



2013 Educational Achievement Award

Bridge Design Training Program Using the Canadian Highway Bridge Design Code

Submitted by:



MORRISON HERSHFIELD



Ontario



Program Identification

Title of Submission: Bridge Design Training Program Using the Canadian Highway Bridge Design Code

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Owner: Ministry of Transportation of Ontario



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Introduction

The Engineering Industry has undergone dramatic changes in the last 2 decades. Many of the traditional “knowledgeable” clients in the public sector, including transportation and power authorities, have gradually shifted away from production areas to concentrate on direct project delivery. This has led to a large vacuum in the research and development areas, leaving engineers in the private sector to fill this role. At the same time, tight competition in fees, computerization and rapid standardization to economize both design and construction costs, have resulted in a significant decline in design opportunities in a wide range of engineering works for engineers in the consulting industry. As a consequence, the ability of engineers in the private sector to design and innovate was also severely limited.

Amongst all engineers, the group of engineers most affected are bridge engineers. Major clients such as the Ministry of Transportation of Ontario (MTO), has outsourced their bridge design almost entirely since the mid 1990’s. Because of the lack of knowledge and experience in designing bridges within MTO, its engineers have limited ability in in-house designs and evaluations, as well as in consultant management.

In early 2012, the MTO embarked on a new initiative to create and implement a Training Program for Bridge Engineering based on the Canadian Highway Bridge Design Code (CHBDC). This program would be delivered to Structural Engineers at the MTO Head Office as well as at all MTO Regional Offices. The program is to address this knowledge gap, allow MTO to undertake in-house design activities, maintain MTO as a knowledgeable owner, and enhance its ability to oversee Bridge Design Consultants.

Morrison Hershfield Limited, a wholly employee owned Canadian Consultant, and the University of Western Ontario, rose up to this challenge by MTO. The resulting program combined expertise in practical bridge design with academic teaching skill in adult education. The program was successfully delivered, with the work monitored by a Steering Committee comprised of MTO Senior Members. Between September 2012 and February 2013, the project



team delivered five 3-day teaching sessions in four Ontario cities across the Province, to over 80 MTO engineers and engineers-in-training. The modular method of preparing the teaching materials and delivery, allow future expansion of the program to address other specialty areas in Bridge Engineering when funding becomes available. The format of the teaching manual, complete with facilitator notes for each of the module, will allow the course to be delivered by others. This will enable the course to benefit a wider circle of bridge engineers across the nation, since the use of CHBDC has now become a national standard.

A detailed survey was conducted throughout the program and responses were received from all participating engineers and trainees on each day of each class of the 5 sessions. The result shows an overwhelming appreciation from participants; most thought that this training program was long overdue.

The MH and UWO team feels that the tremendous effort invested in the Bridge Training course should be expanded to benefit more engineers in the industry. The team is currently exploring other delivery channels such as in University graduate courses, as well as working with national learned societies for other practicing engineers across the country.



This training program is highly successful, and was uniquely designed adopting many innovative approaches. The team headed by Morrison Hershfield would like to submit the program for the consideration for the “2013 Education Achievement Award” organized by Transportation Association of Canada.



The Canadian Highway Bridge Design Code (CHBDC), CAN/CSA-S6

The CHBDC is a well-recognized Bridge Standard adopted throughout Canada. First published in 2006, it amalgamated and superseded previously codes and standards, including CAN/CSA-S6-88, Design of Highway Bridges, and the Ontario Ministry of Transportation's OHBDC-91-01, Ontario Highway Bridge Design Code. The recent Supplement No. 2 was issued in October 2011, incorporating a number of changes to the original 2006 code. The training program was prepared based on this version of the CHBDC, as well as other relevant documents and MTO standards and practices.



An Innovative Approach

This education program adopted many innovative ideas and approaches to address the unique nature, scope and audience receiving the information. Some ground-breaking features of the program include:

1. Integrating immensely condensed technically and fundamentally rich content with comprehensive step by step design process and detailed explanatory notes for 4 wholly different structural systems. The material covers subjects from planning aspect to detail design of reinforced concrete structure, pre-stressed concrete structure, structural steel structure, and soil retaining structure.
2. Combining academic teaching specialists with practising professionals in an engineering program to ensure practical usage of the teaching materials directly in real-life engineering applications. The program recognized the importance that any bridge designed by participating engineers can actually and practically be built, be durable and robust, and will not incur unnecessary costs in construction and future maintenance.
3. Using “Adult Learning” principles in the program design as the participants are practising engineers who have obtained basic engineering knowledge from universities or colleges, many with years of experience in similar work. The program must be able to keep the focus and maintain interest of the audience throughout the 3 days of intensive learning.
4. Mixing theoretical derivation of engineering solutions with actual detailing and contract presentation currently being adopted in the province.
5. Compiling a “Facilitator Guide” along with the teaching materials, laying the groundwork for future expansion of the program for “in-house” delivery or industry-wide transfer of knowledge and skill to other engineers.



6. Using a Modular approach with due consideration of the potential of expanding the program to include other structural types and forms, which can be added easily.

7. Conducting 100% Participant Survey to identify potential improvements for future courses, both in the teaching materials and the format and method of presentation. In fact, throughout the program each subsequent session incorporated comments from participants of previous sessions, with modifications to improve the content and usefulness of the sessions.

8. Inviting a handful of engineers from other disciplines to join and assess the program at the final stage. This arrangement went a long way to allow other disciplines to appreciate the challenges and considerations in bridge design, thus further improving project communications and working relations in large, multi-disciplinary project teams, which are typical of MTO and other transportation projects.

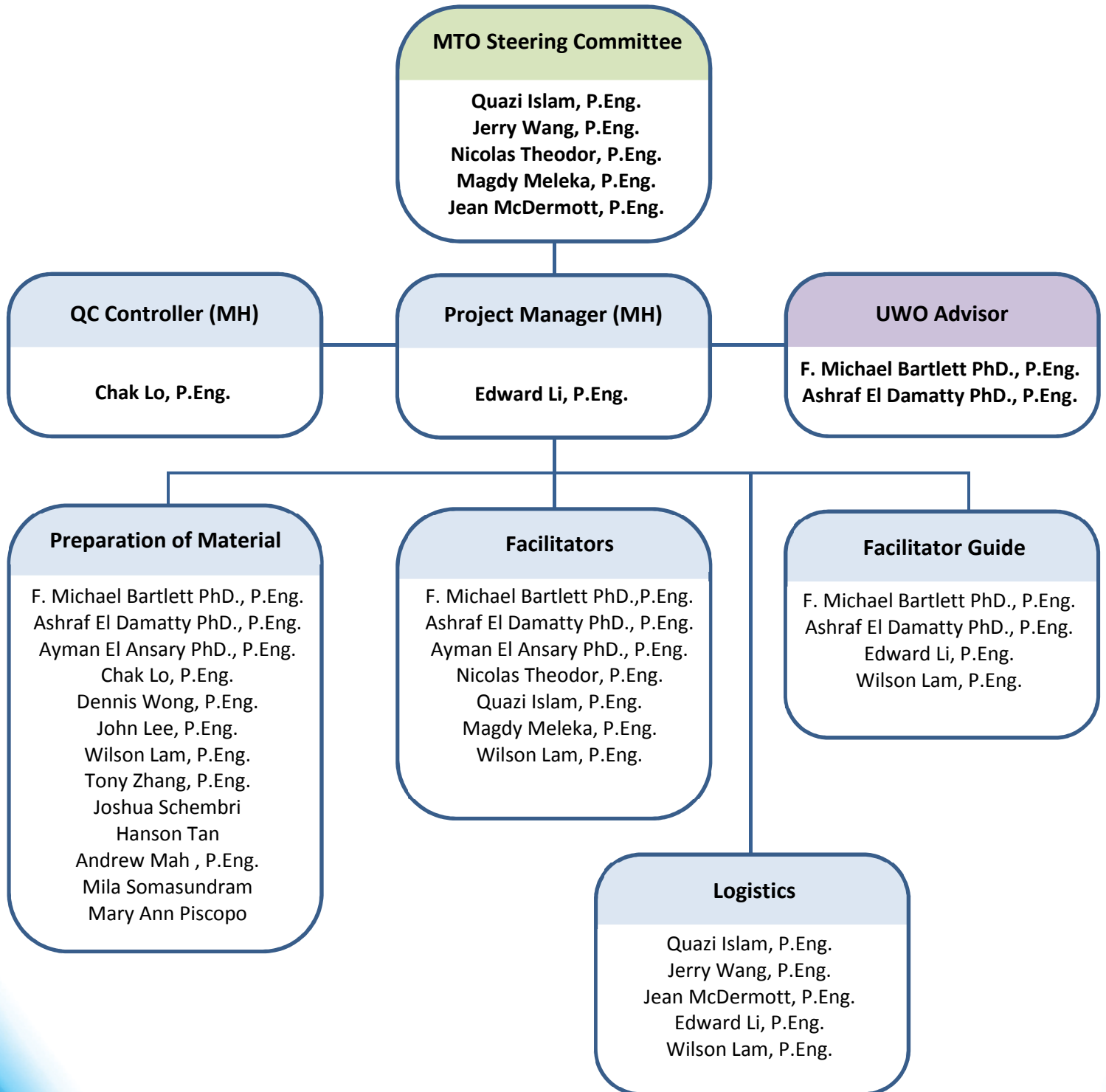


The Project Team

The project team comprises engineers of MH and professors of UWO working under the direction of a MTO Steering Committee. The team manages the delivery of the program, including scheduling of classes, preparation of teaching materials (manuals and handouts), course time-table, visual aids (PowerPoint presentations), development of class exercises, preparation of facilitators' guide, organization of feedback information, management of general house-keeping issues (venues, equipment, food and beverages, etc.), and delivery of other miscellaneous tasks. The organization chart of the team is presented on the following page.



Organization Chart



Project Schedule

The program was delivered within a very tight timeline to address fiscal requirement and commitment of the client. The following summarizes the major milestones of this project:

Project Start-up:	June 1, 2012
Preparation of Teaching Materials:	June to September 2012
Printing, Binding and Distribution:	September 2012
<i>First Session - Kingston, Ontario:</i>	September 25 to September 27, 2012
<i>Second Session - Toronto, Ontario:</i>	October 9 to October 11, 2012
<i>Third Session - North Bay, Ontario:</i>	October 30 to October 31, 2012
<i>Fourth Session - London, Ontario:</i>	November 6 to November 8, 2012
<i>Fifth Session - Toronto, Ontario:</i>	February 20 to February 27, 2013
<i>Future Sessions</i>	To Be Arranged

Between each session, review meetings were held to identify and implement improvements to the course material, course content and presentation format.



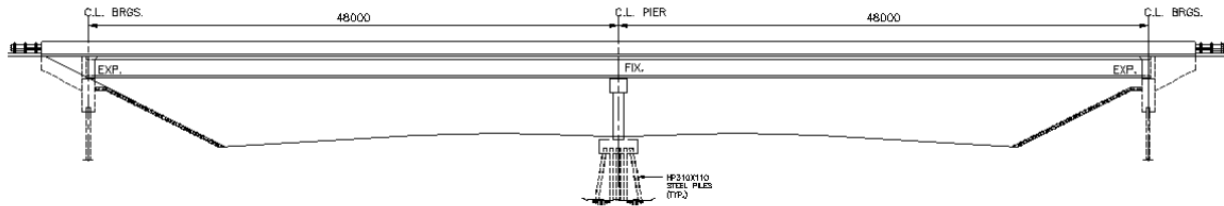
Program Scope

The program, as a pilot of bridge engineering teaching, started with the design of 4 of the most common bridges and highway structures generally found in the Province of Ontario and in Canada, namely:

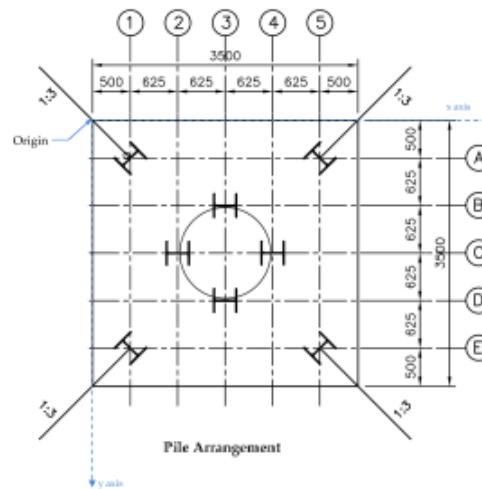
1. Single Span Reinforced Concrete Rigid Frame Bridges on spread footing foundations;
2. Two-span Concrete Deck on Precast Prestressed Girder Bridges on spread footing foundations;
3. Two-span Concrete Deck on Structural Steel Girder Bridges with Integral Abutments; and
4. Cantilevered Retaining Walls on spread footing foundations and on piled foundations.



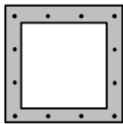
The presentation included design notes, design instruments, design checklists, practical examples, graphics, drawings and sketches to illustrate the details, construction sequences, MTO standards and details for each key components, class exercises, and the like.



Bridge Elevation View



Exercise:



- 1000x1000 column.
- For $f'_c = 30$ MPa and $f_y = 400$ MPa
 $\rho > 0.01$
- This is 10000 mm²!

1. How big an imaginary void is needed to reduce A_s to 6000 mm² (12 No. 25)?
2. What is the capacity (M_p , P_f) of this column for the balanced condition? (Allow 100 mm cover to the centres of the No. 25 bars)

30

Preparation of Teaching Materials and Handout Binder

A dedicated team of MH design engineers and supervising engineers were involved to complete this task and presented the materials in a logical and professional format. UOW professors and MTO Steering Committee Members participated in the review and quality control of the work.

A 600 page binder manual was developed for each participant to keep and use during the course. The binder comprised:

1. Course Introduction.
2. Course Schedule and Daily Timetable. *(A typical schedule is attached in Appendix 1)*
3. Design calculations for each of the 4 structural types stated above, starting from Design Criteria, use of materials, loads, analyses, summary and design, including all design summary tables and figures and illustrations.
4. Printout of all PowerPoint Presentation Slides used in the 3-day session.
5. Spaces for notes.

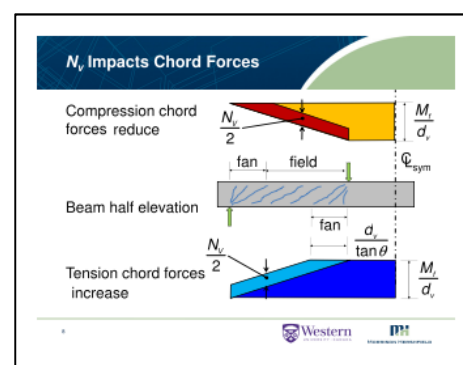
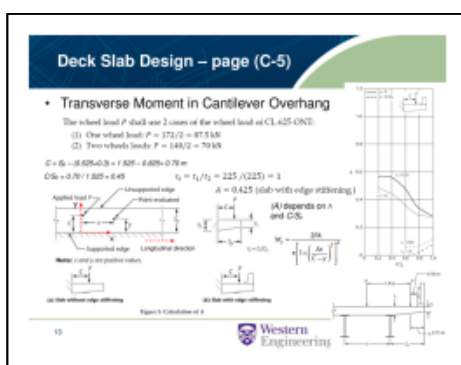
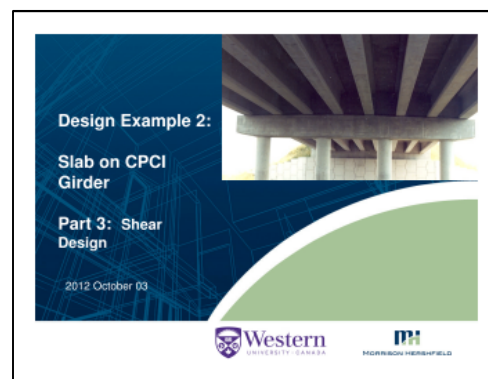
The collage displays several pages from the design binder:

- RIGID FRAME DESIGN EXAMPLE:**
 - A4.2. LONGITUDINAL DIMENSIONS:** Shows a preliminary longitudinal section with clear span $L = 18\text{ m}$, vertical clearance $H_{clear} = 4.8\text{ m}$, and various support dimensions.
 - A4.3. TRANSVERSE DIMENSIONS:** Lists lane width (3.5 m), sidewalk width (1.5 m), shoulder width (0.5 m), barrier wall width (0.25 m), parapet wall width (0.25 m), pavement width (8.75 m), asphalt thickness (0.09 m), design lanes (2), multi-lane factor (1.0), design lane width (8.75 m), and structural width (11.075 m).
 - A12. Abutment Wall Design:**
 - A12.1. NEGATIVE MOMENT:** Discusses reinforcement design for negative moment at the top of the wall.
 - A12.2. SHEAR:** Details shear design on a per metre width, including effective shear depth d_v and reinforcement spacing.
- STEEL PLATE GIRDER DESIGN EXAMPLE:**
 - C17.2. INTERMEDIATE TRANSVERSE WEB STIFFENERS:** Provides calculations for development of shear capacity, minimum width of stiffener, and thickness ratio.
- PCI GIRDER DESIGN EXAMPLE:**
 - 810.2. ANCHORAGE ZONE:** Details end block design, including reinforcement area $A_{st} = 1876\text{ mm}^2$ and stirrup cover.
 - 810.3. SLAB DESIGN:** Discusses slab design on concrete girders.

Visual Presentation (PowerPoint) Preparation

A number of PowerPoint presentations were prepared for each session, to be presented by different members of the project team and Steering Committee, they include:

- | | |
|------------------------------------------|------------------------------------------------|
| 1. Bridge Planning | <i>Quazi Islam (retired), MTO</i> |
| 2. Bridge Basics | <i>Nicolas Theodor, MTO</i> |
| 3. Design Example 1: Rigid Frame | <i>Michael Bartlett, UWO</i> |
| 4. Design Example 2: Slab on CPCI Girder | <i>Michael Bartlett, UWO</i> |
| 5. Design Example 3: Steel Plate Girder | <i>Ashraf El Damatty, UWO / Wilson Lam, MH</i> |
| 6. Design Example 4: Retaining Wall | <i>Ashraf El Damatty, UWO</i> |



Other visual aids like flip charts and smart boards were also used due to the size of the classes. Animation, references, hands on exercises, and historic background were added and tailored to adult learning behavior.

Preparation of Facilitators' Guide

It is the intention of the Program that the materials prepared can be reused in the future for education of other new comers to the MTO, with delivery by in-house tutors. As a result, a Facilitators' Guide was developed, making use of the existing presentation slides and design examples to deliver the training workshop. The guide provides the background of the project, logistical check list, detailed timeline for the presentation, and highlights and comments on each workshop modules. Briefs and comments against the presentation slides are documented to assist the future presenter in the classes.

FACILITATOR GUIDE

Table of Contents

- E1 Introduction 1
- E2 Background 1
- E3 Program Objectives 1
- E4 Program Components 1
- E4.1 BINDERS 1
- E4.2 PRESENTATION SLIDES 1
- E4.3 EXERCISES/QUIZS 1
- E5 Delivery Framework 1
- E5.1 ROLE OF FACILITATOR 1
- E5.2 GROUP DYNAMICS 1
- E5.3 LOGISTICS 1
- E5.4 SCHEDULE AND TIME LINE 1
- E5.4.1. Schedule 1
- E5.4.2. Time Line 1
- E6 Briefs and Comments on Workshop Modules
- E6.1 BRIDGE PLANNING
- E6.2 BRIDGE BASICS
- E6.3 RIGID FRAME DESIGN
- E6.4 CPCJ BRIDGE
- E6.5 RETAINING WALL
- E6.6 STEEL PLATE GIRDER
 - E6.6.1. Superstructure
 - E6.6.2. Substructure
- E6.7 OPENING AND CLOSING REMARKS
 - E6.7.1. Opening Remarks
 - E6.7.2. Closing Remarks
- E7 Onwards

APPENDIX

- Appendix A - Rigid Frame Design Slides with Facilitator Notes
- Appendix B - CPCJ Bridge Design Slides with Facilitator Notes
- Appendix C - Steel Plate Girder Bridge Substructure Design Slides with Facilitator Notes

MTO Bridge Design Training
(2013-03-15)

FACILITATOR GUIDE

ES.3. LOGISTICS

The facilitator may adjust logistics according to one's style. Suggestion of the Logistics as follows:

Course Length: Three days
No of facilitators: 2+
Group Size: ~25 participants maximum
Table arrangement: A number of round, 3-4 feet radius tables for groups of 4 to 5 sitting together with books and room for writing and calculation.

Facilitator's Stage: 1 Platform
 1 4 feet x 3 feet bench table for placement of handout, program material, supplies, timer, and a computer.
 1 chair/facilitator
 The facilitator's stage must be accessible to power outlet

Remarks

ITEMS	FACILITATOR	PARTICIPANT	COMMENTS
PROGRAM MATERIALS			
Facilitator Guide	1/facilitator		Electronic and hard copy to facilitator
Time Table	1/facilitator	1/participant	Can be due to binder
Binder	1/facilitator	1/participant	
Power Point Slides	1		Facilitator's Electronic copy in USB drive or computer
SUPPLIES			
Flip chart markers	3 set (min, 2 colors)		
Masking tape	1 roll		
Name cards / name tags	1/facilitator	1/participant	

MTO Bridge Design Training
(2013-03-15)

FACILITATOR GUIDE

ES.3. LOGISTICS

It doesn't cover everything

130 tonne Road Train, Lynd Highway, Queensland

I typically say something about permit loads here. This is an excuse to tell a funny story -- on the Lynd Highway, for example, is a 400 km "Development Road" in Queensland paved with a single 8" wide course of asphalt. If you are the only car on the road, you drive on the asphalt. If there is a car coming the other way, you cut right (they drive on the other side of the road in Australia, it is a good test for visitors) to have the two wheels on the driver's side on the asphalt. If the 15 metre road train is coming, you get off the asphalt and try to hide behind a convenient tree.

The bottom picture is neat because that's probably a 3 m plate girder with a clearly visible deflection under load -- say 200 mm!

The last few slides have been dry, need to find something light to cheer people up.

FACILITATOR GUIDE

Integral Abutment- What is it

Left diagram: Conventional abutment with ballast and corbel supporting the approach slab. Location of joint at [indicated].

Water path [indicated] and location of delamination. Expensive to not just replace expansion joint, but the abutment and ballast wall delamination need to be repaired.

Sealing service life reduced as affected by the salt solution. The deck/girder end are also impacted.

Right diagram: Integral Abutment with deck connected to the abutment backwall. Remove contractions. As deck expands or contracts, restraint moment is incurred at the abutment.

Feedbacks and Participant Surveys

As this program is somewhat a pilot and innovative in nature, a comprehensive feedback program was devised to obtain feedback from participants in order to determine the effectiveness of the presentation and usefulness of the materials in enhancing their knowledge and daily practices. Each participant was requested to complete a survey at the end of each day's work and answer a number of questions. Responses in earlier sessions were used to improve on subsequent classes.

The results were sorted and summarized and a first draft summary is attached to the appendix of this submission.

Generally the program was well received with most feedback categories scoring over 80% in terms of satisfaction of the participant.

The following are some positive feedbacks from the owner and the participants:

FROM THE OWNER:

“ Our sincere thanks to Morrison Hershfield staff members, Edward Li & Wilson Lam; Bridge Training Work Group: Jerry Wang, Magdy Meleka, Nicolas Theodor & Jean McDermott; and Dr. Michael Bartlett and Dr. Ashraf El Damatty of University of Western Ontario for making the training a great success. ”

- Quazi Islam, P. Eng., Head, Structural Section, MTO, Eastern Region

“ It [Bridge Design Training Program] definitely [is] beneficial to staff esp. those who have not done much design in years. ”

- Wade Young, P. Eng., Head, Structural Section, MTO, Western Region

“Many thanks to you and your team for the excellent work that went into preparing and delivering the course materials. While there was a lot of information to cover over a relatively short timeframe, the materials were presented in a clear and organised manner. The practical examples that were integrated into the workshop were particularly beneficial for reinforcing some of the key aspects of the design methodology. From the feedback I have received from staff here in Northeastern Region, the course was very well received. The design examples that were prepared



have since proven to be a valuable reference tool and have been used by two of our structural engineers that are presently engaged in in-house structural design activities.

We look forward to similar opportunities to collaborate with you and the rest of the Morrison Hershfield team ”

- Sherif Sidky, P. Eng., Head, Structural Section, MTO, Northeastern Region

“ We appreciate the effort of MH team, Professor Bartlett, and Professor Damatty in the delivery of this intensive design training. It was a challengeable assignment--- --- We believe this training will largely [be a] benefit to our engineers in their future work. ”

- Jerry Wang, P. Eng., Senior Structural Engineer, MTO, Eastern Region

FROM THE PARTICIPANTS:

“ Excellent presentation. ”

- Participant from Kingston

“ Good examples and clear explanations. ”

- Participant from Kingston

“ Job well done. ”

- Participant from Kingston

“ It is great that we are able to take this course. ”

- Participant from Toronto

“ Good examples and clear explanations. ”

- Participant from Toronto

“ Good course material and coverage on bridge design – more complex example. ”

- Participant from Toronto

“ Well compact material to serve the purpose of refresher. ”

- Participant from Toronto



“ Good reference material. ”

- Participant from North Bay

“ This is a good event! ”

- Participant from North Bay

“ Very well done and long overdue. Thank you for putting on the course. ”

- Participant from North Bay

“ Well laid out ”

- Participant from London

“ Very relevant and useful for day to day work. Excellent material well written and detailed. Well thought out exercise. ”

- Participant from London

“ Extremely helpful with direct application in day to day work. Well laid out and detailed. ”

- Participant from London



What's Next?

After the success of this program, the team has been considering and proposing more ambitious methods to deliver the course and adding to the program other modules not covered in the original scope.

Current actions include:

- Horizontally, currently discussing with MTO to take the materials of this course, expand it, and offer through two graduate courses in an M.Eng. degree programme at UWO. Also being considered are discussions with Provincial and National Learned Societies to conduct the course in different locations across the country.
- Vertically, the team is currently considering the potential of adding other topics such as post-tensioned bridge decks, bridge rehabilitation, and concrete and steel box girder bridges.



Appendix 1

Typical Bridge Design Training – Schedule



Bridge Design Training - Schedule

Day 1

- 8:25 to 8:30 Opening Remarks (*MTO*)
- 8:30 to 9:30 Introduction; Bridge Planning (*Quazi Islam & Nicolas Theodor*)
- 9:30 to 10:30 Rigid Frame Bridge Design: Part 1 - Preliminary (*F.M. Bartlett*)
- 10:30 to 10:45 *Break*
- 10:45 to 12:15 Rigid Frame Bridge Design: Part 2 - Load and Analysis; Part 3 - Design (*F.M. Bartlett*)
- 12:15 to 1:00 *Lunch*
- 1:00 to 2:45 Rigid Frame Bridge Design: Part 3 Closure; CPCI Bridge Design: Part 1 - Preliminary (*F.M. Bartlett*)
- 2:45 to 3:00 *Break*
- 3:00 to 4:30 CPCI Bridge Design: Part 2 - Flexural Design (*F.M. Bartlett*)

Day 2

- 8:30 to 9:30 CPCI Bridge Design: Part 3 - Shear Design (*F.M. Bartlett*)
- 9:30 to 10:30 CPCI Bridge Design: Part 4 - Substructure (*F.M. Bartlett*)
- 10:30 to 10:45 *Break*
- 10:45 to 12:15 CPCI Bridge Design: Part 5 - Closure (*F.M. Bartlett*)
- 12:15 to 1:00 *Lunch*
- 1:00 to 2:45 Retaining Wall Design: Part 1 - Shallow Foundation Retaining Wall (*A. El Damatty*)
- 2:45 to 3:00 *Break*
- 3:00 to 4:30 Retaining Wall Design: Part 2 - Deep Foundation Retaining Wall (*A. El Damatty*)

Day 3

- 8:30 to 9:30 Steel Plate Girder Bridge Design: Part 1 (*A. El Damatty*)
- 9:30 to 10:30 Steel Plate Girder Bridge Design: Part 2 (*A. El Damatty*)
- 10:30 to 10:45 *Break*
- 10:45 to 12:15 Steel Plate Girder Bridge Design: Part 3 (*A. El Damatty*)
- 12:15 to 1:00 *Lunch*
- 1:00 to 2:45 Steel Plate Girder Bridge Design: Part 4 (*A. El Damatty*)
- 2:45 to 3:00 *Break*
- 3:00 to 4:30 Steel Plate Girder Bridge Design: Part 5 (*W. Lam*)
- 4:30 to 4:35 Closing Remarks/ MTO



Appendix 2

Bridge Design Training Design Examples

Binder Cover and Introduction





Ministry of Transportation
Bridge Design Training
Design Examples



Ministry of Transportation
Government of Ontario, Canada



INTRODUCTION

GENERAL

This publication, titled “Bridge Design Training – Design Examples”, prepared by Morrison Hershfield Limited in conjunction with Professors F.M. Bartlett, P.Eng. and A. El Damatty, P.Eng., of the University of Western Ontario, and produced for the Provincial Highways Management Division of the Ministry of Transportation of Ontario (MTO), provides examples of practical application of the Canadian Highway Bridge Design Code (CAN/CSA S6-06) including the provisions of Supplement 1 (May 2010) and Supplement 2 (October 2011), for the following structural types commonly encountered on Ontario Highways:

- i. A Rigid Frame Structure on Spread Footings;
- ii. A two span CPCI Girder Bridge with Simply-Supported Ends, and with references to the use of Semi-Integral Abutments;
- iii. A two span Steel I-Girder Bridge with Integral Abutments using piles foundations for both abutments and pier; and
- iv. A Cantilevered Retaining Wall with Spread Footing Foundations, as well as on Piled Foundations.

This reference is intended for use in a training program for in-house bridge engineers of the Ministry to be conducted in 2012 and 2013 in various MTO Offices.

USE OF REFERENCE

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Illustrations including computer images for this publication were produced for the sole purpose of this publication, and shall not be reproduced, transmitted or reused in any other context.

The calculations, design notes, illustrations and other presentation materials developed for this publication were based on specific assumptions, simplifications and fictitious site conditions. Readers of this publication shall consider individual bridge sites, needs, constraints and results of investigations prior to proceeding with any actual bridge planning and design.

Morrison Hershfield Limited
September 2012

Bridge Design Training
Design Examples



Appendix 3

Typical Feedback Survey Form and Draft Summary



Sample feedback form:

PILOT: T121 Bridge Design DAY 1

Date of Course: September 25, 2012 **Location:** Kingston

1. Rate the overall **usefulness** of this course in helping you do your job. (e.g. topics, content)

1 2 3 4 5 6 7

Not At All Useful Very Useful

Comments _____

2. Rate how **satisfied** you are with the course materials.

1 2 3 4 5 6 7

Not At All Satisfied Very Satisfied

Comments _____

3. Rate how **satisfied** you are with the presentations.

1 2 3 4 5 6 7

Not At All Satisfied Very Satisfied

Comments _____

4. Rate how **satisfied** you are with the workshop and exercises.

1 2 3 4 5 6 7

Not At All Satisfied Very Satisfied

Comments _____

5. Rate how **motivated** you are to apply what you have learned.

1 2 3 4 5 6 7

Not At All Motivated Very Motivated

Comments _____

6. What did you like **most** about this course?

(Over)



7. What did you like **least** about this course?

8. What is the **most significant** thing that you learned during this course?

9. What will you **do differently** back on-the-job, as a result of what you have learned during this course?

10. For each of the following topics, rate the amount of information that was covered.

Topic	Too Much - not necessary	Too Much - but not that significant	Just Right	Not Enough - but not that significant	Not Enough - need more

11. Would you recommend this workshop to others?

Yes No

12. Other Comments



Example of actual filled-in feedback form from two participants:

T121 Bridge Design DAY 1

Date of Course: February 20, 2013 **Location:** Toronto

1. Rate the overall **usefulness** of this course in helping you do your job. (e.g. topics, content)

1 2 3 4 5 6 7

Not At All Useful Very Useful

Comments _____

2. Rate how **satisfied** you are with the course materials.

1 2 3 4 5 6 7

Not At All Satisfied Very Satisfied

Comments _____

3. Rate how **satisfied** you are with the presentations.

1 2 3 4 5 6 7

Not At All Satisfied Very Satisfied

Comments _____

4. Rate how **satisfied** you are with the workshop and exercises.

1 2 3 4 5 6 7

Not At All Satisfied Very Satisfied

Comments _____

5. Rate how **motivated** you are to apply what you have learned.

1 2 3 4 5 6 7

Not At All Motivated Very Motivated

Comments _____

6. What did you like **most** about this course?

Very organized slides + examples. Very very knowledgeable
instructor.

(Over)

7. What did you like **least** about this course?

food during lunch

8. What is the **most significant** thing that you learned during this course?

Coordination of fundamentals behind CHBDC code

9. What will you **do differently** back on-the-job, as a result of what you have learned during this course?

will do more detail calculations.

10. For each of the following topics, rate the amount of information that was covered.

Topic	Too Much - not necessary	Too Much - but not that significant	Just Right	Not Enough - but not that significant	Not Enough - need more

11. Would you recommend this workshop to others?

Yes No

12. Other Comments



7. What did you like **least** about this course?

A lot to take in a day

8. What is the **most significant** thing that you learned during this course?

Forces on cantilever section of slab.

9. What will you **do differently** back on-the-job, as a result of what you have learned during this course?

Consult the binder as a great resource.

10. For each of the following topics, rate the amount of information that was covered.

Topic	Too Much - not necessary	Too Much - but not that significant	Just Right	Not Enough - but not that significant	Not Enough - need more

11. Would you recommend this workshop to others?

Yes No

12. Other Comments



Summary of the Survey Results from over 80 participants, total 238 survey feedback collected (1 survey per day. A few participants were not able to attend all 3 full day):

Question 1: Rate the overall usefulness of this course.

Average Rating 6.0 / 7.0

Question 2: Rate how satisfied you are with the course material.

Average Rating 5.9 / 7.0

Question 3: Rate how satisfied you were with the presentations

Average Rating 5.9 / 7.0

Question 4: Rate how satisfied you are with workshop and exercise.

Average Rating 5.9 / 7.0

Question 5: Rate how motivated you are to apply what you have learned.

Average Rating 5.7 / 7.0

Question 11

Over 97% participants recommend this workshop to others.



Appendix 4

Comments from Some Department Heads of MTO



E-mail from Quazi Islam, Head, Structural Section, Ministry of Transportation, Eastern Region.

Wilson Lam

From: Islam, Quazi (MTO) <Quazi.Islam@ontario.ca>
Sent: Friday, September 28, 2012 1:38 PM
To: Kate G; Green, Kate (MTO); Casista, Kaurie (MTO); Abdul-Rahim, Samir (MTO); Theodor, Nicolas (MTO); McDermott, Jean (MTO); Rowat, Don (MTO); Mihov, Boris (MTO); Collins, George (MTO); Wang, Zhengsheng (MTO); Miron, Dina (MTO); Wang, Jerry (MTO); Edward Li; Wilson Lam; Ashraf El Damatty; Michael F Bartlett; Meleka, Magdy (MTO)
Cc: Bagnariol, Dino (MTO); Ismail, Salah (MTO); Krisciunas, Ray (MTO); Sherif.Sidky@ontario.ca; Young, Wade (MTO)
Subject: RE: Bridge Design Training, Kingston

To: All

Our sincere thanks to Morrison Hershfield staff members, Edward Li & Wilson Lam; Bridge Training Work Group Jerry Wang, Magdy Meleka, Nicolas Theodor & Jean McDermott; and Dr. Michael Bartlett and Dr. Ashraf El Damatty of University of Western Ontario for making the training a great success. Thanks to all attendees for enduring 3 days of intensive training with all of us.

Quazi

Quazi M. Islam, P. Eng.
Head
Structural Section
Ministry of Transportation
Eastern Region
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Kingston, ON
K7L 5A3
Tel. (613) 545-4712
Fax (613) 540-5106
E-mail: Quazi.Islam@Ontario.Ca



E-mail from Wade Young, Head, Structural Section, Ministry of Transportation, Western Region.

Wilson Lam

From: Edward Li
Sent: Tuesday, March 19, 2013 3:09 PM
To: Wilson Lam
Subject: FW: Bridge Design Training using CHBDC

From: Young, Wade (MTO) [<mailto:Wade.Young@ontario.ca>]
Sent: Saturday, February 23, 2013 2:55 PM
To: Edward Li
Subject: Re: Bridge Design Training using CHBDC

Edward:

It definitely beneficial to staff esp those who have not done much design in years.

Wade

Sent using BlackBerry



E-mail from Sherif Sidky, Head, Structural Section, Ministry of Transportation, Northeastern Region.

Wilson Lam

From: Edward Li
Sent: Wednesday, March 20, 2013 1:47 PM
To: Wilson Lam
Cc: Joshua Schembri; Mary Ann Piscopo
Subject: FW: Bridge Design Training using CHBDC

From: Sidky, Sherif (MTO) [<mailto:Sherif.Sidky@ontario.ca>]
Sent: Wednesday, March 20, 2013 12:36 PM
To: Edward Li
Subject: RE: Bridge Design Training using CHBDC

Hi Edward

Many thanks to you and your team for the excellent work that went into preparing and delivering the course materials. While there was a lot of information to cover over a relatively short timeframe, the materials were presented in a clear and organised manner. The practical examples that were integrated into the workshop were particularly beneficial for reinforcing some of the key aspects of the design methodology. From the feedback I have received from staff here in Northeastern Region, the course was very well received. The design examples that were prepared have since proven to be a valuable reference tool and have been used by two of our structural engineers that are presently engaged in in-house structural design activities.

We look forward to similar opportunities to collaborate with you and the rest of the Morrison Hershfield team.

Regards,

Sherif Sidky, M.Sc., P.Eng.
Head, Structural Section
Northeastern Region
Ministry of Transportation
Phone: (705) 497 5243 Fax : (705) 497 6839
E-mail: sherif.sidky@ontario.ca



E-mail from Jerry Wang, Senior Structural Engineer, Ministry of Transportation, Eastern Region.

Wilson Lam

From: Wang, Jerry (MTO) <Jerry.Wang@ontario.ca>
Sent: Monday, February 25, 2013 9:47 AM
To: Edward Li
Cc: Ismail, Salah (MTO); Krisciunas, Ray (MTO); Sidky, Sherif (MTO); Miron, Dina (MTO); Young, Wade (MTO); Merlo, Tony (MTO); Bagnariol, Dino (MTO); Mary Ann Piscopo; McDermott, Jean (MTO); Meleka, Magdy (MTO); Theodor, Nicolas (MTO); damatty@uwo.ca; Mike Bartlett (mbartlett@uwo.ca); Wilson Lam; Chak Lo
Subject: RE: Bridge Design Training using CHBDC

Hi Edward,

We appreciate the effort of MH team, Professor Bartlett, and Professor Damatty in the delivery of this intensive design training. It was a challengeable assignment to prepare this training in such a short period and deliver it within a 3-day course. We believe this training will largely benefit to our engineers in their future work.

Thanks
Jerry

E-mail from Jean McDermott, Education Consultant, Ministry of Transportation, Head Office.

Wilson Lam

From: McDermott, Jean (MTO) <Jean.McDermott@ontario.ca>
Sent: Friday, March 01, 2013 3:05 PM
To: Wilson Lam
Cc: Merlo, Tony (MTO); Wang, Jerry (MTO); Meleka, Magdy (MTO)
Subject: RE: CHBDC Bridge Design Training Survey Response 05-Toronto

Hi Wilson
Yes, I have received the surveys, thank you.

Thank you very much for your help on this. I appreciate how much work the project has been and all feedback I have received has been very positive.

Regards,
Jean

