

**Midtown Oakville Transportation and Stormwater  
Municipal Class EA Final Report June 2014**

**APPENDIX H  
STRUCTURES REPORTS**

Planning

Design and Design  
Review

Seismic Assessment

Structural Evaluation

Condition Surveys

Structural  
Rehabilitation

Feasibility Studies

Construction  
Engineering

Contract Administration  
and Tendering

Construction  
Inspection

Quality Verification  
Engineering (QVE)

# PRELIMINARY/FUNCTIONAL STRUCTURAL DESIGN

## TRAFALGAR ROAD UNDERPASS STRUCTURE S1

### OAKVILLE MIDTOWN EA

2011-149  
June, 2014

 **REMISZ** Consulting  
Engineers

June 3, 2014

2011-149

Rory O'Sullivan, M.Sc.  
Project Designer, Transportation Design  
Cole Engineering Group Ltd.  
70 Valleywood Drive  
Markham, ON L3R 4T5

**Re: Oakville Midtown EA  
Preliminary/Functional Structural Design  
Trafalgar Road Underpass – Structure S1**

Dear Mr. O'Sullivan:

REMISZ Consulting Engineers Ltd. is pleased to submit this report for the above mentioned project.

The preliminary design was developed based on plan and profile drawings provided by COLE.

Preliminary drawings and our cost estimate can be found in the Appendix of the report.

We trust that this submission is sufficient for your requirements. If you have any questions, please do not hesitate to contact us.

Yours very truly,

A handwritten signature in black ink, appearing to read 'Wojciech Remisz', is written over a vertical line that extends down to the typed name below.

Wojciech Remisz, M.Sc., P.Eng., FCSCE  
Senior Structural Engineer  
wojciech.remisz@remisz.com

## **1.0 Introduction**

REMISZ Consulting Engineers Ltd. (RCE) has been retained by Cole Engineering Group Ltd. (COLE), to carry out preliminary/functional structural design for the proposed Trafalgar Road Underpass, as part of the Oakville Transportation Master Plan, COLE project number TR11-767.

## **2.0 Scope of Work**

The scope of work assigned to RCE, as sub-consultants to COLE, was to provide structures-related support in the development of the preliminary design. This support pertained to the following items:

- Bridge/structural considerations;
- Structural requirements;
- Constructability/feasibility;
- Geotechnical/foundation considerations;
- Impact on existing utilities; and
- Preliminary cost estimate.

Further to the items listed above, RCE also developed a preliminary general arrangement drawing and structure cross-section (Appendix A), and itemized cost breakdown (Appendix B).

## **3.0 Bridge/Structural Considerations**

The new Underpass consists of a reinforced concrete rigid frame structure crossing under Trafalgar Road in the west-east direction, south of the QEW. The components of the new structure include reinforced concrete: rigid frame, wingwalls, footings, approach slabs, parapet walls, barriers, and retaining wall for the multi-use path.

## **4.0 Structural Requirements**

The new Underpass structure has been developed in accordance with the Canadian Highway Bridge Design Code (CHBDC). The bridge deck accommodates six thru lanes, an off ramp, and sidewalks on both the east and west sides of Trafalgar Road. The rigid frame structure has a span of 14.5m and an overall width of 46m. The multi-use pathway passing under Trafalgar Road has a width of 4m and is raised 2m above the West to Cross Ave. Ramp separated by a retaining wall and guard rail. The reinforced concrete deck is 600mm thick at midspan with 90mm of asphalt and waterproofing topping.

## **5.0 Constructability/Feasibility**

The constructability of the new Underpass does not pose any concerns. The new rigid frame structure can be constructed with traditional construction techniques. The construction will require open cut excavation with temporary shifting of Trafalgar Road for multi-stage construction requiring temporary lane closures. The existing water table is high and is to be considered during the detailed design phase of the project. Traffic control and staging will be required throughout the construction activities and is to be developed at the detailed design phase of the project.

## **6.0 Geotechnical/Foundation Considerations**

According to a limited preliminary desktop foundation study, completed by Golder Associates dated August 29<sup>th</sup> 2013, in the vicinity of the site the founding elevation of hard clayey silt to silty clay is 100.5. Slightly weathered shale bedrock can be found at an estimated elevation of 98.0.

Based on very limited geotechnical information obtained north of the proposed site in 1979, the groundwater level was measured to be at an elevation of 105.9. The construction methodology, staging and the extents of retaining walls will have to be confirmed during the detailed design phase of the project.

The new bridge foundation will be constructed with continuous spread footings measuring 2m in width and 0.8m in depth founded on the clayey silt to silty clay. The actual geotechnical conditions and foundation design is to be confirmed during the detailed design phase of the project. Additional boreholes will be required.

## 7.0 Impact on Existing Utilities

The existing utilities identified on the plan, in the direct vicinity of the Trafalgar Road Underpass construction area are as follows:

- Storm Water located at the west end of the structure running in the north-south direction;
- Storm Water located at the edge of the south side approach slabs;
- Sanitary located at the south-east approach slab;
- Hydro located at the east end of the structure running in the north-south direction;
- Hydro located at the west end of the structure running in the north-south direction;
- Bell located at the east end of the structure running in the north-south direction;
- CATV located along the east shoulder of Trafalgar Rd. running in the north-south direction; and
- Catch Basin located at the north-west approach slab.

Exact locates of the above utilities and coordination of relocations will be required during the detailed design phase of the project.

## 8.0 Preliminary Cost Estimate

The preliminary cost estimate for the Trafalgar Road Underpass structure (S1) has been broken down into two categories. These categories include general work and new construction. Our cost estimate for each category is as follows:

Category	Total
General Work	\$39,700
New Construction	\$3,354,475
<b>Total</b>	<b>\$3,394,175</b>

See Appendix B for a detailed itemized cost breakdown.

## 9.0 Closure

We trust that this submission provides you with all of the information necessary, and completes the required scope of work.

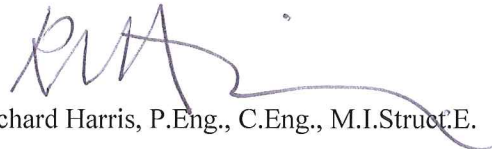
Yours very truly,



Wojciech Remisz, M.Sc., P.Eng., FCSCE

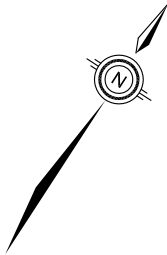


Christoph von Teichman, B.Eng., EIT

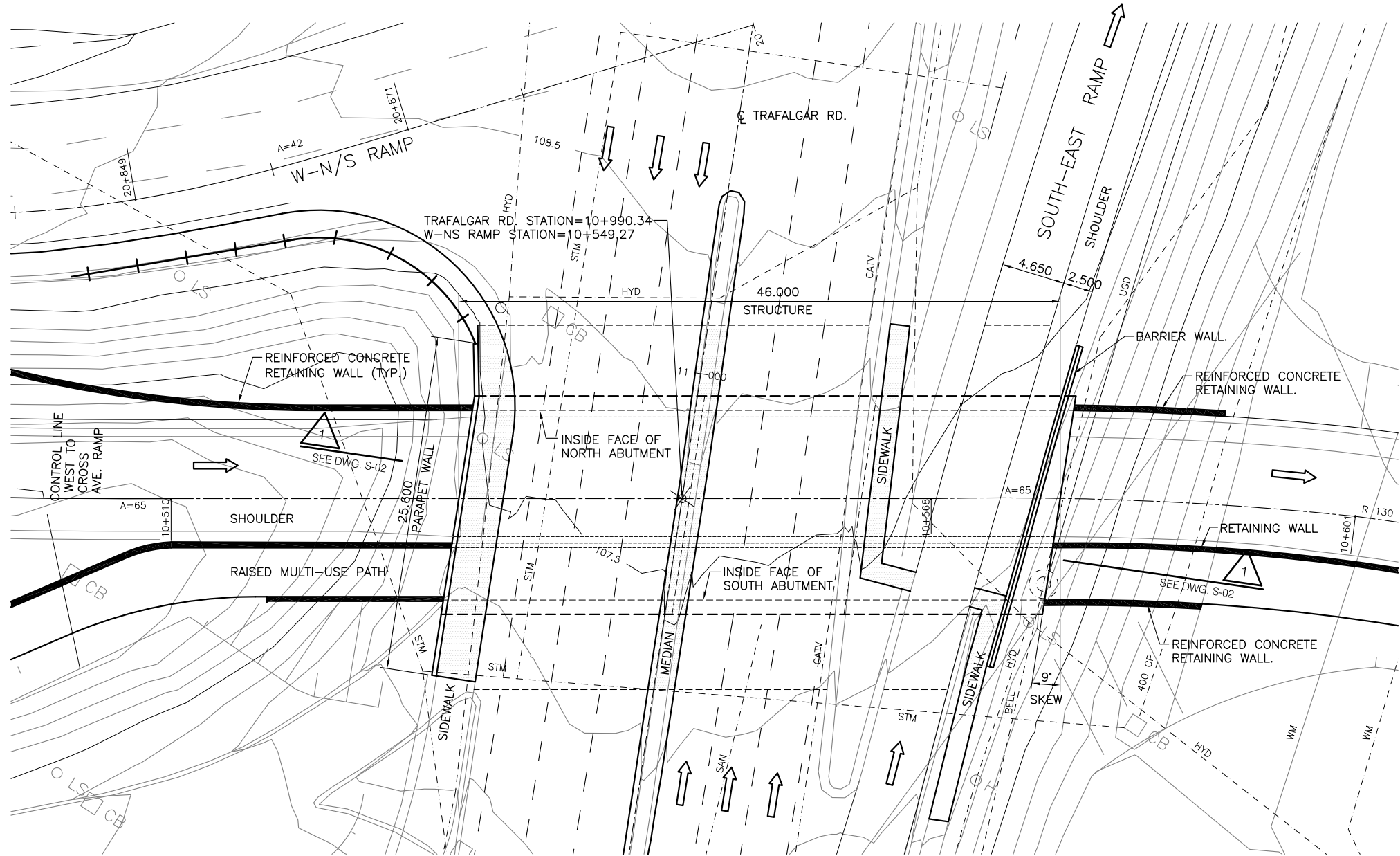


Richard Harris, P.Eng., C.Eng., M.I.Struct.E.

## **Appendix A – Drawings**



SEE DWG. S-02  
2



PLAN  
1:400

**ABBREVIATIONS:**

- ABUT. - ABUTMENT
- BRG'S - BEARINGS
- C.J. - CONSTRUCTION JOINT
- E.J. - EXPANSION JOINT
- CL - CENTRELINE
- TYP. - TYPICAL
- T/A - TOP OF ASPHALT
- T/C - TOP OF CONCRETE
- T/R - TOP OF ROCK
- W.L. - WATER LEVEL
- W.P. - WORKING POINT

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

**GENERAL NOTES:**

1. ELEVATIONS AND CHAINAGES ARE SHOWN IN METRES, DIMENSIONS ARE SHOWN IN MILLIMETRES.
2. LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE ONLY AND ARE NOT COMPREHENSIVE.
3. GEOTECHNICAL DRAFT REPORT - DESKTOP REVIEW AND PRELIMINARY RECOMMENDATIONS BY GOLDER ASSOCIATES REPORT No.13-1111-0033 AUGUST 29, 2013.
4. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING S-02 AND ALL CIVIL DRAWINGS.

No.	Date (dd/mm/yyyy)	Revision	By:

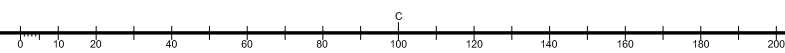
**REMISZ** CONSULTING ENGINEERS  
 1950 Merivale Road, Suite 205  
 Ottawa, K2G 5T5  
 Phone 613-225-1162  
 Fax 613-225-4529

Client  
**TOWN OF OAKVILLE**  
ENGINEERING AND CONSTRUCTION

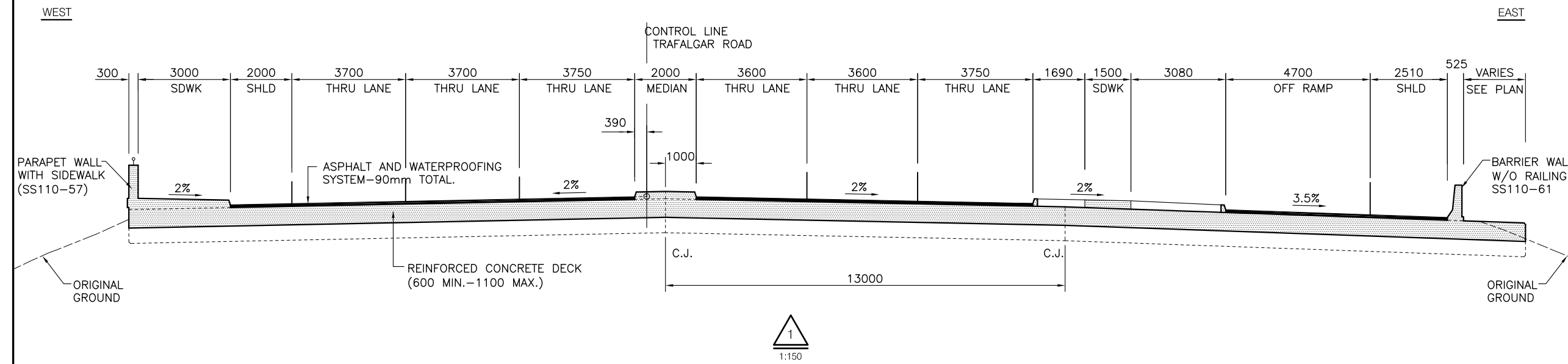
Project  
**TRAFALGAR ROAD UNDERPASS**  
STRUCTURE S1

Drawing  
**GENERAL ARRANGEMENT**  
PLAN

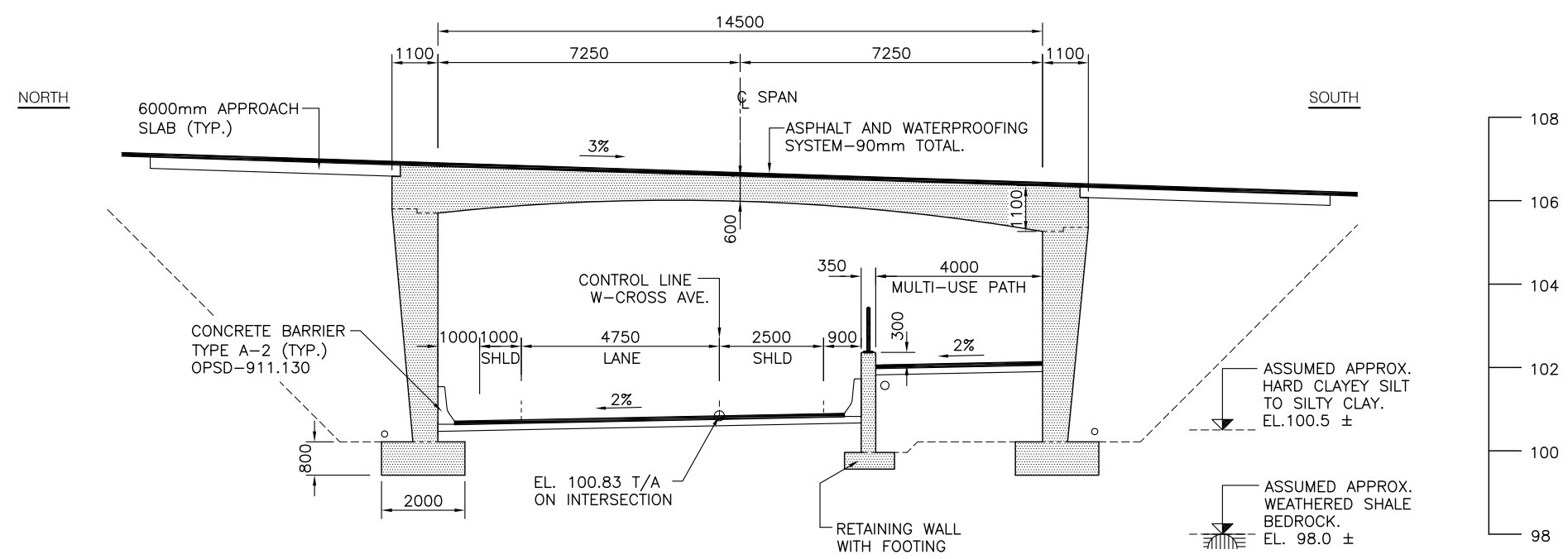
Designed	C.R.C.	Date	JUNE 2014
Drawn	W.M.K.	Scale	AS SHOWN
Checked	W.R.	Sheet	1 of 2
Project No.	2011-149-1	Dwg. No.	S-01



Frame 790x530 mm



1  
1:150  
DIMENSION MEASURED PERPENDICULAR TO TRAFALGAR ROAD AT CONTROL LINE STATION 10+990.00



EXISTING WATER TABLE IS HIGH, TO BE CONSIDERED DURING DETAIL DESIGN AND CONSTRUCTION.

2  
1:150

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  4. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING S-01 AND ALL CIVIL DRAWINGS.

No.	Date (dd/mm/yyyy)	Revision	By:

**REMISZ** CONSULTING ENGINEERS  
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Phone 613-225-1162  
Fax 613-225-4529

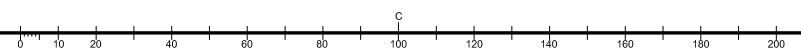
Client  
**TOWN OF OAKVILLE**  
ENGINEERING AND CONSTRUCTION

Project  
**TRAFALGAR ROAD UNDERPASS**  
STRUCTURE S1

Drawing  
**TYPICAL SECTIONS**

Designed	C.R.C.	Date	JUNE 2014
Drawn	W.M.K.	Scale	AS SHOWN
Checked	W.R.	Sheet	2 of 2
Project No.	2011-149-1	Dwg. No.	S-02

Remisz Consulting Eng. Frame 2000x800





## **Appendix B – Cost Estimate**

Town of Oakville  
TRAFFALGAR ROAD UNDERPASS

**S-1**

Item	Description	Unit	Quantity	Unit price	Total
<b>General Work</b>					
1	Mobilization and general requirements	LS	1	\$25,000	\$25,000
2	Site office	week	35	\$420	\$14,700
<b>Sub-Total for General Work</b>					<b>\$39,700</b>
<b>New Construction</b>					
1	Earth excavation for structure	m <sup>3</sup>	10,000	\$40	\$400,000
2	Concrete in footings	m <sup>3</sup>	148	\$600	\$88,800
3	Concrete in abutments	m <sup>3</sup>	436	\$1,450	\$632,200
4	Concrete in approach slabs	m <sup>3</sup>	93	\$650	\$60,450
5	Concrete in deck	m <sup>3</sup>	617	\$2,500	\$1,542,500
6	Concrete in parapet wall	m <sup>3</sup>	9	\$1,500	\$13,500
7	Concrete in sidewalks	m <sup>3</sup>	34	\$750	\$25,500
8	Concrete in barrier wall	m <sup>3</sup>	10	\$1,500	\$15,000
9	Concrete in median	m <sup>3</sup>	14	\$650	\$9,100
10	Reinforcing bars-black *	tonne	88	\$3,000	\$264,000
11	Backfill to structure	m <sup>3</sup>	3,000	\$25	\$75,000
12	Bridge deck waterproofing	m <sup>2</sup>	613	\$75	\$45,975
13	90mm paving, including on approach slabs	tonne	187	\$250	\$46,750
14	Quality Verification Engineering	LS	1	\$25,000	\$25,000
15	Steel railing	m	24	\$150	\$3,600
16	Retaining walls (46 m long under structure)	m <sup>3</sup>	63	\$1,700	\$107,100
<b>Sub-Total for New Construction</b>					<b>\$3,354,475</b>
<b>New Construction by Cole Engineering</b>					
1	Traffic control and staging on Trafalgar Road			\$0	\$0
2	Roadway barrier walls			\$0	\$0
3	Road protection on Trafalgar Road and erosion control			\$0	\$0
4	Relocation of services			\$0	\$0
5	Trafalgar Road widening and reconstruction by others			\$0	\$0
6	Retaining walls outside of structure by others			\$0	\$0
<b>Sub-Total by Cole Engineering</b>					<b>\$0</b>

\* As per MTO Memo, dated March 7, 2013, the use of epoxy coated reinforcing steel has been terminated.

Bridges, Dams, Culverts

Retaining Walls

Falsework, Formwork, Temporary Structures

Parking Garages, Parking Lots

Sewage and Storm Water Management

Piles, Platforms

Condominiums, Apartments Buildings, Office Buildings

*PROFESSIONAL SERVICES PROVIDED WITH CARE,  
COMPETENCE AND INTEGRITY THAT DELIVER  
PRACTICAL SOLUTIONS TO COMPLEX PROBLEMS*



Planning

Design and Design  
Review

Seismic Assessment

Structural Evaluation

Condition Surveys

Structural  
Rehabilitation

Feasibility Studies

Construction  
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Contract Administration  
and Tendering

Construction  
Inspection

Quality Verification  
Engineering (QVE)

# PRELIMINARY/FUNCTIONAL STRUCTURAL DESIGN

## NORTH-SOUTH CONNECTION OVER QEW STRUCTURE S4

### OAKVILLE MIDTOWN EA

2011-149  
June, 2014

 **REMISZ** Consulting  
Engineers

June 3, 2014

2011-149

Rory O'Sullivan, M.Sc.  
Project Designer, Transportation Design  
Cole Engineering Group Ltd.  
70 Valleywood Drive  
Markham, ON L3R 4T5

**Re: Oakville Midtown EA  
Preliminary/Functional Structural Design  
North-South Connection over QEW – Structure S4**

Dear Mr. O'Sullivan:

REMISZ Consulting Engineers Ltd. is pleased to submit this report for the above mentioned project.

The preliminary design was developed based on plan and profile drawings provided by COLE.

Preliminary drawings and our cost estimate can be found in the Appendix of the report.

We trust that this submission is sufficient for your requirements. If you have any questions, please do not hesitate to contact us.

Yours very truly,



Wojciech Remisz, M.Sc., P.Eng., FCSCE  
Senior Structural Engineer  
wojciech.remisz@remisz.com

## Table of Contents

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6.0	GEOTECHNICAL/FOUNDATION CONSIDERATIONS.....	3
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## Appendix A - Drawings

Drawing S-01 – General Arrangement, Plan and Elevation  
Drawing S-02 – Typical Sections

## Appendix B - Cost Estimate

Detailed Itemized Cost Estimate

## **1.0 Introduction**

REMISZ Consulting Engineers Ltd. (RCE) has been retained by Cole Engineering Group Ltd. (COLE), to carry out preliminary/functional structural design for the proposed North-South Connection over the Queen Elizabeth Way (QEW), as part of the Oakville Transportation Master Plan, COLE project number TR11-767.

## **2.0 Scope of Work**

The scope of work assigned to RCE, as sub-consultants to COLE, was to provide structures-related support in the development of the preliminary design. This support pertained to the following items:

- Bridge/structural considerations;
- Structural requirements;
- Constructability/feasibility;
- Geotechnical/foundation considerations;
- Impact on existing utilities; and
- Preliminary cost estimate.

Further to the items listed above, RCE also developed a preliminary general arrangement drawing and structure cross-section (Appendix A), and itemized cost breakdown (Appendix B).

## **3.0 Bridge/Structural Considerations**

The proposed Overpass consists of a reinforced concrete deck with a median, sidewalks and parapet walls on a steel box girder superstructure, crossing over the QEW in the north-south direction, east of Trafalgar Road. The substructure comprises: abutments, wingwalls, pier columns, pier caps, footings, caissons, and approach slabs.

## **4.0 Structural Requirements**

The new Overpass structure has been developed in accordance with the Canadian Highway Bridge Design Code (CHBDC). The bridge deck accommodates two thru lanes, two transit lanes, a left turn lane, two bike lanes, a sidewalk along the east side of the structure and a multi-use trail along the west side of the structure. The steel box girders have a depth of 1600mm and have two spans of 45m and one span of 47m (centre span). The bridge structure has a total width of 29.7m. The multi-use trail along the west side of the structure has an overall width of 3m. The reinforced concrete deck has a thickness of 225mm with 90mm of asphalt and waterproofing topping.

## **5.0 Constructability/Feasibility**

Construction of the new overpass structure will have a large impact on local traffic. Temporary lane closures on the QEW will be required for extended periods of time with New Jersey barrier protection of the construction zone. Construction of the piers on the QEW will require coordination of lane closures with MTO. Appropriate staging and traffic control will be developed during the detailed design phase of the project.

## 6.0 Geotechnical/Foundation Considerations

According to a limited preliminary desktop foundation study, completed by Golder Associates dated August 29<sup>th</sup> 2013, in the vicinity of the site the founding elevation of hard clayey silt to silty clay is 104.5. Slightly weathered shale bedrock can be found at an estimated elevation of 101.5. The groundwater level was measured to be at an elevation of 102.8 to 103.8. The new bridge foundation will be constructed with continuous spread footings at the abutments measuring 6m in width and 1.8m in depth founded on the clayey silt to silty clay. The pier foundations will consist of five caissons measuring 1500mm in diameter with a depth of 5m into the bedrock layer. The actual geotechnical conditions and foundation design are to be confirmed during the detailed design phase of the project. Additional boreholes will be required.

## 7.0 Impact on Existing Utilities

The existing utilities identified on the plan, in the direct vicinity of the North-South Connection over the QEW construction area are as follows:

- GAS located in front of the south abutment running east-west;
- Water Main located in front of the south abutment running east-west;
- CATV located in front of the south abutment running east-west;
- BELL located within the south span of the structure running east-west;
- Light Standard located within the south span of the structure;
- Light Standard located within the south pier;
- Water Main located south of the north pier running east-west;
- Sanitary located north of the north pier;
- Light Standard located within the north span of the structure;
- Catch Basin located at the north-east side of the structure;
- GAS and CATV located just beyond the north-east corner of the structure; and
- Man Hole located at the east corner of the north abutment.

Exact locations of the above utilities for coordination of relocations, or protection during construction, will be required during the detailed design phase of the project.

## 8.0 Preliminary Cost Estimate

The preliminary cost estimate for the North-South Connection over the QEW (S4) has been broken down into two categories. These categories include general work and new construction. Our cost estimate for each category is as follows:

<b>Category</b>	<b>Total</b>
General Work	\$57,760
New Construction	\$11,012,200
<b>Total</b>	<b>\$11,069,960</b>

See Appendix B for a detailed itemized cost breakdown.



## 9.0 Closure

We trust that this submission provides you with all of the information necessary, and completes the required scope of work.

Yours very truly,



Wojciech Remisz, M.Sc., P.Eng., FCSCE



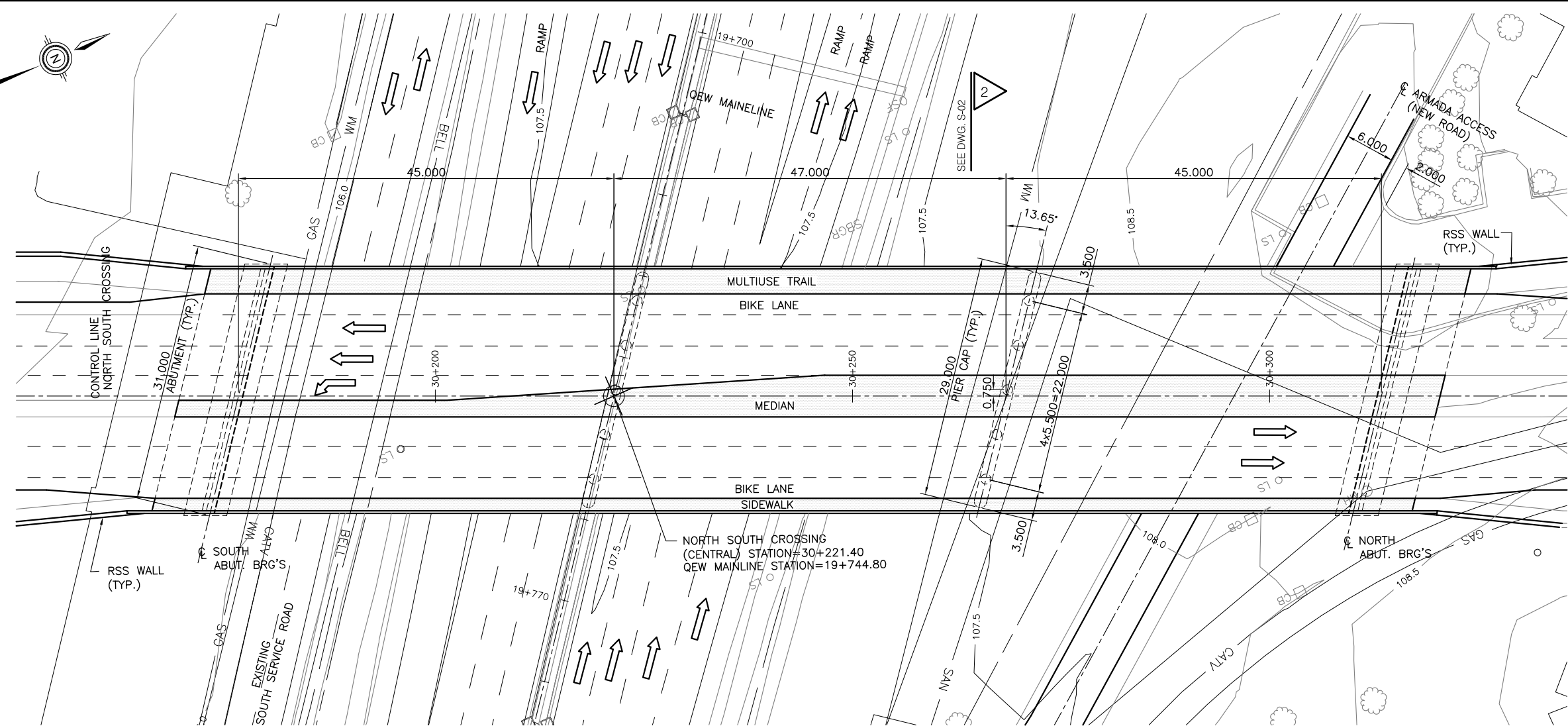
Richard Harris, P.Eng., C.Eng., M.I.Struct.E.



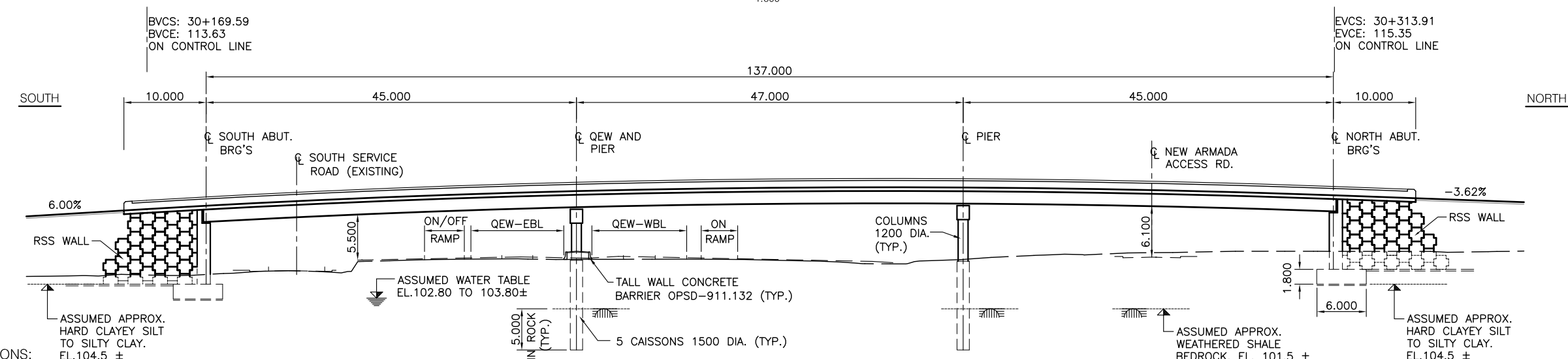
Christoph von Teichman, B.Eng., EIT

## **Appendix A – Drawings**

Frame 790x530 mm



PLAN  
1:600



FRONT ELEVATION  
1:600

- ABBREVIATIONS:**
- ABUT. - ABUTMENT
  - BRG'S - BEARINGS
  - C.J. - CONSTRUCTION JOINT
  - E.J. - EXPANSION JOINT
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THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

**GENERAL NOTES:**

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4. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING S-02 AND ALL CIVIL DRAWINGS.

No.	Date (dd/mm/yyyy)	Revision	By:

**REMISZ** CONSULTING ENGINEERS  
 1950 Merivale Road, Suite 205  
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 Phone 613-225-1162  
 Fax 613-225-4529

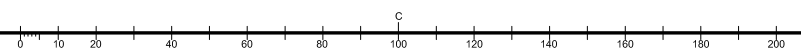
Client  
**TOWN OF OAKVILLE**  
 ENGINEERING AND CONSTRUCTION

Project  
**NORTH-SOUTH CONNECTION OVER QEW STRUCTURE S4**

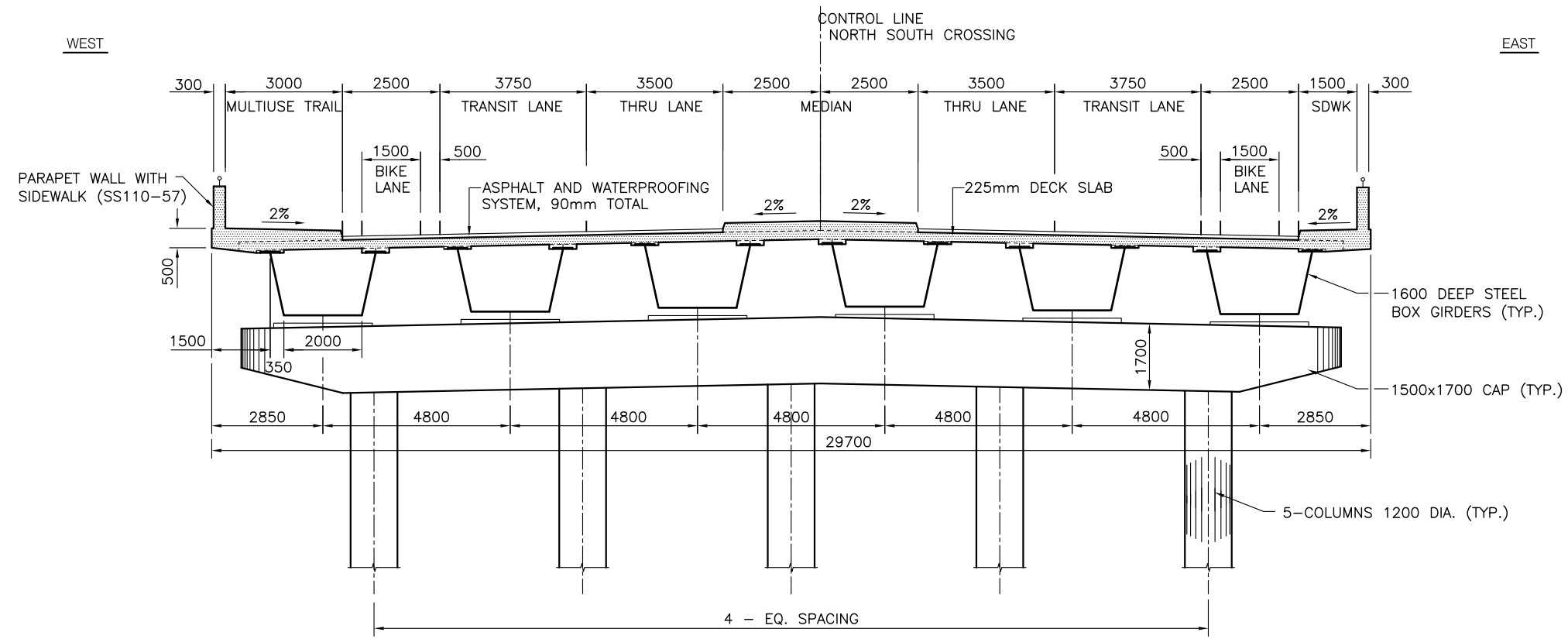
Drawing  
**GENERAL ARRANGEMENT PLAN AND ELEVATION**

Designed	C.R.C.	Date	JUNE 2014
Drawn	W.M.K.	Scale	AS SHOWN
Checked	W.R.	Sheet	1 of 2
Project No.	2011-149-4	Dwg. No.	S-01

Remisz Consulting Eng. Frame 2009/06/01



Frame 790x520 mm



DIMENSION MEASURED PERPENDICULAR TO NORTH SOUTH CROSSING ROAD AT CONTROL LINE STATION 30+260.00

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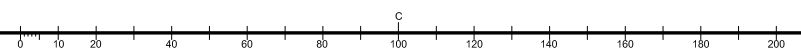
Client  
**TOWN OF OAKVILLE**  
 ENGINEERING AND CONSTRUCTION

Project  
**NORTH-SOUTH CONNECTION OVER QEW STRUCTURE S4**

Drawing  
**TYPICAL SECTIONS**

Designed	C.R.C.	Date	JUNE 2014
Drawn	W.M.K.	Scale	AS SHOWN
Checked	W.R.	Sheet	2 of 2
Project No.	2011-149-4	Dwg. No.	S-02

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  - W.P. - WORKING POINT



Remisz Consulting Eng. - Frame 2000x800

## **Appendix B – Cost Estimate**

**Town of Oakville  
 NORTH-SOUTH CONNECTION OVER QEW**
**S-4**

Item	Description	Unit	Quantity	Unit price	Total
<b>General Work</b>					
1	Mobilization and general requirements	LS	1	\$25,000	\$25,000
2	Site office	week	78	\$420	\$32,760
<b>Sub-Total for General Work</b>					<b>\$57,760</b>
<b>New Construction</b>					
1	Roadway protection system for pier footing construction	LS	1	\$225,000	\$225,000
2	Earth excavation for structure	m <sup>3</sup>	5,000	\$40	\$200,000
3	Rock excavation for caisson piles	m <sup>3</sup>	88	\$125	\$11,000
4	Caisson piles 1.5 m dia.	m	100	\$1,000	\$100,000
5	Concrete in piers 1.2 m dia. columns with cap	m <sup>3</sup>	190	\$1,750	\$332,500
6	Concrete in footings	m <sup>3</sup>	670	\$600	\$402,000
7	Concrete in abutments	m <sup>3</sup>	758	\$1,450	\$1,099,100
8	Concrete in wingwalls	m <sup>3</sup>	60	\$1,450	\$87,000
9	Concrete in approach slabs	m <sup>3</sup>	87	\$650	\$56,550
10	Concrete in deck	m <sup>3</sup>	995	\$2,500	\$2,487,500
11	Concrete in parapet wall	m <sup>3</sup>	101	\$1,500	\$151,500
12	Concrete in sidewalks	m <sup>3</sup>	274	\$750	\$205,500
13	Concrete in median	m <sup>3</sup>	142	\$650	\$92,300
14	Reinforcing bars-black *	tonne	232	\$3,000	\$696,000
15	Bearings	ea	48	\$2,500	\$120,000
16	Structural steel	tonne	904	\$5,000	\$4,520,000
17	Backfill to structure	m <sup>3</sup>	7,200	\$25	\$180,000
18	Bridge deck waterproofing	m <sup>2</sup>	280	\$75	\$21,000
19	90mm paving, including on approach slabs	tonne	615	\$250	\$153,750
20	Quality Verification Engineering	LS	1	\$50,000	\$50,000
21	Steel railing	m	310	\$150	\$46,500
<b>Sub-Total for New Construction</b>					<b>\$11,012,200</b>
<b>New Construction by Cole Engineering</b>					
1	Traffic control and staging			\$0	\$0
2	Road protection on South Service Road and erosion control			\$0	\$0
3	Relocation of services			\$0	\$0
4	Armada Road construction			\$0	\$0
<b>Sub-Total by Cole Engineering</b>					<b>\$0</b>

\* As per MTO Memo, dated March 7, 2013, the use of epoxy coated reinforcing steel has been terminated.

Bridges, Dams, Culverts

Retaining Walls

Falsework, Formwork, Temporary Structures

Parking Garages, Parking Lots

Sewage and Storm Water Management

Piles, Platforms

Condominiums, Apartments Buildings, Office Buildings

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COMPETENCE AND INTEGRITY THAT DELIVER  
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Planning

Design and Design  
Review

Seismic Assessment

Structural Evaluation

Condition Surveys

Structural  
Rehabilitation

Feasibility Studies

Construction  
Engineering

Contract Administration  
and Tendering

Construction  
Inspection

Quality Verification  
Engineering (QVE)

# PRELIMINARY/FUNCTIONAL STRUCTURAL DESIGN

## DIVERSION CHANNEL CROSSING STRUCTURE S5

### OAKVILLE MIDTOWN EA

2011-149  
June, 2014

 **REMISZ** Consulting  
Engineers



June 3, 2014

2011-149

Rory O'Sullivan, M.Sc.  
Project Designer, Transportation Design  
Cole Engineering Group Ltd.  
70 Valleywood Drive  
Markham, ON L3R 4T5

**Re: Oakville Midtown EA  
Preliminary/Functional Structural Design  
Diversion Channel Crossing – Structure S5**

Dear Mr. O'Sullivan:

REMISZ Consulting Engineers Ltd. is pleased to submit this report for the above mentioned project.

The preliminary design was developed based on plan and profile drawings provided by COLE.

Preliminary drawings and our cost estimate can be found in the Appendix of the report.

We trust that this submission is sufficient for your requirements. If you have any questions, please do not hesitate to contact us.

Yours very truly,



Wojciech Remisz, M.Sc., P.Eng., FCSCE  
Senior Structural Engineer  
wojciech.remisz@remisz.com

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2.0	SCOPE OF WORK.....	2
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4.0	STRUCTURAL REQUIREMENTS .....	2
5.0	CONSTRUCTABILITY/FEASIBILITY .....	2
6.0	GEOTECHNICAL/FOUNDATION CONSIDERATIONS.....	2
7.0	IMPACT ON EXISTING UTILITIES .....	3
8.0	PRELIMINARY COST ESTIMATE .....	3
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## Appendix A - Drawings

Drawing S-01 – General Arrangement, Plan  
Drawing S-02 – Typical Sections

## Appendix B - Cost Estimate

Detailed Itemized Cost Estimate

## **1.0 Introduction**

REMISZ Consulting Engineers Ltd. (RCE) has been retained by Cole Engineering Group Ltd. (COLE), to carry out preliminary/functional structural design for the proposed Trafalgar Road Underpass, as part of the Oakville Transportation Master Plan, COLE project number TR11-767.

## **2.0 Scope of Work**

The scope of work assigned to RCE, as sub-consultants to COLE, was to provide structures-related support in the development of the preliminary design. This support pertained to the following items:

- Bridge/structural considerations;
- Structural requirements;
- Constructability/feasibility;
- Geotechnical/foundation considerations;
- Impact on existing utilities; and
- Preliminary cost estimate.

Further to the items listed above, RCE also developed a preliminary general arrangement drawing and structure cross-section (Appendix A), and itemized cost breakdown (Appendix B).

## **3.0 Bridge/Structural Considerations**

The new Diversion Channel Crossing consists of a reinforced concrete rigid frame open footing culvert structure, crossing under the new North-South Connection roadway in the east-west direction, north of the QEW. The components of the new structure include reinforced concrete: rigid frame, footings and parapet walls.

## **4.0 Structural Requirements**

The new culvert structure has been developed in accordance with the Canadian Highway Bridge Design Code (CHBDC). The structure width accommodates: two thru lanes, two transit lanes, two bike lanes, a sidewalk on the east side, a multi-use trail on the west side and boulevards on both the east and west sides of the roadway. The culvert structure has a clear span of 8m and an overall width of 32m. The minimum cover over the culvert structure is 650mm.

## **5.0 Constructability/Feasibility**

The constructability of the new culvert structure does not pose any concerns. The new rigid frame open footing culvert can be constructed with traditional construction techniques. The construction will require open cut excavation with temporary diversion of the Morrison Wedgewood watercourse.

Traffic control and staging will be required throughout the construction activities and is to be developed at the detailed design phase of the project.

## **6.0 Geotechnical/Foundation Considerations**

According to a limited preliminary desktop foundation study, completed by Golder Associates dated August 29<sup>th</sup> 2013, in the vicinity of the site, the overburden consisted of stiff to hard silty clay. Slightly weathered shale bedrock can be found at an estimated elevation of 109.0.

Based on very limited geotechnical information obtained south of the proposed site in 1979, the groundwater level was measured to be at an elevation of 108.5. The construction methodology and staging will have to be confirmed during the detailed design phase of the project.

The new bridge foundation will be constructed with continuous spread footings measuring 1.5m in width and 0.7m in depth founded within the stiff to hard silty clay. The actual geotechnical conditions and foundation design is to be confirmed during the detailed design phase of the project. Additional boreholes will be required.

## 7.0 Impact on Existing Utilities

No existing utilities have been identified in the direct vicinity of the Diversion Channel Crossing construction area. The existing Morrison Wedgewood Channel will require temporary diversion throughout the construction activities.

Confirmation of the presence of utilities will be required during the detailed design phase of the project.

## 8.0 Preliminary Cost Estimate

The preliminary cost estimate for the Diversion Channel Crossing structure (S5) has been broken down into two categories. These categories include general work and new construction. Our cost estimate for each category is as follows:


Category	Total
General Work	\$37,600
New Construction	\$943,125
<b>Total</b>	<b>\$980,725</b>

See Appendix B for a detailed itemized cost breakdown.

## 9.0 Closure

We trust that this submission provides you with all of the information necessary, and completes the required scope of work.

Yours very truly,



Wojciech Remisz, M.Sc., P.Eng., FCSCE



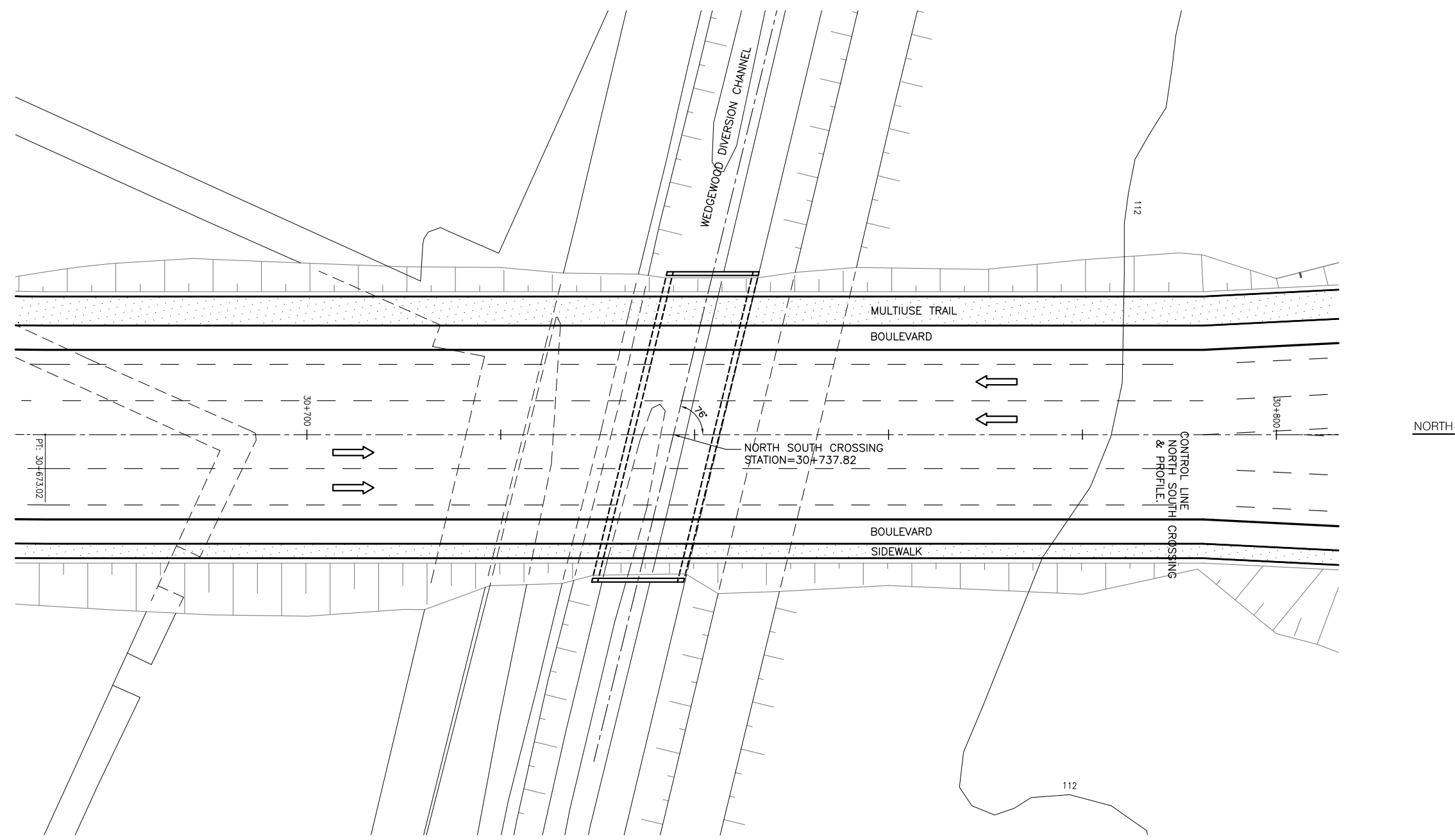
Christoph von Teichman, B.Eng., EIT

## **Appendix A – Drawings**

Frame: 790x530 mm



SEE DWG. S-02



PLAN  
1:500

**ABBREVIATIONS:**

- ABUT. - ABUTMENT
- BRG'S - BEARINGS
- C.J. - CONSTRUCTION JOINT
- E.J. - EXPANSION JOINT
- CL - CENTRELINE
- TYP. - TYPICAL
- T/A - TOP OF ASPHALT
- T/C - TOP OF CONCRETE
- T/R - TOP OF ROCK
- W.L. - WATER LEVEL
- W.P. - WORKING POINT

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

**GENERAL NOTES:**

1. ELEVATIONS AND CHAINAGES ARE SHOWN IN METRES, DIMENSIONS ARE SHOWN IN MILLIMETRES.
2. LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE ONLY AND ARE NOT COMPREHENSIVE.
3. GEOTECHNICAL DRAFT REPORT - DESKTOP REVIEW AND PRELIMINARY RECOMMENDATIONS BY GOLDER ASSOCIATES REPORT No.13-1111-0033 AUGUST 29, 2013.
4. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING S-02 AND ALL CIVIL DRAWINGS.

No.	Date (dd/mm/yyyy)	Revision	By:

**REMISZ** CONSULTING ENGINEERS  
 1950 Merivale Road, Suite 205  
 Ottawa, K2G 5T5  
 Phone 613-225-1162  
 Fax 613-225-4529

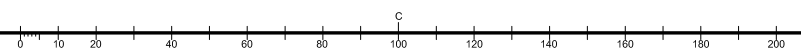
Client  
**TOWN OF OAKVILLE**  
 ENGINEERING AND CONSTRUCTION

Project  
**NORTH - SOUTH ROAD**  
**DIVERSION CHANNEL CROSSING**  
**STRUCTURE S5**

Drawing  
**RIGID FRAME OPEN FOOTING CULVERT**  
**GENERAL ARRANGEMENT**  
**PLAN**

Designed	C.R.C.	Date	JUNE 2014
Drawn	W.M.K.	Scale	AS SHOWN
Checked	W.R.	Sheet	1 of 2
Project No.	2011-149-5	Dwg. No.	S-01

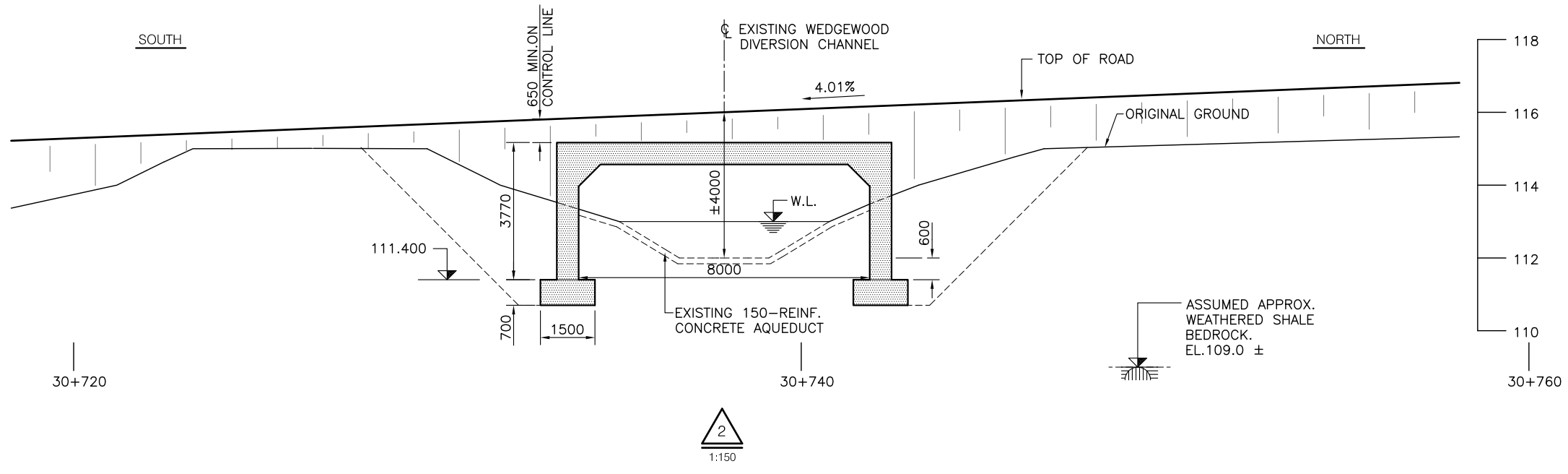
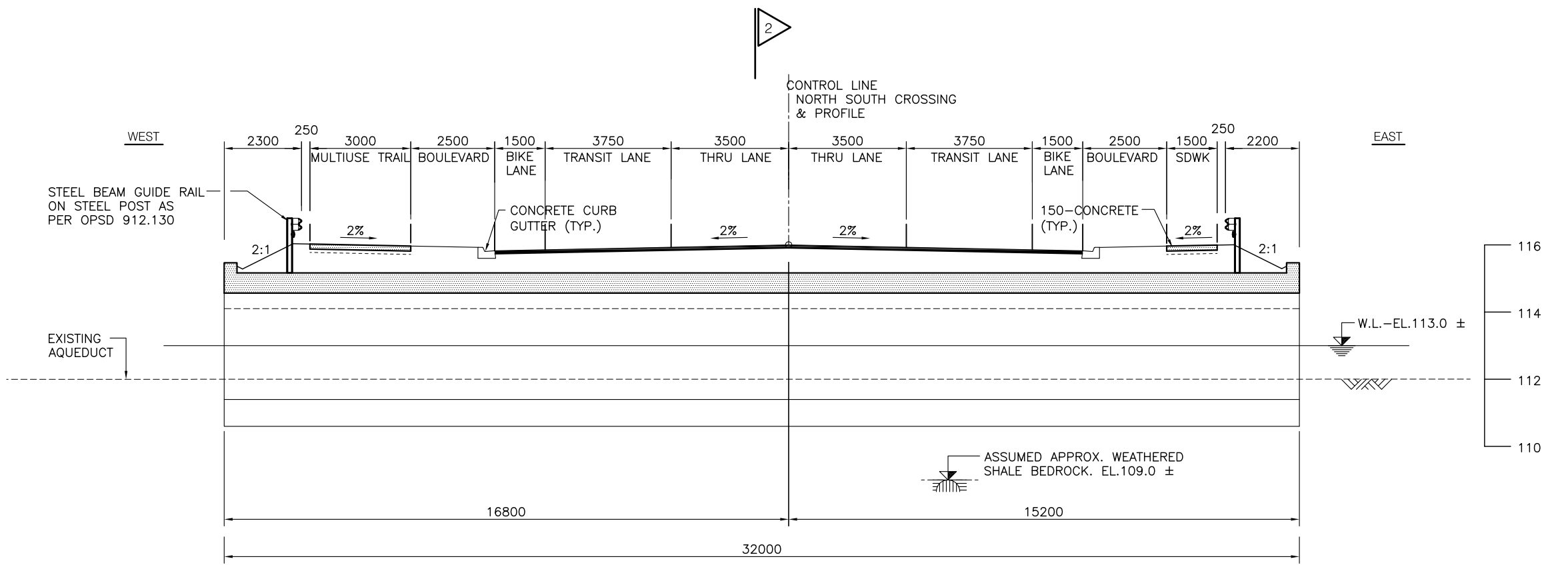
Remisz Consulting Eng. - Frame: 2009/08/01



Frame 790x530 mm

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  - THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING S-01 AND ALL CML DRAWINGS.



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No.	Date (dd/mm/yyyy)	Revision	By:

**REMISZ** CONSULTING ENGINEERS  
 1950 Merivale Road, Suite 205  
 Ottawa, K2G 5T5  
 Phone 613-225-1162  
 Fax 613-225-4529

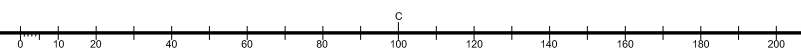
Client  
**TOWN OF OAKVILLE**  
 ENGINEERING AND CONSTRUCTION

Project  
**NORTH - SOUTH ROAD**  
**DIVERSION CHANNEL CROSSING**  
**STRUCTURE S5**

Drawing  
**RIGID FRAME OPEN FOOTING CULVERT**  
**TYPICAL SECTIONS**

Designed	C.R.C.	Date	JUNE 2014
Drawn	W.M.K.	Scale	AS SHOWN
Checked	W.R.	Sheet	2 of 2
Project No.	2011-149-5	Dwg. No.	S-02

Remisz Consulting Eng. - Frame 2000x800



## **Appendix B – Cost Estimate**



**Town of Oakville**  
**NORTH-SOUTH Rd. DIVERSION CHANNEL CROSSING**  
**Rigid Frame Open Footing Culvert**

**S-5**

Item	Description	Unit	Quantity	Unit price	Total
<b>General Work</b>					
1	Mobilization and general requirements	LS	1	\$25,000	\$25,000
2	Site office	week	30	\$420	\$12,600
<b>Sub-Total for General Work</b>					<b>\$37,600</b>
<b>New Construction</b>					
1	Earth excavation for structure	m <sup>3</sup>	1,000	\$40	\$40,000
2	Concrete in footings	m <sup>3</sup>	70	\$600	\$42,000
3	Concrete in walls	m <sup>3</sup>	105	\$1,450	\$152,250
4	Concrete in top slab	m <sup>3</sup>	220	\$2,500	\$550,000
5	Reinforcing bars-black *	tonne	27	\$3,000	\$81,000
6	Backfill to structure	m <sup>3</sup>	1,200	\$25	\$30,000
7	Top slab waterproofing	m <sup>2</sup>	305	\$75	\$22,875
8	Quality Verification Engineering	LS	1	\$25,000	\$25,000
<b>Sub-Total for New Construction</b>					<b>\$943,125</b>
<b>New Construction by Cole Engineering</b>					
1	Road base and sub-base (granular)			\$0	\$0
2	Asphalt pavement (road)			\$0	\$0
3	Concrete pavement (sidewalk and multiuse trail)			\$0	\$0
4	Concrete curbs and gutters			\$0	\$0
5	Guiderail system			\$0	\$0
6	Replacement of existing concrete aqueduct			\$0	\$0
7	Water course diversion/dewatering			\$0	\$0
<b>Sub-Total by Cole Engineering</b>					<b>\$0</b>

\* As per MTO Memo, dated March 7, 2013, the use of epoxy coated reinforcing steel has been terminated.

Bridges, Dams, Culverts

Retaining Walls

Falsework, Formwork, Temporary Structures

Parking Garages, Parking Lots

Sewage and Storm Water Management

Piles, Platforms

Condominiums, Apartments Buildings, Office Buildings

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Review

Seismic Assessment

Structural Evaluation

Condition Surveys

Structural  
Rehabilitation

Feasibility Studies

Construction  
Engineering

Contract Administration  
and Tendering

Construction  
Inspection

Quality Verification  
Engineering (QVE)

## PRELIMINARY/FUNCTIONAL STRUCTURAL DESIGN

### CROSS AVE. OVER RWD W-N/S RAMP STRUCTURE S6

### OAKVILLE MIDTOWN EA

2011-149  
June, 2014

 **REMISZ** Consulting  
Engineers

June 3, 2014

2011-149

Rory O'Sullivan, M.Sc.  
Project Designer, Transportation Design  
Cole Engineering Group Ltd.  
70 Valleywood Drive  
Markham, ON L3R 4T5

**Re: Oakville Midtown EA  
Preliminary/Functional Structural Design  
Cross Ave. over RWD W-N/S Ramp – Structure S6**

Dear Mr. O'Sullivan:

REMISZ Consulting Engineers Ltd. is pleased to submit this report for the above mentioned project.

The preliminary design was developed based on plan and profile drawings provided by COLE.

Preliminary drawings and our cost estimate can be found in the Appendix of the report.

We trust that this submission is sufficient for your requirements. If you have any questions, please do not hesitate to contact us.

Yours very truly,



Wojciech Remisz, M.Sc., P.Eng., FCSCE  
Senior Structural Engineer  
wojciech.remisz@remisz.com

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4.0	STRUCTURAL REQUIREMENTS .....	2
5.0	CONSTRUCTABILITY/FEASIBILITY .....	2
6.0	GEOTECHNICAL/FOUNDATION CONSIDERATIONS.....	2
7.0	IMPACT ON EXISTING UTILITIES .....	3
8.0	PRELIMINARY COST ESTIMATE .....	3
9.0	CLOSURE .....	3

## Appendix A - Drawings

Drawing S-01 – General Arrangement, Plan  
Drawing S-02 – Typical Sections

## Appendix B - Cost Estimate

Detailed Itemized Cost Estimate

## **1.0 Introduction**

REMISZ Consulting Engineers Ltd. (RCE) has been retained by Cole Engineering Group Ltd. (COLE), to carry out preliminary/functional structural design for the proposed Cross Ave. over RWD W-N/S Ramp, as part of the Oakville Transportation Master Plan, COLE project number TR11-767.

## **2.0 Scope of Work**

The scope of work assigned to RCE, as sub-consultants to COLE, was to provide structures-related support in the development of the preliminary design. This support pertained to the following items:

- Bridge/structural considerations;
- Structural requirements;
- Constructability/feasibility;
- Geotechnical/foundation considerations;
- Impact on existing utilities; and
- Preliminary cost estimate.

Further to the items listed above, RCE also developed a preliminary general arrangement drawing and structure cross-section (Appendix A), and itemized cost breakdown (Appendix B).

## **3.0 Bridge/Structural Considerations**

The proposed Overpass consists of a CPCI girder superstructure and reinforced concrete substructure crossing over the W-N/S Ramp in the north-south direction, south of Royal Windsor Drive. The components of the new structure in addition to the CPCI girders include reinforced concrete: deck, abutments, wingwalls, footings, approach slabs, parapet walls and barriers.

## **4.0 Structural Requirements**

The new Overpass structure has been developed in accordance with the Canadian Highway Bridge Design Code (CHBDC). The bridge deck accommodates four thru lanes, a left turning lane, bike lanes, a sidewalk along the west side of the structure and a multi-use trail along the east side of the structure. The CPCI girders have a span of 14.1m from centre to centre of bearing and the bridge structure has a total width of 29.2m. The multi-use trail along the east side of the structure has an overall width of 3m. The reinforced concrete deck has a thickness of 225mm with 90mm of asphalt and waterproofing topping.

## **5.0 Constructability/Feasibility**

The constructability of the new Overpass does not pose any concerns. The new bridge structure can be constructed with traditional construction techniques without any special requirements or considerations. Traffic control and staging will be required throughout the construction activities and is to be developed at the detailed design phase of the project.

## **6.0 Geotechnical/Foundation Considerations**

According to a limited preliminary desktop foundation study, completed by Golder Associates dated August 29<sup>th</sup> 2013, in the vicinity of the site the founding elevation of hard clayey silt to silty clay is 103.0 to 104.0. Slightly weathered shale bedrock can be found at an estimated elevation of 100.5 to 101.0. The groundwater level was measured to be at an elevation of 101.3. The new bridge foundations will be constructed with continuous spread footings measuring 4m min. in width and 1.2m min. in depth, subject to detail design, founded within the clayey silt to silty clay. The actual

geotechnical conditions and foundation design are to be confirmed during the detailed design phase of the project. Additional boreholes will be required.

## 7.0 Impact on Existing Utilities

The existing utilities identified on the plan do not present any concerns for the required construction activities. There are drains running east-west located at the north and south approach slabs which can be relocated with minimal effort at the time of construction.

## 8.0 Preliminary Cost Estimate

The preliminary cost estimate for the Cross Ave. over Royal Windsor Drive W-N/S Ramp Overpass structure (S6) has been broken down into two categories. These categories include general work and new construction. Our cost estimate for each category is as follows:

Category	Total
General Work	\$39,700
New Construction	\$2,974,050
<b>Total</b>	<b>\$3,013,750</b>

See Appendix B for a detailed itemized cost breakdown.

## 9.0 Closure

We trust that this submission provides you with all of the information necessary, and completes the required scope of work.

Yours very truly,



Wojciech Remisz, M.Sc., P.Eng., FCSCE



Richard Harris, P.Eng., C.Eng., M.I.Struct.E.

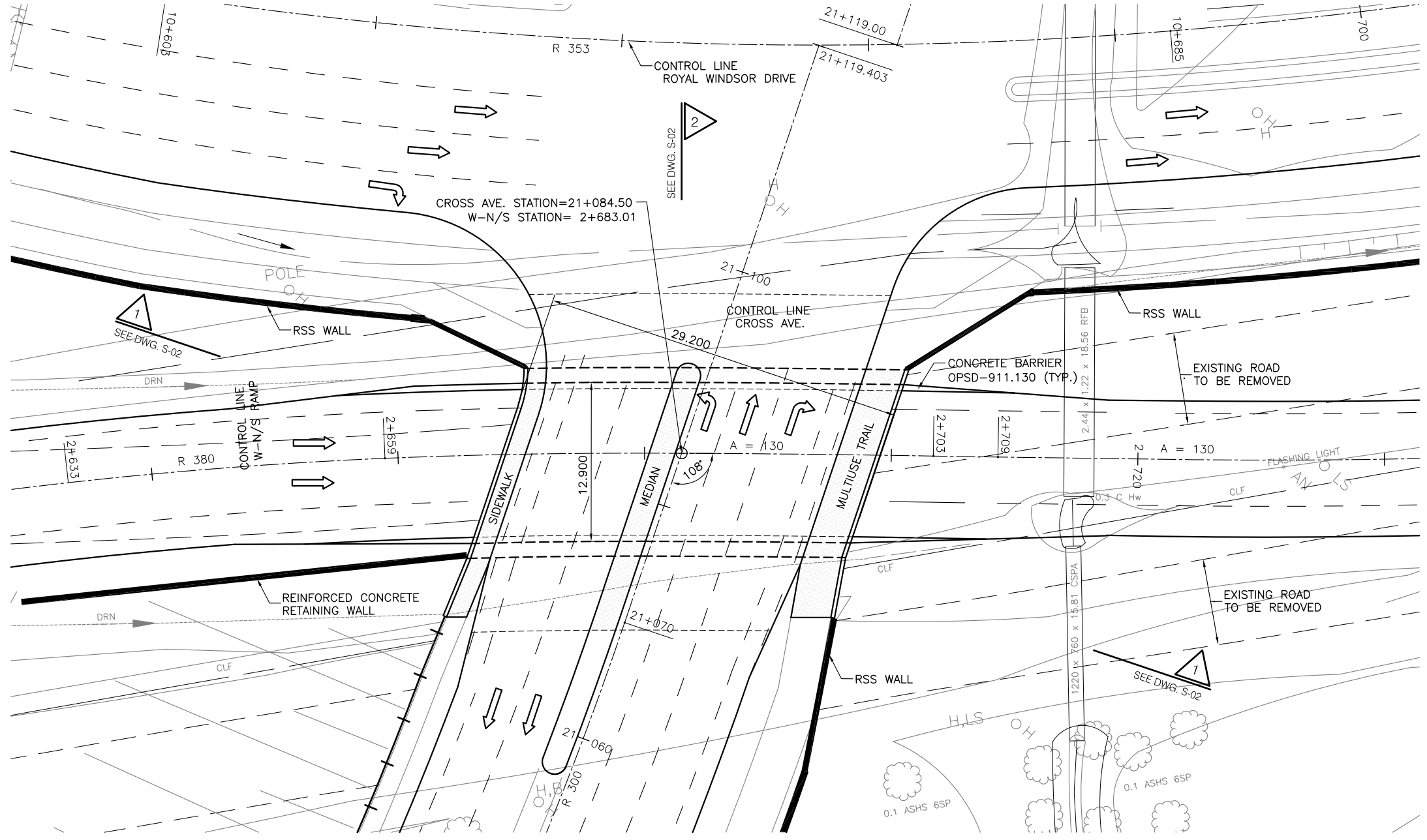
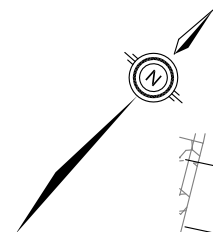


Christoph von Teichman, B.Eng., EIT

## **Appendix A – Drawings**



Frame: 790x530 mm



PLAN  
1:400

- ABBREVIATIONS:**
- ABUT. - ABUTMENT
  - BRG'S - BEARINGS
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  - W.P. - WORKING POINT

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

**GENERAL NOTES:**

1. ELEVATIONS AND CHAINAGES ARE SHOWN IN METRES, DIMENSIONS ARE SHOWN IN MILLIMETRES.
2. LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE ONLY AND ARE NOT COMPREHENSIVE.
3. GEOTECHNICAL DRAFT REPORT - DESKTOP REVIEW AND PRELIMINARY RECOMMENDATIONS BY GOLDER ASSOCIATES REPORT No.13-1111-0033 AUGUST 29, 2013.
4. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING S-02 AND ALL CIVIL DRAWINGS.

No.	Date (dd/mm/yyyy)	Revision	By:

**REMISZ** CONSULTING ENGINEERS  
 1950 Merivale Road, Suite 205  
 Ottawa, K2G 5T5  
 Phone 613-225-1162  
 Fax 613-225-4529

Client  
**TOWN OF OAKVILLE**  
 ENGINEERING AND CONSTRUCTION

Project  
**CROSS AVE. OVER RWD**  
**W-N/S RAMP**  
**STRUCTURE S6**

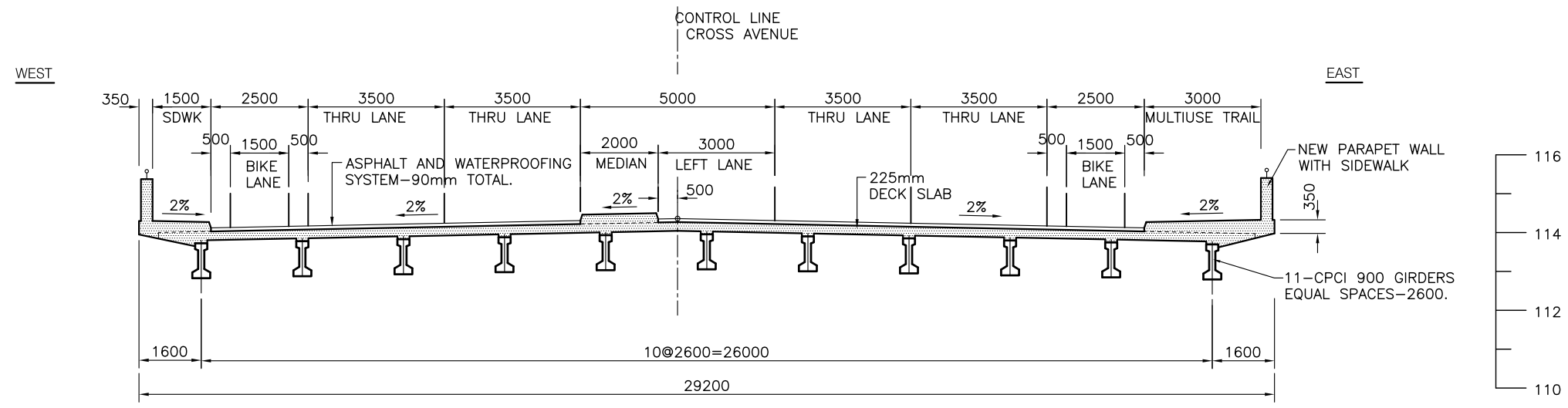
Drawing  
**GENERAL ARRANGEMENT**  
**PLAN**

Designed	C.R.C.	Date	JUNE 2014
Drawn	W.M.K.	Scale	AS SHOWN
Checked	W.R.	Sheet	1 of 2
Project No.	2011-149-6	Dwg. No.	S-01

Remisz Consulting Eng. - Frame: 2000x800

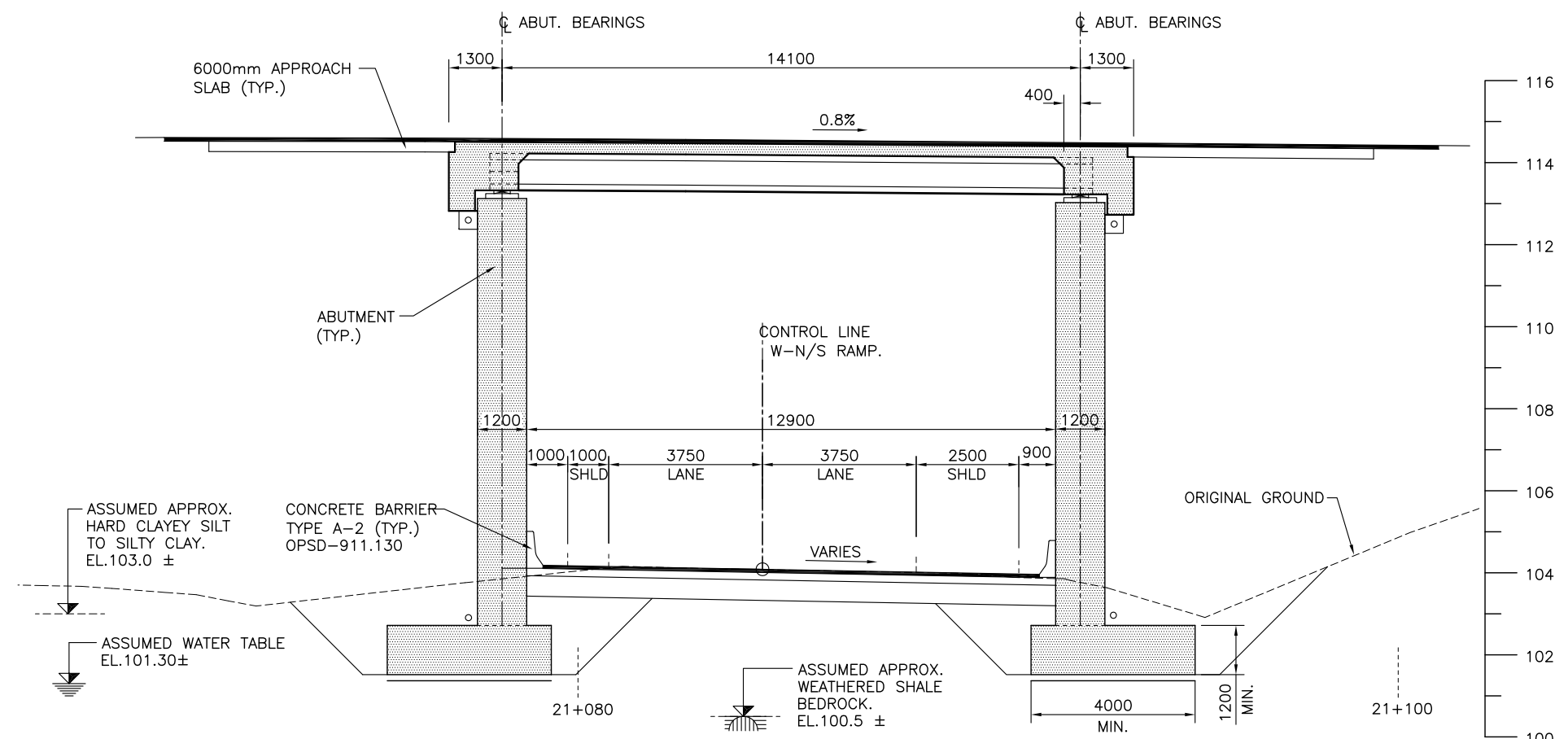
Frame 790x530 mm

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1  
1:150

NORTH SOUTH



2  
1:150

**ABBREVIATIONS:**  
 ABUT. - ABUTMENT  
 BRG'S - BEARINGS  
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No.	Date (dd/mm/yyyy)	Revision	By:

**REMISZ** CONSULTING ENGINEERS  
 1950 Merivale Road, Suite 205  
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 Phone 613-225-1162  
 Fax 613-225-4529

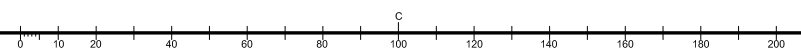
Client  
**TOWN OF OAKVILLE**  
 ENGINEERING AND CONSTRUCTION

Project  
**CROSS AVE. OVER RWD**  
**W-N/S RAMP**  
**STRUCTURE S6**

Drawing  
**TYPICAL SECTIONS**

Designed	C.R.C.	Date	JUNE 2014
Drawn	W.M.K.	Scale	AS SHOWN
Checked	W.R.	Sheet	2 of 2
Project No.	2011-149-6	Dwg. No.	S-02

Remisz Consulting Eng. - Frame 2000x800



## **Appendix B – Cost Estimate**

Town of Oakville  
CROSS Ave. OVER ROYAL WINDSOR Dr. W-N/S RAMP

**S-6**

Item	Description	Unit	Quantity	Unit price	Total
<b>General Work</b>					
1	Mobilization and general requirements	LS	1	\$25,000	\$25,000
2	Site office	week	35	\$420	\$14,700
<b>Sub-Total for General Work</b>					<b>\$39,700</b>
<b>New Construction</b>					
1	Earth excavation for structure	m <sup>3</sup>	950	\$40	\$38,000
2	Concrete in footings	m <sup>3</sup>	298	\$600	\$178,800
3	Concrete in abutments	m <sup>3</sup>	665	\$1,450	\$964,250
4	Concrete in approach slabs	m <sup>3</sup>	77	\$650	\$50,050
5	Concrete in deck	m <sup>3</sup>	241	\$2,500	\$602,500
6	Concrete in parapet wall	m <sup>3</sup>	14	\$1,500	\$21,000
7	Concrete in sidewalks	m <sup>3</sup>	34	\$750	\$25,500
8	Elastomeric bearing	each	22	\$1,000	\$22,000
9	Concrete in median	m <sup>3</sup>	12	\$650	\$7,800
10	Reinforcing bars-black *	tonne	104	\$3,000	\$312,000
11	Backfill to structure	m <sup>3</sup>	5,250	\$25	\$131,250
12	Bridge deck waterproofing	m <sup>2</sup>	356	\$75	\$26,700
13	90mm paving, including on approach slabs	tonne	132	\$250	\$33,000
14	CPCI 900, 14.7 m long girder	each	11	\$15,000	\$165,000
15	Quality Verification Engineering	LS	1	\$25,000	\$25,000
16	Steel railing	m	38	\$150	\$5,700
17	Retaining wall SW Quadrant (reinforced concrete)	m <sup>3</sup>	215	\$1,700	\$365,500
<b>Sub-Total for New Construction</b>					<b>\$2,974,050</b>
<b>New Construction by Cole Engineering</b>					
1	RSS walls - 3 quadrants			\$0	\$0
2	Traffic control			\$0	\$0
3	Guiderails			\$0	\$0
4	Relocation of services			\$0	\$0
<b>Sub-Total by Cole Engineering</b>					<b>\$0</b>

\* As per MTO Memo, dated March 7, 2013, the use of epoxy coated reinforcing steel has been terminated.

Bridges, Dams, Culverts

Retaining Walls

Falsework, Formwork, Temporary Structures

Parking Garages, Parking Lots

Sewage and Storm Water Management

Piles, Platforms

Condominiums, Apartments Buildings, Office Buildings

*PROFESSIONAL SERVICES PROVIDED WITH CARE,  
COMPETENCE AND INTEGRITY THAT DELIVER  
PRACTICAL SOLUTIONS TO COMPLEX PROBLEMS*



Planning

Design and Design  
Review

Seismic Assessment

Structural Evaluation

Condition Surveys

Structural  
Rehabilitation

Feasibility Studies

Construction  
Engineering

Contract Administration  
and Tendering

Construction  
Inspection

Quality Verification  
Engineering (QVE)

# PRELIMINARY/FUNCTIONAL STRUCTURAL DESIGN

## WIDENING OF EXISTING ROYAL WINDSOR DRIVE BRIDGE STRUCTURE S7

### OAKVILLE MIDTOWN EA

2011-149  
June, 2014

 **REMISZ** Consulting  
Engineers

June 3, 2014

2011-149

Rory O'Sullivan, M.Sc.  
Project Designer, Transportation Design  
Cole Engineering Group Ltd.  
70 Valleywood Drive  
Markham, ON L3R 4T5

**Re: Oakville Midtown EA  
Preliminary/Functional Structural Design  
Widening of Existing Royal Windsor Drive Bridge – Structure S7**

Dear Mr. O'Sullivan:

REMISZ Consulting Engineers Ltd. is pleased to submit this report for the above mentioned project.

The preliminary design was developed based on plan and profile drawings provided by COLE.

Preliminary drawings and our cost estimate can be found in the Appendix of the report.

We trust that this submission is sufficient for your requirements. If you have any questions, please do not hesitate to contact us.

Yours very truly,

A handwritten signature in black ink, appearing to read 'Wojciech Remisz', is written over a vertical line that extends down to the typed name below.

Wojciech Remisz, M.Sc., P.Eng., FCSCE  
Senior Structural Engineer  
wojciech.remisz@remisz.com

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## Appendix A - Drawings

Drawing S-01 – General Arrangement, Plan and Elevation  
Drawing S-02 – Central Pier, Typical Sections

## Appendix B – Cost Estimate

Detailed Itemized Cost Estimate



## 1.0 Introduction

REMISZ Consulting Engineers Ltd. (RCE) has been retained by Cole Engineering Group Ltd. (COLE), to carry out preliminary/functional structural design for the proposed widening of the existing Royal Windsor Drive Bridge, as part of the Oakville Transportation Master plan, COLE project number TR11-767.

## 2.0 Scope of Work

The scope of work assigned to RCE, as sub-consultants to COLE, was to provide structures-related support in the development of the preliminary design. This support pertained to the following items:

- Bridge/structural considerations;
- Structural requirements;
- Constructability/feasibility;
- Geotechnical/foundation considerations;
- Impact on existing utilities; and
- Preliminary cost estimate.

Further to the items listed above, RCE also developed a preliminary general arrangement drawing and structure cross-section (See Appendix A), and cost estimate (Appendix B).

The existing structure comprises CPCI girders and crosses over the QEW in the west-east direction. The proposed widening is to be built along the south side of the bridge, and includes the approach slabs. A new parapet wall and sidewalk is to be added along the north side of the existing bridge. Work beyond the approach slabs, including Retained Soil System (RSS) retaining walls, transition barriers, tall wall barriers and related median modifications at the QEW level are to be included in the COLE road design.

## 3.0 Bridge/Structural Considerations

In order to widen the existing Royal Windsor Drive Bridge to accommodate the proposed roadway cross-section, the following existing bridge components have been identified as requiring removal:

- South barrier wall and sidewalk;
- North barrier wall and sidewalk;
- Median barrier wall;
- Top part of the south-east and south-west wingwall columns and precast panels; and
- Transition barrier tall wall at south end of pier bent along QEW.

The widening of the bridge requires a total of 16 new CPCI 2300 deck girders with a maximum span of 46 m. The widened bridge deck includes the following new reinforced concrete components: deck, median, barrier, parapet walls and sidewalks/bike trail. The pier bent is to be widened by drilling five new caissons complete with new reinforced concrete columns and pier cap. Excavation is required along the south side of the east and west abutments in order to construct new abutment footings, RSS retaining walls and reinforced concrete retaining walls to accommodate the widened superstructure. New approach slabs at both ends of the structure will also be required. The existing barrier wall along the north side of the bridge will be replaced with a new parapet wall and a sidewalk for the full length of the structure.

## **4.0 Structural Requirements**

The new widened structure has been developed in accordance with the Canadian Highway Bridge Design Code (CHBDC). The new portion of the bridge accommodates two 3.5 m wide thru lanes, a left turning lane and a right turning lane, which is in addition to the lanes on the existing structure. The overall width varies as the structure is fanned from east to west along its cross-section. Due to this fanning, the centre to centre spacing of the new CPCI girders and the length of each girder will vary across the width of the structure. A 3 m wide bike trail and 2 m wide sidewalk are located along the south side of the structure protected with a new barrier and parapet wall. A 1.5 m wide sidewalk is located along the north side of the structure with a new parapet wall. The existing vertical clearance below the bridge structure is maintained, and the deck surface is 225 mm of reinforced concrete with 90 mm asphalt and waterproofing.

## **5.0 Constructability/Feasibility**

The constructability of the bridge widening does not pose any major concerns. The new girders and deck match that of the existing bridge. For this reason, the new construction should be relatively straightforward and not present unforeseen challenges.

Construction of the deck widening will have a moderate impact to traffic flow on the existing Royal Windsor Drive Bridge. After removal of the existing (south) barrier wall and sidewalk, and north barrier wall, temporary New Jersey barriers will have to be installed over the length of the bridge and approaches to separate the construction zone from vehicle and pedestrian traffic. During the removals, installation of temporary debris protection over the QEW traffic lanes will also be required.

Placing the new CPCI girders will require temporary lane and sidewalk closures on the Royal Windsor Drive and QEW. In order to reduce the impact on traffic, this work can be done at night.

Construction of the piers on the QEW median will require coordination of lane closures with MTO. Appropriate construction staging and traffic control will be developed during the detailed design phase of the project.

## **6.0 Geotechnical/Foundation Considerations**

According to a limited preliminary desktop foundation study, completed by Golder Associates dated August 29<sup>th</sup> 2013, in the vicinity of this site the founding elevation of hard clayey silt to silty clay is 103.5. Slightly weathered shale bedrock can be found at an estimated elevation of 101.0. The groundwater level was measured to be below the bedrock at a depth of 2.6m below the surface. The new abutments will be constructed with continuous spread footings founded on bedrock with dimensions of 8 m in width and 2 m in depth to match existing. The widening of the pier will be carried out by drilling five new 1500 mm diameter caissons into bedrock to support the new reinforced concrete columns and pier cap. The actual geotechnical conditions and foundation design are to be confirmed during the detailed design phase of the project. Additional boreholes will be required.

## **7.0 Impact on Existing Utilities**

The existing utilities identified on the plan do not present any major concerns for the required construction activities. There is an electrical conduit located along the west abutment, a concrete pipe storm water drain just outside of the west approach, and a culvert located at the south-west retaining wall. The conduit can be relocated during construction with minimal effort and impact to construction activities. The storm water drain should not impact construction activities as it is sufficiently far away from the west abutment. The culvert will impact the limits of excavation and construction of the south-west retaining wall; however this does not represent a concern as it can be protected by sheet piling or similar temporary construction. The retaining wall footings will have to span across the culvert.

## 8.0 Cost Estimate

The preliminary cost estimate for the widening of the existing Royal Windsor Drive structure (S7) has been broken down into three categories. These categories include: general work, removals, and new construction. Our cost estimate for each category is as follows:

Category	Total
General Work	\$58,600
Removals	\$210,000
New Construction	\$6,421,425
<b>Total</b>	<b>\$6,690,025</b>

See Appendix B for a detailed itemized cost breakdown.

## 9.0 Closure

We trust that this submission provides you with all of the information required, and completes the required scope of work.

Yours very truly,



Wojciech Remisz, M.Sc., P.Eng., FCSCE



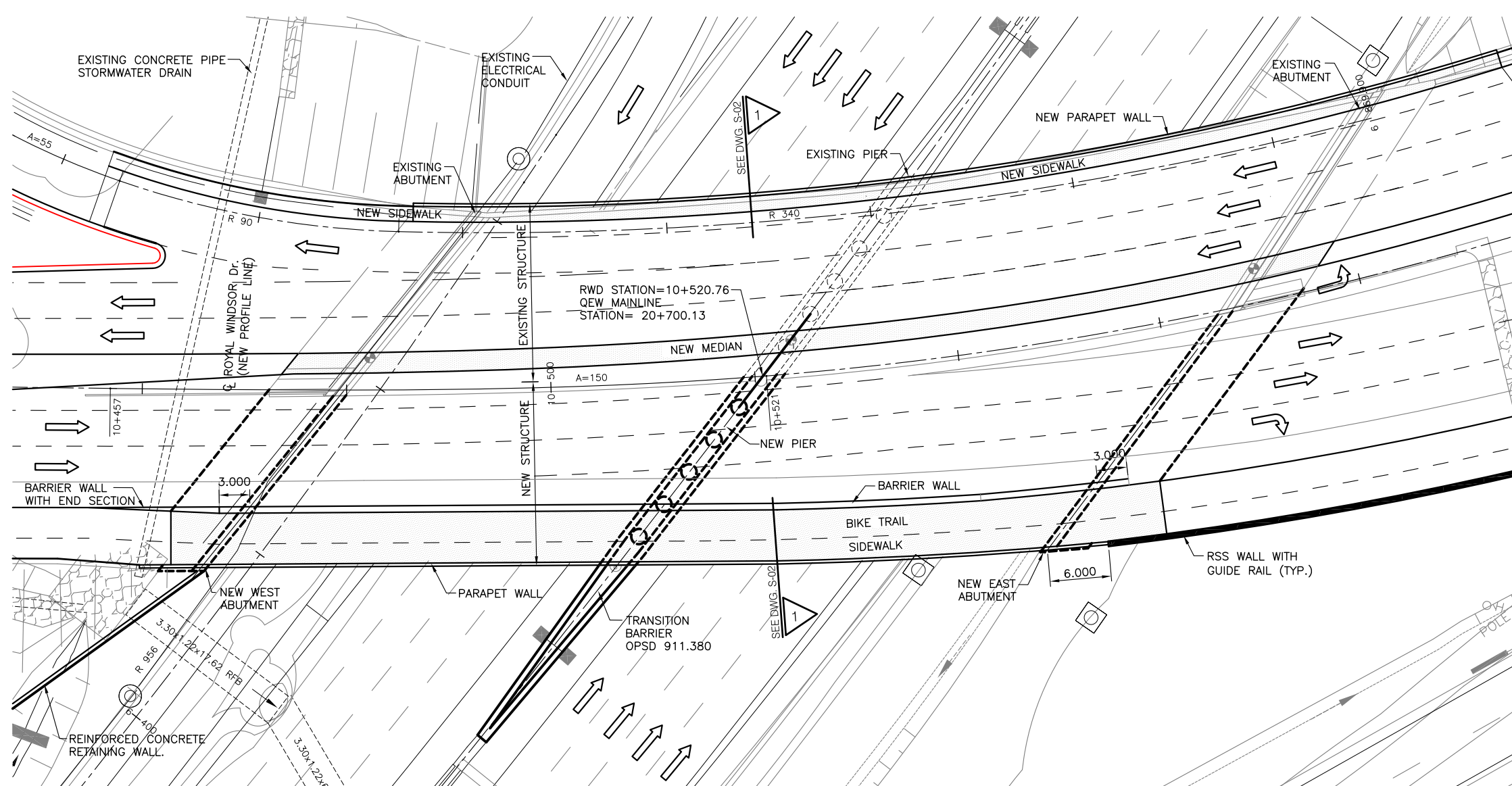
Richard Harris, P.Eng., C.Eng., M.I.Struct.E.



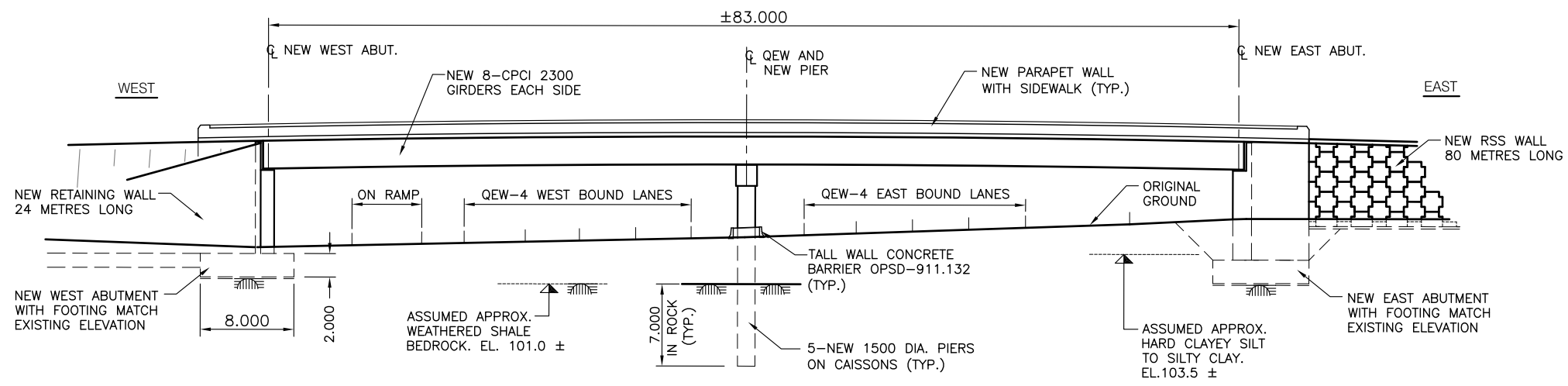
Christoph von Teichman, B.Eng., EIT

## **Appendix A – Drawings**

Frame: 790x520 mm



PLAN  
1:500



FRONT ELEVATION  
1:500

**ABBREVIATIONS:**  
 ABUT. - ABUTMENT  
 BRG'S - BEARINGS  
 C.J. - CONSTRUCTION JOINT  
 Q - CENTRELINE  
 TYP. - TYPICAL  
 T/A - TOP OF ASPHALT  
 T/C - TOP OF CONCRETE  
 T/R - TOP OF ROCK  
 W.L. - WATER LEVEL  
 W.P. - WORKING POINT

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

- GENERAL NOTES:**
- ELEVATIONS AND CHAINAGES ARE SHOWN IN METRES, DIMENSIONS ARE SHOWN IN MILLIMETRES.
  - LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE ONLY AND ARE NOT COMPREHENSIVE.
  - GEOTECHNICAL DRAFT REPORT - DESKTOP REVIEW AND PRELIMINARY RECOMMENDATIONS BY GOLDER ASSOCIATES REPORT No.13-1111-0033 AUGUST 29, 2013.
  - THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING S-02 AND ALL CIVIL DRAWINGS.

No.	Date (dd/mm/yyyy)	Revision	By:

**REMISZ** CONSULTING ENGINEERS  
 1950 Merivale Road, Suite 205  
 Ottawa, K2G 5T5  
 Phone 613-225-1162  
 Fax 613-225-4529

Client  
**TOWN OF OAKVILLE**  
 ENGINEERING AND CONSTRUCTION

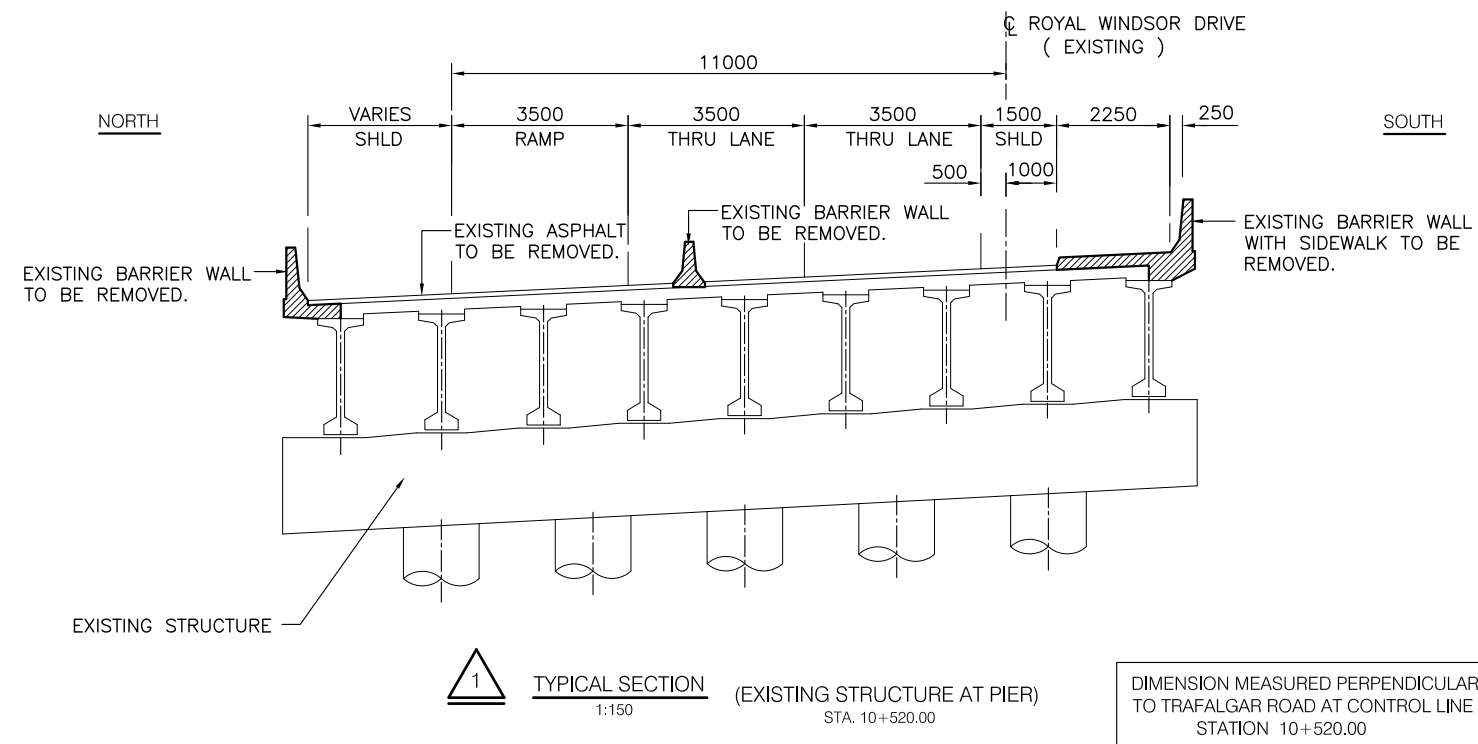
Project  
**WIDENING OF ROYAL WINDSOR DRIVE BRIDGE STRUCTURE S7**

Drawing  
**GENERAL ARRANGEMENT PLAN AND ELEVATION**

Designed	C.R.C.	Date	JUNE 2014
Drawn	W.M.K.	Scale	AS SHOWN
Checked	W.R.	Sheet	1 of 2
Project No.	2011-149-7	Dwg. No.	S-01

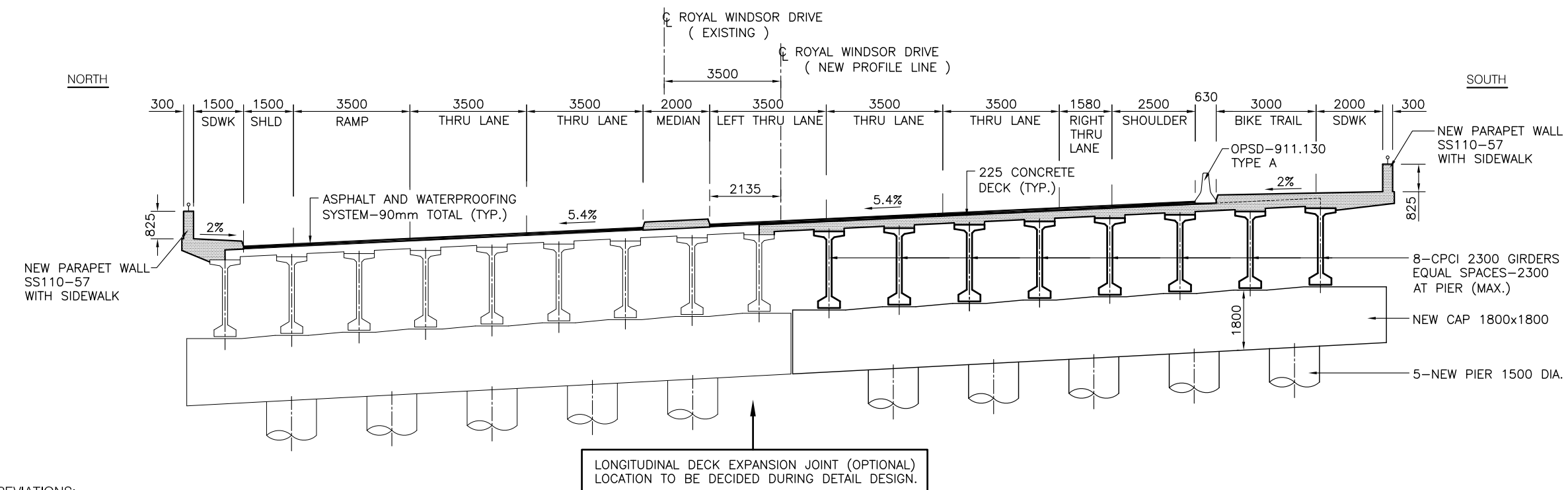
Remisz Consulting Eng. Frame: 2000x800

Frame 790x520 mm



1 TYPICAL SECTION (EXISTING STRUCTURE AT PIER)  
1:150 STA. 10+520.00

DIMENSION MEASURED PERPENDICULAR TO TRAFALGAR ROAD AT CONTROL LINE STATION 10+520.00



1 TYPICAL SECTION (WIDENED STRUCTURE AT PIER)  
1:150 STA. 10+520.00

DIMENSION MEASURED PERPENDICULAR TO TRAFALGAR ROAD AT CONTROL LINE STATION 10+520.00

**ABBREVIATIONS:**

- ABUT. - ABUTMENT
- BRG'S - BEARINGS
- C.J. - CONSTRUCTION JOINT
- C. - CENTRELINE
- TYP. - TYPICAL
- T/A - TOP OF ASPHALT
- T/C - TOP OF CONCRETE
- T/R - TOP OF ROCK
- W.L. - WATER LEVEL
- W.P. - WORKING POINT

LONGITUDINAL DECK EXPANSION JOINT (OPTIONAL)  
LOCATION TO BE DECIDED DURING DETAIL DESIGN.

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

**GENERAL NOTES:**

1. ELEVATIONS AND CHAINAGES ARE SHOWN IN METRES, DIMENSIONS ARE SHOWN IN MILLIMETRES.
2. LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE ONLY AND ARE NOT COMPREHENSIVE.
3. GEOTECHNICAL DRAFT REPORT - DESKTOP REVIEW AND PRELIMINARY RECOMMENDATIONS BY GOLDER ASSOCIATES REPORT No.13-1111-0033 AUGUST 29, 2013.
4. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING S-01 AND ALL CIVIL DRAWINGS.

No.	Date (dd/mm/yyyy)	Revision	By:

**REMISZ** CONSULTING ENGINEERS  
1950 Merivale Road, Suite 205  
Ottawa, K2G 5T5  
Phone 613-225-1162  
Fax 613-225-4529

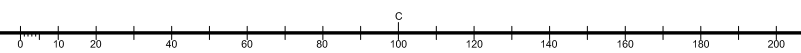
Client  
**TOWN OF OAKVILLE**  
ENGINEERING AND CONSTRUCTION

Project  
**WIDENING OF ROYAL WINDSOR DRIVE BRIDGE STRUCTURE S7**

Drawing  
**CENTRAL PIER TYPICAL SECTIONS**

Designed	C.R.C.	Date	JUNE 2014
Drawn	W.M.K.	Scale	AS SHOWN
Checked	W.R.	Sheet	2 of 2
Project No.	2011-149-7	Dwg. No.	S-02

Remisz Consulting Eng. Frame 2000x800



## **Appendix B – Cost Estimate**

**Town of Oakville**  
**WIDENING OF EXISTING ROYAL WINDSOR DRIVE STRUCTURE**

**S-7**

Item	Description	Unit	Quantity	Unit price	Total
<b>General Work</b>					
1	Mobilization and general requirements	ls	1	\$25,000	\$25,000
2	Site office	week	80	\$420	\$33,600
<b>Sub-Total for General Work</b>					<b>\$58,600</b>
<b>Removals</b>					
1	Remove existing barrier wall with sidewalk (160 m <sup>3</sup> )	ls	1	\$135,000	\$135,000
2	Remove existing barrier wall on median (33m <sup>3</sup> )	ls	1	\$25,000	\$25,000
3	Cut and remove wingwall precast panels on piles	ls	1	\$50,000	\$50,000
<b>Sub-Total for Removals</b>					<b>\$210,000</b>
<b>New Construction</b>					
1	Roadway protection system for pier footing construction	LS	1	\$225,000	\$225,000
2	Earth excavation for structure	m <sup>3</sup>	3,600	\$40	\$144,000
3	Rock excavation for structure	m <sup>3</sup>	62	\$125	\$7,750
4	Caisson piles	m	35	\$1,000	\$35,000
5	Concrete in piers	m <sup>3</sup>	135	\$1,750	\$236,250
6	Concrete in footings	m <sup>3</sup>	815	\$600	\$489,000
7	Concrete in abutments	m <sup>3</sup>	660	\$1,450	\$957,000
8	Concrete in wingwalls	m <sup>3</sup>	40	\$1,450	\$58,000
9	Retaining wall (reinforced concrete)	m <sup>3</sup>	180	\$1,700	\$306,000
10	Concrete in approach slabs	m <sup>3</sup>	50	\$650	\$32,500
11	Concrete in deck	m <sup>3</sup>	370	\$2,500	\$925,000
12	Concrete in diaphragms	m <sup>3</sup>	95	\$1,500	\$142,500
13	Concrete in parapet walls	m <sup>3</sup>	52	\$1,500	\$78,000
14	Concrete in sidewalk	m <sup>3</sup>	195	\$750	\$146,250
15	Concrete in barrier wall	m <sup>3</sup>	26	\$1,500	\$39,000
16	Concrete in median	m <sup>3</sup>	50	\$650	\$32,500
17	Reinforcing bars-black *	tonne	205	\$3,000	\$615,000
18	CPCI 2300 girders-fabrication-delivery-installation L=43m	ea	16	\$85,000	\$1,360,000
19	Elastomeric bearings	ea	32	\$2,500	\$80,000
20	Expansion joints (transverse)	m	52	\$1,400	\$72,800
21	Embedded works	LS	1	\$15,000	\$15,000
22	Backfill to structure	m <sup>3</sup>	6,000	\$25	\$150,000
23	Bridge deck waterproofing	m <sup>2</sup>	1,265	\$75	\$94,875
24	90mm paving, including on approach slabs	tonne	300	\$250	\$75,000
25	Quality Verification Engineering	LS	1	\$75,000	\$75,000
26	Steel railing	m	200	\$150	\$30,000
<b>Sub-Total for New Construction</b>					<b>\$6,421,425</b>
<b>New Construction by Cole Engineering</b>					
1	Transition barrier, tall wall barrier				\$0
2	New RSS wall				\$0
3	Relocation of services				\$0
4	Traffic control and staging				\$0
5	Road protection on QEW and erosion control				\$0
<b>Sub-Total by Cole Engineering</b>					<b>\$0</b>

\* As per MTO Memo, dated March 7, 2013, the use of epoxy coated reinforcing steel has been terminated.



Bridges, Dams, Culverts

Retaining Walls

Falsework, Formwork, Temporary Structures

Parking Garages, Parking Lots

Sewage and Storm Water Management

Piles, Platforms

Condominiums, Apartments Buildings, Office Buildings

*PROFESSIONAL SERVICES PROVIDED WITH CARE,  
COMPETENCE AND INTEGRITY THAT DELIVER  
PRACTICAL SOLUTIONS TO COMPLEX PROBLEMS*



Planning

Design and Design  
Review

Seismic Assessment

Structural Evaluation

Condition Surveys

Structural  
Rehabilitation

Feasibility Studies

Construction  
Engineering

Contract Administration  
and Tendering

Construction  
Inspection

Quality Verification  
Engineering (QVE)

# PRELIMINARY/FUNCTIONAL STRUCTURAL DESIGN

## ROYAL WINDSOR DRIVE OVER NORTH SERVICE ROAD STRUCTURE S8

### OAKVILLE MIDTOWN EA

2011-149  
June, 2014

 **REMISZ** Consulting  
Engineers

June 3, 2014

2011-149

Rory O'Sullivan, M.Sc.  
Project Designer, Transportation Design  
Cole Engineering Group Ltd.  
70 Valleywood Drive  
Markham, ON L3R 4T5

**Re: Oakville Midtown EA  
Preliminary/Functional Structural Design  
Royal Windsor Drive over North Service Road – Structure S8**

Dear Mr. O'Sullivan:

REMISZ Consulting Engineers Ltd. is pleased to submit this report for the above mentioned project.

The preliminary design was developed based on plan and profile drawings provided by COLE.

Preliminary drawings and our cost estimate can be found in the Appendix of the report.

We trust that this submission is sufficient for your requirements. If you have any questions, please do not hesitate to contact us.

Yours very truly,

A handwritten signature in black ink, appearing to read 'Wojciech Remisz'.

Wojciech Remisz, M.Sc., P.Eng., FCSCE  
Senior Structural Engineer  
wojciech.remisz@remisz.com

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2.0	SCOPE OF WORK.....	2
3.0	BRIDGE/STRUCTURAL CONSIDERATIONS.....	2
4.0	STRUCTURAL REQUIREMENTS .....	2
5.0	CONSTRUCTABILITY/FEASIBILITY .....	2
6.0	GEOTECHNICAL/FOUNDATION CONSIDERATIONS.....	3
7.0	IMPACT ON EXISTING UTILITIES .....	3
8.0	PRELIMINARY COST ESTIMATE .....	3
9.0	CLOSURE .....	3

## Appendix A - Drawings

Drawing S-01 – General Arrangement, Plan  
Drawing S-02 – Typical Sections

## Appendix B - Cost Estimate

Detailed Itemized Cost Estimate

## **1.0 Introduction**

REMISZ Consulting Engineers Ltd. (RCE) has been retained by Cole Engineering Group Ltd. (COLE), to carry out preliminary/functional structural design for the proposed Royal Windsor Drive over North Service Road Overpass, as part of the Oakville Transportation Master Plan, COLE project number TR11-767.

## **2.0 Scope of Work**

The scope of work assigned to RCE, as sub-consultants to COLE, was to provide structures related support in the development of the preliminary design. This support pertained to the following items:

- Bridge/structural considerations;
- Structural requirements;
- Constructability/feasibility;
- Geotechnical/foundation considerations;
- Impact on existing utilities; and
- Preliminary cost estimate.

Further to the items listed above, RCE also developed a preliminary general arrangement drawing and structure cross-section (Appendix A), and itemized cost breakdown (Appendix B).

## **3.0 Bridge/Structural Considerations**

The new Overpass consists of a reinforced concrete rigid frame structure crossing over the North Service Road in the east-west direction. The components of the new structure include reinforced concrete: rigid frame, wingwalls, footings, approach slabs, parapet walls and barrier walls. This new structure has been designed with a span sufficient to accommodate the widening of the North Service Road.

## **4.0 Structural Requirements**

The new Overpass structure has been developed in accordance with the Canadian Highway Bridge Design Code (CHBDC). The bridge deck accommodates four 3.5m wide thru lanes, a median, an off ramp of variable width, and a multi-use pathway along the south side. The rigid frame structure has a span of 21m and an overall width of 39.88m. The multi-use pathway has sufficient width to accommodate both a bike trail and sidewalk. The multi-use pathway is protected with a barrier wall on the north side and parapet wall on the south side. The reinforced concrete deck is 800mm thick at midspan with 90mm of asphalt and waterproofing topping. The North Service Road is being widened from the existing two lanes to four 3.5m wide thru lanes, two bike lanes and a sidewalk. The north and south sides of the structure are parallel, creating a projection at the north-west corner of the structure. This small projection will facilitate a uniform arrangement of reinforcing steel and ease of forming during construction. Modifications to the north-west corner may be completed during the detailed design phase of the project.

## **5.0 Constructability/Feasibility**

The constructability of the new Overpass does not pose any concerns. The new rigid frame structure can be constructed with traditional construction techniques without any special requirements or considerations. Traffic control and staging will be required throughout the construction activities and is to be coordinated along with the widening of the North Service Road.

## 6.0 Geotechnical/Foundation Considerations

According to a limited preliminary desktop foundation study, completed by Golder Associates dated August 29<sup>th</sup> 2013, in the vicinity of this site the founding elevation of hard clayey silt to silty clay is 104.5. Slightly weathered shale bedrock can be found at an estimated elevation of 102.0. The groundwater level was measured to be below the bedrock at a depth of 2.6 m below the surface. The new bridge foundation will be constructed with continuous spread footings measuring 2m in width and 0.8m in depth founded on the clayey silt to silty clay. The actual geotechnical conditions and foundation design are to be confirmed during the detailed design phase of the project. Additional boreholes will be required.

## 7.0 Impact on Existing Utilities

There is an existing sanitary sewer as well as a storm water drainage pipe located along the west abutment of the new structure. There is also a drain located along the east abutment. Relocation of these services will be required to by-pass the new west abutment footing.

## 8.0 Preliminary Cost Estimate

The preliminary cost estimate for the Royal Windsor Drive over North Service Road Overpass structure (S8) has been broken down into two categories. These categories include general work and new construction. Our cost estimate for each category is as follows:

Category	Total
General Work	\$39,700
New Construction	\$4,744,075
<b>Total</b>	<b>\$4,783,775</b>

See Appendix B for a detailed itemized cost breakdown.

## 9.0 Closure

We trust that this submission provides you with all of the information necessary, and completes the required scope of work.

Yours very truly,



Wojciech Remisz, M.Sc., P.Eng., FCSCE



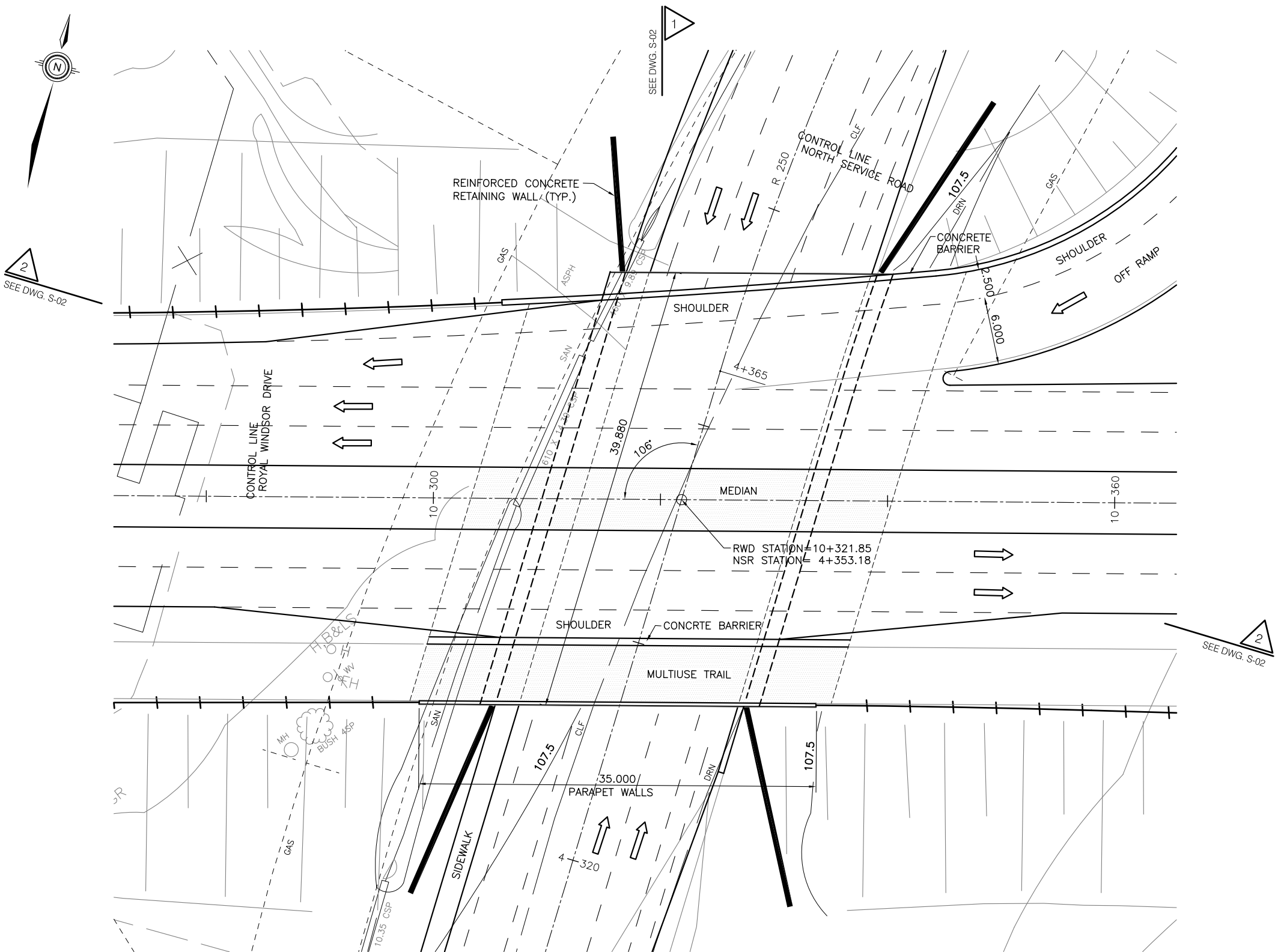
Richard Harris, P.Eng., C.Eng., M.I.Struct.E.



Christoph von Teichman, B.Eng., EIT

## **Appendix A – Drawings**

Frame: 790x530 mm



PLAN  
1:400

- ABBREVIATIONS:**
- ABUT. - ABUTMENT
  - BRG'S - BEARINGS
  - C.J. - CONSTRUCTION JOINT
  - CL - CENTRELINE
  - TYP. - TYPICAL
  - T/A - TOP OF ASPHALT
  - T/C - TOP OF CONCRETE
  - T/R - TOP OF ROCK
  - W.L. - WATER LEVEL
  - W.P. - WORKING POINT

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

- GENERAL NOTES:**
1. ELEVATIONS AND CHAINAGES ARE SHOWN IN METRES, DIMENSIONS ARE SHOWN IN MILLIMETRES.
  2. LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE ONLY AND ARE NOT COMPREHENSIVE.
  3. GEOTECHNICAL DRAFT REPORT - DESKTOP REVIEW AND PRELIMINARY RECOMMENDATIONS BY GOLDER ASSOCIATES REPORT No.13-1111-0033 AUGUST 29, 2013.
  4. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING S-02 AND ALL CIVIL DRAWINGS.

No.	Date (dd/mm/yyyy)	Revision	By:

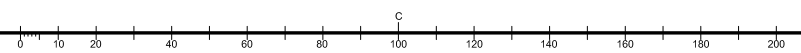
**REMISZ** CONSULTING ENGINEERS  
 1950 Merivale Road, Suite 205  
 Ottawa, K2G 5T5  
 Phone 613-225-1162  
 Fax 613-225-4529

Client  
**TOWN OF OAKVILLE**  
 ENGINEERING AND CONSTRUCTION

Project  
**ROYAL WINDSOR DRIVE**  
**OVER NORTH SERVICE ROAD**  
**STRUCTURE S8**

Drawing  
**GENERAL ARRANGEMENT**  
**PLAN**

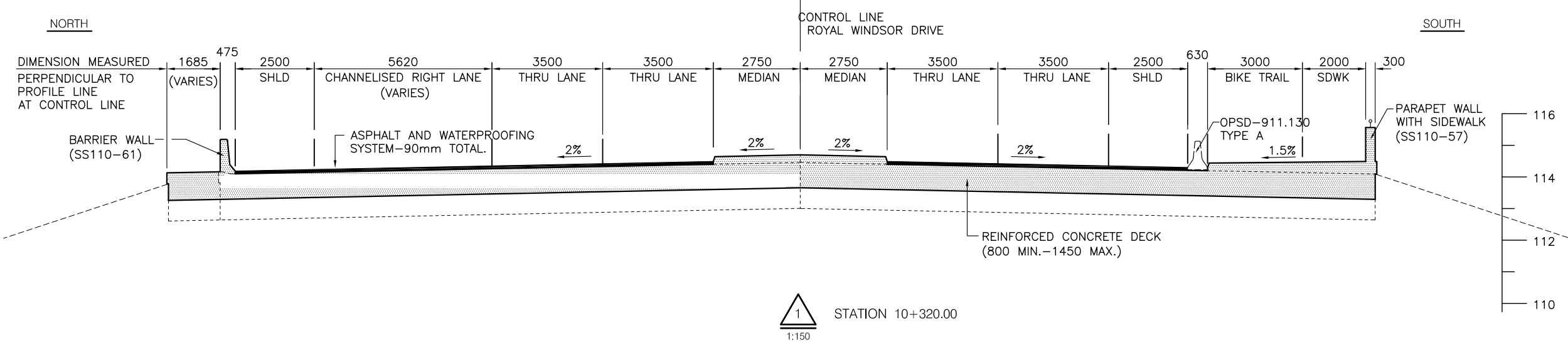
Designed	C.R.C.	Date	JUNE 2014
Drawn	W.M.K.	Scale	AS SHOWN
Checked	W.R.	Sheet	1 of 2
Project No.	2011-149-8	Dwg. No.	S-01



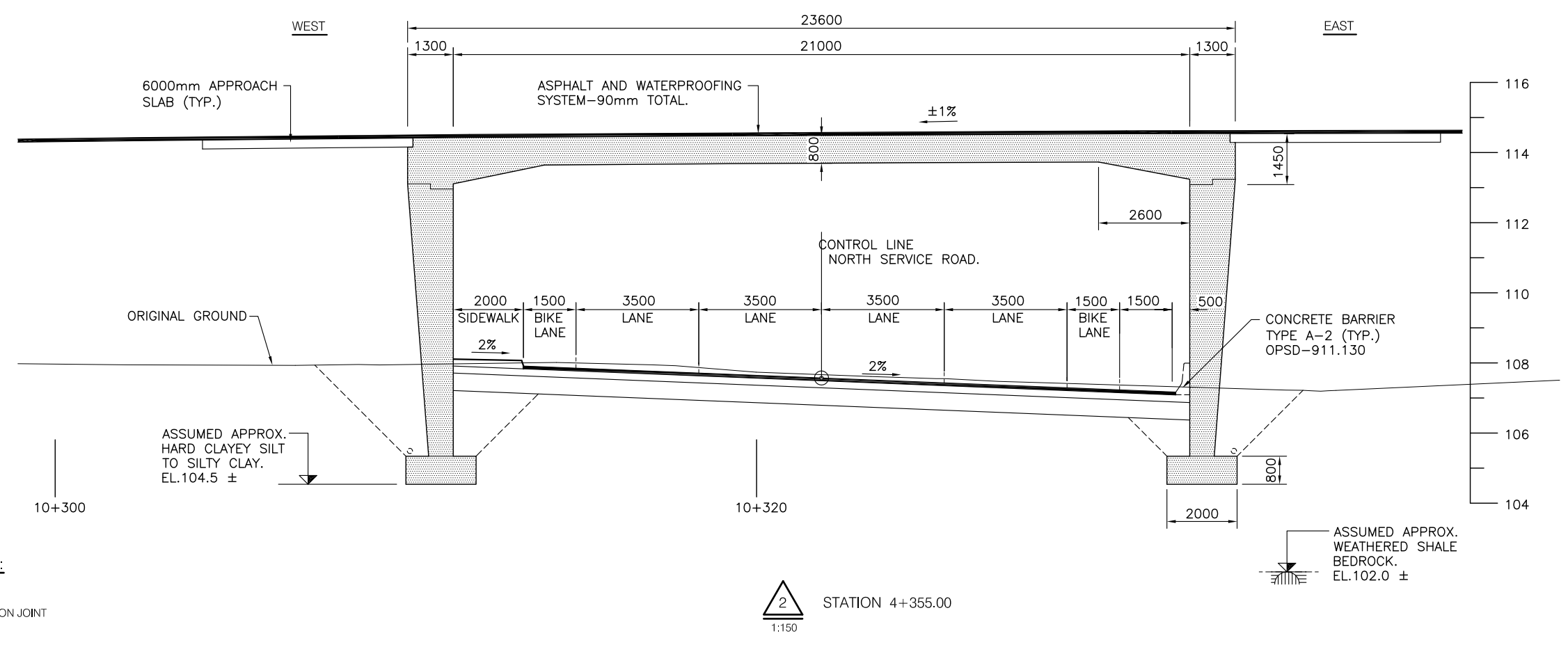


Frame: 790x520 mm

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.



- GENERAL NOTES:**
- ELEVATIONS AND CHAINAGES ARE SHOWN IN METRES, DIMENSIONS ARE SHOWN IN MILLIMETRES.
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  - GEOTECHNICAL DRAFT REPORT - DESKTOP REVIEW AND PRELIMINARY RECOMMENDATIONS BY GOLDBER ASSOCIATES REPORT No.13-1111-0033 AUGUST 29, 2013.
  - THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING S-01 AND ALL CIVIL DRAWINGS.



**ABBREVIATIONS:**  
 ABUT. - ABUTMENT  
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 T/R - TOP OF ROCK  
 W.L. - WATER LEVEL  
 W.P. - WORKING POINT

No.	Date (dd/mm/yyyy)	Revision	By:

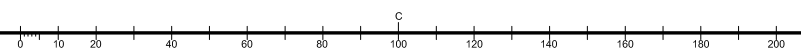
**REMISZ** CONSULTING ENGINEERS  
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 Fax 613-225-4529

Client  
**TOWN OF OAKVILLE**  
 ENGINEERING AND CONSTRUCTION

Project  
**ROYAL WINDSOR DRIVE**  
 OVER NORTH SERVICE ROAD  
 STRUCTURE S8

Drawing  
**TYPICAL SECTIONS**

Designed	C.R.C.	Date	JUNE 2014
Drawn	W.M.K.	Scale	AS SHOWN
Checked	W.R.	Sheet	2 of 2
Project No.	2011-149-8	Dwg. No.	S-02



## **Appendix B – Cost Estimate**

Town of Oakville  
ROYAL WINDSOR DRIVE OVER NORTH SERVICE ROAD

**S-8**

Item	Description	Unit	Quantity	Unit price	Total
<b>General Work</b>					
1	Mobilization and general requirements	LS	1	\$25,000	\$25,000
2	Site office	week	35	\$420	\$14,700
<b>Sub-Total for General Work</b>					<b>\$39,700</b>
<b>New Construction</b>					
1	Earth excavation for structure	m <sup>3</sup>	920	\$40	\$36,800
2	Concrete in footings	m <sup>3</sup>	128	\$600	\$76,800
3	Concrete in abutments	m <sup>3</sup>	624	\$1,450	\$904,800
4	Concrete in wingwalls	m <sup>3</sup>	30	\$1,450	\$43,500
5	Concrete in approach slabs	m <sup>3</sup>	115	\$650	\$74,750
6	Concrete in deck	m <sup>3</sup>	855	\$2,500	\$2,137,500
7	Concrete in parapet wall	m <sup>3</sup>	12	\$1,500	\$18,000
8	Concrete in sidewalks (multiuse trail)	m <sup>3</sup>	63	\$750	\$47,250
9	Concrete in barrier wall	m <sup>3</sup>	14	\$1,500	\$21,000
10	Concrete in median	m <sup>3</sup>	49	\$650	\$31,850
11	Reinforcing bars-black *	tonne	128	\$3,000	\$384,000
13	Backfill to structure	m <sup>3</sup>	2,700	\$25	\$67,500
14	Bridge deck waterproofing	m <sup>2</sup>	623	\$75	\$46,725
15	90mm paving, including on approach slabs	tonne	187	\$250	\$46,750
16	Quality Verification Engineering	LS	1	\$25,000	\$25,000
17	Steel railing	m	33	\$150	\$4,950
18	Retaining walls (reinforced concrete)	m <sup>3</sup>	457	\$1,700	\$776,900
<b>Sub-Total for New Construction</b>					<b>\$4,744,075</b>
<b>New Construction by Cole Engineering</b>					
1	Traffic control and staging			\$0	\$0
2	Road protection on North Service Road and erosion control			\$0	\$0
3	Relocation of services			\$0	\$0
4	North Service Rd. widening and reconstruction by others			\$0	\$0
5	Roadway barrier walls			\$0	\$0
<b>Sub-Total by Cole Engineering</b>					<b>\$0</b>

\* As per MTO Memo, dated March 7, 2013, the use of epoxy coated reinforcing steel has been terminated.

Bridges, Dams, Culverts

Retaining Walls

Falsework, Formwork, Temporary Structures

Parking Garages, Parking Lots

Sewage and Storm Water Management

Piles, Platforms

Condominiums, Apartments Buildings, Office Buildings

*PROFESSIONAL SERVICES PROVIDED WITH CARE,  
COMPETENCE AND INTEGRITY THAT DELIVER  
PRACTICAL SOLUTIONS TO COMPLEX PROBLEMS*

