2013 Educational Achievement Award

Bridge Design Training Program
Using the Canadian Highway Bridge Design Code

Submitted by:

Morrison Hershfield

Ontario
Western University - Canada
## Program Identification

<table>
<thead>
<tr>
<th><strong>Title of Submission:</strong></th>
<th>Bridge Design Training Program Using the Canadian Highway Bridge Design Code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Member Submitting:</strong></td>
<td>Morrison Hershfield Limited</td>
</tr>
</tbody>
</table>
| **Contact:**             | Project Manager  
Edward K.Y. Li, P.Eng., Vice President, Transportation and Civil Structures  
Tel: (416) 499-3110, Ext 1011206  
Email: eli@morrisonhershfield.com |
| **Collaborating Party:** | University of Western Ontario, Department of Civil & Environmental Engineering |
| **Owner:**               | Ministry of Transportation of Ontario                                           |
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

MTO Steering Committee
- Quazi Islam, P.Eng.
- Jerry Wang, P.Eng.
- Nicolas Theodor, P.Eng.
- Magdy Meleka, P.Eng.
- Jean McDermott, P.Eng.

QC Controller (MH)
- Chak Lo, P.Eng.

UWO Advisor
- F. Michael Bartlett PhD., P.Eng.
- Ashraf El Damatty PhD., P.Eng.

Project Manager (MH)
- Edward Li, P.Eng.

Facilitator Guide
- F. Michael Bartlett PhD., P.Eng.
- Ashraf El Damatty PhD., P.Eng.
- Edward Li, P.Eng.
- Wilson Lam, P.Eng.

Preparation of Material
- F. Michael Bartlett PhD., P.Eng.
- Ashraf El Damatty PhD., P.Eng.
- Ayman El Ansary PhD., P.Eng.
- Chak Lo, P.Eng.
- Dennis Wong, P.Eng.
- Wilson Lam, P.Eng.
- Tony Zhang, P.Eng.
- Joshua Schembri
- Hanson Tan
- Andrew Mah, P.Eng.
- Mila Somasundram
- Mary Ann Piscopo

Facilitators
- F. Michael Bartlett PhD., P.Eng.
- Ashraf El Damatty PhD., P.Eng.
- Ayman El Ansary PhD., P.Eng.
- Nicolas Theodor, P.Eng.
- Quazi Islam, P.Eng.
- Magdy Meleka, P.Eng.
- Wilson Lam, P.Eng.

Facilitator Guide
- F. Michael Bartlett PhD., P.Eng.
- Ashraf El Damatty PhD., P.Eng.
- Edward Li, P.Eng.
- Wilson Lam, P.Eng.

Logistics
- Quazi Islam, P.Eng.
- Jerry Wang, P.Eng.
- Jean McDermott, P.Eng.
- Edward Li, P.Eng.
- Wilson Lam, P.Eng.
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
- **First Session - Kingston, Ontario:** September 25 to September 27, 2012
- **Second Session - Toronto, Ontario:** October 9 to October 11, 2012
- **Third Session - North Bay, Ontario:** October 30 to October 31, 2012
- **Fourth Session - London, Ontario:** November 6 to November 8, 2012
- **Fifth Session - Toronto, Ontario:** February 20 to February 27, 2013
- **Future Sessions** 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 component, class exercises, and the like.
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.
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  
   **Quazi Islam (retired), MTO**

2. Bridge Basics  
   **Nicolas Theodor, MTO**

3. Design Example 1: Rigid Frame  
   **Michael Bartlett, UWO**

4. Design Example 2: Slab on CPCI Girder  
   **Michael Bartlett, UWO**

5. Design Example 3: Steel Plate Girder  
   **Ashraf El Damatty, UWO / Wilson Lam, MH**

6. Design Example 4: Retaining Wall  
   **Ashraf El Damatty, UWO**

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.

FACILITATORS GUIDE

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2. Background 1
3. Program Objective 1
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4.3 Storyboards 1
5. Delivery Framework 1
6.1 Role of Facilitator 1
6.2 Checkpoint Dynamics 1
6.3 Logistics 1
6.4 Schedule and Time Line 1
6.5 Schedule 1
6.6 Time Line 1

6. Briefs and Comments on Workshop Modules 1
6.1 Bridge Planning 1
6.2 Bridge Basics 1
6.3 Beam Frame Design 1
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6.5 Retaining Wall 1
6.6 Steel, Reinforced Concrete 1
6.7 Substructure 1
6.8 Opening and Closing Remarks 1
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7. Appendices
Appendix A - Rigid Frame Design Slides with Facilitator Notes
Appendix B - PCCP Bridge Design Slides with Facilitator Notes
Appendix C - Steel Plate Girder Bridge Substructure Design Slides with Facilitator Notes

MTU Bridge Design Training (2011/2012)
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

“\(^{\text{\textquoteleft\textquoteleft We appreciate the effort of MH team, Professor Bartlett, and Professor Damatty in the delivery of this intensive design training. It was a challengeable assignment--- --- We believe this training will largely [be a] benefit to our engineers in their future work.\textquoteright\textquoteleft}}\)"

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

FROM THE PARTICIPANTS:

“\(^{\text{\textquoteleft\textquoteleft Excellent presentation.\textquoteright\textquoteleft}}\)"

- Participant from Kingston

“\(^{\text{\textquoteleft\textquoteleft Good examples and clear explanations.\textquoteright\textquoteleft}}\)"

- Participant from Kingston

“\(^{\text{\textquoteleft\textquoteleft Job well done.\textquoteright\textquoteleft}}\)"

- Participant from Kingston

“\(^{\text{\textquoteleft\textquoteleft It is great that we are able to take this course.\textquoteright\textquoteleft}}\)"

- Participant from Toronto

“\(^{\text{\textquoteleft\textquoteleft Good examples and clear explanations.\textquoteright\textquoteleft}}\)"

- Participant from Toronto

“\(^{\text{\textquoteleft\textquoteleft Good course material and coverage on bridge design – more complex example.\textquoteright\textquoteleft}}\)"

- Participant from Toronto

“\(^{\text{\textquoteleft\textquoteleft Well compact material to serve the purpose of refresher.\textquoteright\textquoteleft}}\)"

- 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**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:25 to 8:30</td>
<td>Opening Remarks (MTO)</td>
</tr>
<tr>
<td>8:30 to 9:30</td>
<td>Introduction; Bridge Planning (Kuni Islam &amp; Nicolae Theodor)</td>
</tr>
<tr>
<td>9:30 to 10:30</td>
<td>Rigid Frame Bridge Design: Part 1 - Preliminary (F. M. Bartlett)</td>
</tr>
<tr>
<td>10:30 to 10:45</td>
<td><strong>Break</strong></td>
</tr>
<tr>
<td>10:45 to 12:15</td>
<td>Rigid Frame Bridge Design: Part 2 - Load and Analysis; Part 3 - Design (F. M. Bartlett)</td>
</tr>
<tr>
<td>12:15 to 1:00</td>
<td><strong>Lunch</strong></td>
</tr>
<tr>
<td>1:00 to 2:45</td>
<td>Rigid Frame Bridge Design: Part 3 Closure; CPCI Bridge Design: Part 1 - Preliminary (F. M. Bartlett)</td>
</tr>
<tr>
<td>2:45 to 3:00</td>
<td><strong>Break</strong></td>
</tr>
<tr>
<td>3:00 to 4:30</td>
<td>CPCI Bridge Design: Part 2 - Flexural Design (F. M. Bartlett)</td>
</tr>
</tbody>
</table>

**Day 2**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td>8:30 to 9:30</td>
<td>CPCI Bridge Design: Part 3 - Shear Design (F. M. Bartlett)</td>
</tr>
<tr>
<td>9:30 to 10:30</td>
<td>CPCI Bridge Design: Part 4 - Substructure (F. M. Bartlett)</td>
</tr>
<tr>
<td>10:30 to 10:45</td>
<td><strong>Break</strong></td>
</tr>
<tr>
<td>10:45 to 12:15</td>
<td>CPCI Bridge Design: Part 5 - Closure (F. M. Bartlett)</td>
</tr>
<tr>
<td>12:15 to 1:00</td>
<td><strong>Lunch</strong></td>
</tr>
<tr>
<td>1:00 to 2:45</td>
<td>Retaining Wall Design: Part 1 - Shallow Foundation Retaining Wall (A. El Damatty)</td>
</tr>
<tr>
<td>2:45 to 3:00</td>
<td><strong>Break</strong></td>
</tr>
<tr>
<td>3:00 to 4:30</td>
<td>Retaining Wall Design: Part 2 - Deep Foundation Retaining Wall (A. El Damatty)</td>
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**Day 3**

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<th>Time</th>
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<tr>
<td>8:30 to 9:30</td>
<td>Steel Plate Girder Bridge Design: Part 1 (A. El Damatty)</td>
</tr>
<tr>
<td>9:30 to 10:30</td>
<td>Steel Plate Girder Bridge Design: Part 2 (A. El Damatty)</td>
</tr>
<tr>
<td>10:30 to 10:45</td>
<td><strong>Break</strong></td>
</tr>
<tr>
<td>10:45 to 12:15</td>
<td>Steel Plate Girder Bridge Design: Part 3 (A. El Damatty)</td>
</tr>
<tr>
<td>12:15 to 1:00</td>
<td><strong>Lunch</strong></td>
</tr>
<tr>
<td>1:00 to 2:45</td>
<td>Steel Plate Girder Bridge Design: Part 4 (A. El Damatty)</td>
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<td>2:45 to 3:00</td>
<td><strong>Break</strong></td>
</tr>
<tr>
<td>3:00 to 4:30</td>
<td>Steel Plate Girder Bridge Design: Part 5 (W. Lam)</td>
</tr>
<tr>
<td>4:30 to 4:35</td>
<td>Closing Remarks/ MTO</td>
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Appendix 2

Bridge Design Training
Design Examples

Binder Cover and Introduction
Ontario

Ministry of Transportation
Bridge Design Training
Design Examples

Ministry of Transportation
Government of Ontario, Canada

Morrison Hershfield
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 CPC 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

This publication is the property of MTO and must not be reproduced or copied unless with written consent from the Provincial Highways Management Division of MTO.

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**

<table>
<thead>
<tr>
<th>Date of Course:</th>
<th>September 25, 2012</th>
<th>Location: Kingston</th>
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1. Rate the overall **usefulness** of this course in helping you do your job. (e.g. topics, content)
   
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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tbody>
<tr>
<td>Not At All Useful</td>
<td>Very Useful</td>
<td></td>
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   Comments

2. Rate how **satisfied** you are with the course materials.
   
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<th>4</th>
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<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not At All Satisfied</td>
<td>Very Satisfied</td>
<td></td>
<td></td>
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   Comments

3. Rate how **satisfied** you are with the presentations.
   
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<th>7</th>
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<tbody>
<tr>
<td>Not At All Satisfied</td>
<td>Very Satisfied</td>
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   Comments

4. Rate how **satisfied** you are with the workshop and exercises.
   
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<tr>
<td>Not At All Satisfied</td>
<td>Very Satisfied</td>
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   Comments

5. Rate how **motivated** you are to apply what you have learned.
   
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<th>7</th>
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<tr>
<td>Not At All Motivated</td>
<td>Very Motivated</td>
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</table>
   
   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.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Too Much - not necessary</th>
<th>Too Much - but not that significant</th>
<th>Just Right</th>
<th>Not Enough - but not that significant</th>
<th>Not Enough - need more</th>
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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  
   Very Useful  
   Comments

2. Rate how **satisfied** you are with the course materials.  
   1  2  3  4  5  6  7  
   Very Satisfied
   Comments

3. Rate how **satisfied** you are with the presentations.  
   1  2  3  4  5  6  7  
   Very Satisfied
   Comments

4. Rate how **satisfied** you are with the workshop and exercises.  
   1  2  3  4  5  6  7  
   Very Satisfied
   Comments

5. Rate how **motivated** you are to apply what you have learned.  
   1  2  3  4  5  6  7  
   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?
   Good teaching

8. What is the most significant thing that you learned during this course?
   Coordination of fundamentals behind CATBDC

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 calculation.

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

<table>
<thead>
<tr>
<th>Topic</th>
<th>Too Much - not necessary</th>
<th>Too Much - but not that significant</th>
<th>Just Right</th>
<th>Not Enough - but not that significant</th>
<th>Not Enough - need more</th>
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</thead>
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</table>

11. Would you recommend this workshop to others?
   ☑ Yes  ☐ No

12. Other Comments
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
<table>
<thead>
<tr>
<th>Date of Course:</th>
<th>February 22, 2012</th>
<th>Location: Toronto</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rate the overall usefulness of this course in helping you do your job. (e.g. topics, content)</td>
<td></td>
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<tr>
<td>Not At All Useful</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Comments</td>
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<td>2. Rate how satisfied you are with the course materials.</td>
<td></td>
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</tr>
<tr>
<td>Not At All Satisfied</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Comments</td>
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<tr>
<td>3. Rate how satisfied you are with the presentations.</td>
<td></td>
<td></td>
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<tr>
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<td>3</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Comments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Rate how motivated you are to apply what you have learned.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not At All Motivated</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Comments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. What did you like most about this course?</td>
<td>The binder &amp; great presenters.</td>
<td></td>
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</tbody>
</table>

(Over)
7. What did you like least about this course?
   A lot to take in in a day

8. What is the most significant thing that you learned during this course?
   Forces on contilever 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.

<table>
<thead>
<tr>
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<th>Too Much - not necessary</th>
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</tbody>
</table>

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, Joan (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 Damaty; Michael F Bartlett; Meleka, Magdy (MTO)
Cc: Bagnarol, Dino (MTO); Ismail, Salah (MTO); Kriaciunas, 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 Damaty 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
1355 John Counter Blvd.
Kingston, CN
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

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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

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

From: Edward Li
Sent: Wednesday, March 20, 2013 1:47 PM
To: Wilson Lam
Cc: Joshua Schembri; Mary Ann Pisopo
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,

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.

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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); Krisclunas, Ray (MTO); Sidky, Sherif (MTO); Miron, Dina (MTO); Young, Wade (MTO); Merlo, Tony (MTO); Bagnaroli, Dino (MTO); Mary Ann Pracopo; 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 challenging 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
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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
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