TUNNEL.....	6
3.2	STRUCTURAL FORM OF PORTAL STRUCTURES	7
3.3	TRAFFIC AND GEOMETRY	7
3.3.1	Horizontal and vertical alignment of Tunnel and Tunnel approaches.....	7
3.3.2	Cross-section	7
3.3.3	Standards used.....	7
3.3.4	Accommodation of mechanical and electrical services in Tunnel.....	7
3.3.5	Minimum vertical clearance, horizontal clearances.....	8
3.4	PROPOSED ARRANGEMENTS FOR INSPECTION AND MAINTENANCE	8
3.5	PROVISION TO BE MADE IN THE TUNNEL LAYOUT FOR EMERGENCY COMMUNICATION AND ESCAPE FACILITIES, FIRE, ETC.	8
3.6	LANDSCAPING ABOVE TUNNEL AND PROTECTION OF TUNNEL ROOF	8
3.7	FINISHES	8
4	DESIGN ASSESSMENT CRITERIA	8
4.1	LIVE LOADING.....	8
4.1.1	Loading relating to normal traffic under applicable code loading and regulation	8
4.1.2	Design vehicle	8
4.1.3	Provision for exceptional abnormal loads	8
4.1.4	Any special loading not covered above	8
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	9
4.1.6	Authorities consulted or any special conditions required	9
5	STRUCTURAL ANALYSIS.....	9
5.1	METHODS OF ANALYSIS PROPOSED	9
5.2	ASSUMPTIONS OF STRUCTURAL ELEMENTS	9
5.2.1	Cast-In-Place Concrete	9
5.2.2	Precast Prestressed Concrete.....	9
5.2.3	Precast Reinforced Concrete	9
5.2.4	Reinforcing Steel.....	9
5.2.5	Prestressing Steel	9
5.2.6	Structural Stiffness.....	9
5.3	PROPOSED EARTH PRESSURE COEFFICIENT (K_A , K_O , OR K_P).....	10
5.4	PROPOSED FIRE DESIGN INCLUDING PROTECTION OF STRUCTURE AND CABLE.....	10
6	GROUND CONDITIONS.....	10
6.1	GROUND CONDITIONS.....	10

6.2	GEOTECHNICAL DESIGN PARAMETERS.....	10
6.3	DIFFERENTIAL SETTLEMENT	10
6.4	ANTICIPATED GROUND MOVEMENTS OR SETTLEMENT	11
6.5	GROUNDWATER CONDITIONS AND MITIGATIVE MEASURES.....	11
6.6	VARIANCE FROM GEOTECHNICAL INVESTIGATION AND DESIGN REPORT RECOMMENDATIONS.....	11
7	DRAINAGE AND WATERPROOFING	11
7.1	DETAILS OF PROPOSED/EXISTING DRAINAGE.....	11
7.1.1	Ground water seepage and run off.....	11
7.1.2	Accidental spillage, water carried in by vehicles	11
7.1.3	Fire main burst	11
7.1.4	Tunnel washing	11
7.2	DETAILS OF PROPOSED WATERPROOFING.....	12
7.3	LIST SPECIAL REQUIREMENTS OF LOCAL DRAINAGE AUTHORITY	12
8	TUNNEL SUPPORT SYSTEM AND METHOD OF CONSTRUCTION.....	12
8.1	BASIS OF THE DESIGN OF THE TUNNEL SUPPORT SYSTEM FOR TEMPORARY AND PERMANENT CONDITIONS AND ANY PROPOSALS FOR GROUND TREATMENT.....	12
8.2	SHOW HOW THE PROPOSED METHOD OF CONSTRUCTION, I.E. EXCAVATION AND APPLICABLE GROUND SUPPORT, WILL ENSURE THE CONTINUED SAFE USE OF THE PARKWAY AND PREVENT STRUCTURAL FAILURE	12
8.3	GIVE DETAILS OF PREDICTED SETTLEMENTS ON ADJACENT STRUCTURES.....	13
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)	13
9	CHECKING	13
9.1	INDEPENDENT CHECK.....	13
9.2	RESPONSIBLE DESIGN PERSONNEL.....	13
10	DRAWINGS AND DOCUMENTS	13
10.1	LIST OF DRAWINGS (INCLUDED IN THIS SUBMISSION):	13
10.2	LIST OF DOCUMENTS (INCLUDED IN THIS SUBMISSION):.....	15
10.3	LIST OF REFERENCE DRAWINGS AND DOCUMENTS (NOT INCLUDED IN THIS SUBMISSION).....	15

Appendix A – Design Documentation

1 Project Description

This submission contains design drawings and geotechnical recommendations associated with Hearthwood Tunnel (Highway 401) T10A. This is the 90% submission for the structure deliverables.

1.1 Name and location of tunnel

Hearthwood Tunnel (HWY 401) T10A is designed for the westbound and eastbound traffic along the below-grade section of Highway 401 from STA. 12+500 to STA. 12+660.

1.2 Permitted traffic speed

Highway Classification:	UFD 120 – HWY 401
Design Speed:	120 km/h
Posted Speed:	100 km/h
Laning:	Landscape and pedestrian trail over the structure 7 including a speed change lane under the structure for HWY 401
Design Clearance:	Minimum 5.0 m vertical clearance
Bridge Design Vehicle:	CL-625-ONT

2 Tunnel Details

2.1 Basic layout

Hearthwood Tunnel (HWY 401) T10A is 160 m long with a clear roadway width of 17.25 m for eastbound roadway and 19.0 - 21.55 m for westbound roadway. The tunnel is centered at the tangent segment of Highway 401 with three 3.75 m westbound lanes, three 3.75 m eastbound lanes and a 3.5 m westbound speed change lane. 2.5 m or 3.0 m wide shoulders are accommodated along the north and south side of the below-grade highway. The pier is located along the median of HWY 401 with median barrier on both sides of pier to separate the westbound and eastbound lanes.

Basic Layout Summary

Length:	160 m
Clear Roadway Width:	19.0 - 21.55 m for westbound roadway; 17.25 m for eastbound roadway
Alignment:	Highway 401 – tangent
Laning:	3 – 3.75 m westbound lanes under 1 – 3.50 m westbound speed change lane under 3 – 3.75 m eastbound lanes under
Shoulder:	2.5 m or 3.0 m wide on each side of a traffic

	bound
Median Barrier:	Along median on both sides of pier
Road side Barrier:	Along shoulder of westbound lanes

2.2 Restrictions to traffic

Not applicable.

3 Brief Description of Tunnel, Traffic and Tunnel Geometry

3.1 Structural form of Tunnel

Hearthwood Tunnel (HWY 401) T10A is a two span deck-on-girder structure designed along the below-grade section of Highway 401. Abutments and pier is parallel to the tangent of alignment of HWY 401 except that north abutment is parallel to the roadside barrier at northwest portion. Girders have no skew angle with the abutments and pier except at northwest abutment. See summary below for general arrangement.

Structure Summary

Structural Type:	Prestressed concrete NU 1600 girders with deck, semi-integral abutments with RSS return wall and column pier.
Span Arrangement:	Two span structure comprising NU 1600 girders spaced at 3.01 m except at expansion joint which is 2.46 m. Exterior girder's overhang is 1.06 m. Span length is 22-23.3 m at the north span and 25.8 m at the south span.
Foundation Type:	
North Abutment:	Semi-integral abutment supported on HP 310x110 steel piles.
Central Pier	Cap beam supported on 1.2 m diameter of columns over 3.2 m wide concrete footings. Columns on footing supported on HP 310x110 steel piles.
South Abutment:	Semi-integral abutment supported on HP 310x110 steel piles.
Span Articulation:	Semi-integral support at abutments. Concrete footing for central piers. Three expansion joints longitudinal to girders are provided on the deck along length of the tunnel with spacing of 38.41 m and 41.59 m.

Deck:	235 mm deck comprising 90 mm precast panels and cast-in-place concrete topping with 30 mm constant haunch; 1.8 m high, 0.3 m wide parapet wall at each side.
-------	--

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 850 mm 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.

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. 11+597.90 to STA. 12+801.68

Vertical alignment: -0.50% slope from STA. 12+223.27 to STA. 12+573.01

Above Tunnel: Pedestrian trail

3.3.2 Cross-section

Tunnel satisfied 5.0 m minimum vertical clearance. Minimum 5.104 m vertical clearance is provided.

3.3.3 Standards used

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 will be provided on next submission.

3.3.5 Minimum vertical clearance, horizontal clearances

Minimum vertical clearance is 5.104 m. Minimum horizontal clearance provided between the traffic carriageway and the face of the structure is 10 m at eastbound.

3.4 Proposed arrangements for inspection and maintenance

All exposed structure elements will be accessible for inspection and maintenance. Some elements may require 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 are specified in the General Notes, Doc No. 285380-03-060-SEG1-3002.

4 Design Assessment Criteria

4.1 Live Loading

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

Truck load of CL-625-ONT and pedestrian load used in the design of T10A is as per the Canadian Highway and Bridge Design Code (CHBDC) S6-06.

4.1.2 Design vehicle

There are no vehicular traffic lanes except 4 m wide trail over the structure. Therefore, only one CL-625-ONT truck was used in the design of T10A. Tunnel is on tangent alignment with no turning radius.

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

Hearthwood Tunnel (HWY 401) T10A has been analysed in accordance with Canadian Highway Bridge Design Code and S6S1-10 (Supplement No. 1 to CAN/CSA-S6-06). Software design aids including RM Bridge V8i version 08.09.90.01, STAAD Pro 2007 version 20.07.02.15 and Microsoft Office Excel 2007 were used.

5.2 Assumptions of structural elements

5.2.1 Cast-In-Place Concrete

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

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

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 28 days: 40MPa (deck panels)

5.2.3 Precast Reinforced Concrete

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

5.2.4 Reinforcing Steel

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

Coated reinforcing steel bars in pier columns: CAN/CSA G30.18-M92; Grade 500W

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

5.2.5 Prestressing Steel

Strands shall be low-relaxation, size designation 15, Grade 1860 in accordance with CSA Standard G279.

5.2.6 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, Doc No. 285380-04-119-0046.

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.

The structural integrity, and therefore the safety, of the tunnel structure will be demonstrated. Technical and contractual discussions between WEMG and HMQ on this issue are ongoing. The final design solution will comply either with the PA or with the Variance agreed with HMQ and the TAF will be updated at that time.

If no protective measures at T-10A, the melting of bearings will create additional negative and positive moment on girders, which will be resisted by composite section (deck and girders) under fire exposure conditions.

The RSS walls are considered not specifically to be designed to resist a vehicle fire in the tunnel because they are part of the substructure, and are secondary structural elements designed for soil support only. A memo will be issued to HMQ that explains the RSS wall repair procedure, and to justify that if there is failure of the RSS wall during a fire the structure will not collapse.

There are buried electrical and ATMS ducts across this tunnel top. Based on test evidence in published technical papers, and on heat transfer analysis for WEP tunnels, 235 mm concrete deck will be more than sufficient to protect ducts on top of a tunnel in the event of a 2-hour vehicle fire in the tunnel. 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, Doc No. 285380-04-119-0046.

6.2 Geotechnical Design Parameters

Refer to Geotechnical Investigation and Design Report, Doc No. 285380-04-119-0046.

6.3 Differential Settlement

Refer to Geotechnical Investigation and Design Report, Doc No. 285380-04-119-0046.

- 6.4 Anticipated Ground Movements or Settlement
Refer to Geotechnical Investigation and Design Report, Doc No. 285380-04-119-0046.
- 6.5 Groundwater Conditions and Mitigative Measures
Refer to Geotechnical Investigation and Design Report, Doc No. 285380-04-119-0046.
- 6.6 Variance from Geotechnical Investigation and Design Report 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.
- 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 designed for. The flow would be collected within two or three inlets. Watermains crossing Highway 401 and 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 filled 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 designed for. The flow would be collected within two or

three inlets. Watermains crossing Highway 401 and 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 filled 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, Doc No. 285380-03-126-0039.

7.3 List special requirements of local drainage authority

Not applicable.

8 Tunnel Support System and Method of Construction

8.1 Basis of the design of the Tunnel support system for temporary and permanent conditions and any proposals for ground treatment

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

Refer to Geotechnical Investigation and Design Report, Doc No. 285380-04-119-0046 for the basis of permanent ground treatment design.

Design for temporary conditions is not addressed in this submission.

8.2 Show how the proposed method of construction, i.e. excavation and applicable ground support, will ensure the continued safe use of the Parkway and prevent structural failure

Permanent design is based on the assumed 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, Doc No. 285380-04-119-0046 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 I (i).

Independent Checking Team: INTERNATIONAL BRIDGE TECHNOLOGIES.

9.2 Responsible Design Personnel

Originator: Liang Guo, P. Eng.

Checker: Matthias Yu, P. Eng.

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-SEG1-3000	0	COVER SHEET, SITE PLAN AND KEY PLAN
285380-03-060-SEG1-3001	0	GENERAL ARRANGEMENT
285380-03-060-SEG1-3002	0	GENERAL NOTES
285380-04-090-SEG1-3003	0	BOREHOLE LOCATIONS & SOIL STRATA
285380-04-091-SEG1-3004	0	SOIL STRATIGRAPHY
285380-03-061-SEG1-3005	0	FOUNDATION LAYOUT
285380-03-061-SEG1-3006	0	FOUNDATION DETAILS
285380-03-060-SEG1-3007	0	GROUND IMPROVEMENTS - PLAN
285380-03-061-SEG1-3008	0	ABUTMENT LAYOUT I
285380-03-061-SEG1-3009	0	ABUTMENT LAYOUT II
285380-03-061-SEG1-3010	0	ABUTMENT REINFORCEMENT

285380-03-061-SEG1-3011	0	RSS WALL LAYOUT
285380-03-061-SEG1-3012	0	RSS WALL DETAILS
285380-03-061-SEG1-3013	0	PIER LAYOUT
285380-03-061-SEG1-3014	0	PIER REINFORCEMENT
285380-03-062-SEG1-3015	0	BEARING LAYOUT
285380-03-062-SEG1-3016	0	BEARING DETAILS
285380-03-063-SEG1-3017	0	PRESTRESSED GIRDER LAYOUT
285380-03-063-SEG1-3018	0	PRESTRESSED GIRDER ELEVATIONS
285380-03-063-SEG1-3019	0	PRESTRESSED GIRDER DETAILS
285380-03-064-SEG1-3020	0	ABUTMENT DIAPHRAGM LAYOUT & REINFORCEMENT
285380-03-064-SEG1-3021	0	PIER DIAPHRAGM LAYOUT & REINFORCEMENT
285380-03-064-SEG1-3022	0	INTERIOR PRECAST DECK PANELS
285380-03-064-SEG1-3023	0	PRECAST PANELS AT EXPANSION JOINTS
285380-03-064-SEG1-3024	0	DECK LAYOUT
285380-03-064-SEG1-3025	0	DECK REINFORCEMENT AND DETAILS
285380-03-065-SEG1-3026	0	PARAPET WALL FINISH (GRASSLAND PATTERN)
285380-03-065-SEG1-3027	0	FENCE DETAILS
285380-03-065-SEG1-3028	0	DETAILS OF CONCRETE SLOPE PAVING
285380-03-066-SEG1-3029	0	STANDARD DETAILS
285380-07-444-SEG1-3030	0	EMBEDDED ELECTRICAL WORK I
285380-07-444-SEG1-3031	0	EMBEDDED ELECTRICAL WORK II
285380-07-444-SEG1-3032	0	EMBEDDED ELECTRICAL WORK III
285380-07-444-SEG1-3033	0	EMBEDDED ELECTRICAL WORK IV
285380-03-060-SEG1-3034	0	GROUND IMPROVEMENTS – SECTIONS I
285380-03-060-SEG1-3035	0	GROUND IMPROVEMENTS – SECTIONS II
285380-03-060-SEG1-3036	0	GROUND IMPROVEMENTS – SECTIONS III
285380-04-094-SEG1-3037	0	CONSTRUCTION NOTES – BACKFILL AT STRUCTURES
285380-04-094-SEG1-3038	0	CONSTRUCTION NOTES – LIGHTWEIGHT FILL MATERIAL
285380-04-094-SEG1-3039	0	CONSTRUCTION NOTES – EXPANDED POLYSTYRENE
285380-03-061-SEG1-3040	0	LIGHT/SIGNAL/COMMUNICATIONS FOUNDATION
285380-03-080-SEG1-3041	0	FIRE SUPPRESSION PLAN & CONNECTIONS
285380-03-080-SEG1-3042	0	FIRE SUPPRESSION PROFILE
285380-03-080-SEG1-3043	0	FIRE SUPPRESSION DETAILS
285380-07-067-SEG1-3044	0	LUMINAIRE STRUCTURAL SUPPORT OPTION 1
285380-07-067-SEG1-3045	0	LUMINAIRE STRUCTURAL SUPPORT OPTION 2
285380-07-067-SEG1-3046	0	WIREWAY STRUCTURAL SUPPORT

10.2 List of Documents (included in this submission):

Document No.	Revision	Document Name
285380-04-119-0046	0	Geotechnical Investigation and Design Report
285380-03-126-0039	E	Tunnel Watertightness Technical Memorandum
285380-03-127-0024	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:

Design Manager

Name: Biljana Rajlic

Engineering Qualifications: P.Eng

Date: October 23, 2012

Professional Registration Number: 100041385

Affix Professional Seal



Signed:

Project Co Representative

Name: LORACIO LARA

Date: Nov 14, 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