

REPLACEMENT OF THE MIDGELL RIVER BRIDGE

A report submitted exclusively to APEPEI Newsletter by:

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Department of Transportation and Public Works

BACKGROUND

The former Midgell River Bridge was a 12 span timber piled structure with creosote timber stringers and a concrete deck with asphalt overlay. It spanned the Midgell River, oriented east to west and was approx. 55 metres (180 ft.) long and 8.2 metres (27 ft.) wide. The



Elevation - Existing Structure



Looking West along Route 2

original construction date on file was listed as 1937. The timber sub-structure had decayed beyond reasonable repair and there were signs of settlement on the first exterior spans due to impact from larger vehicles. The timber stringers were in fair condition, with most of the creosote treatment having been lost through weathering. The deck was in poor shape, based on the visual condition of the deck edges.

PROPOSED SOLUTION

There were three options proposed during planning of this project. These are as follows:

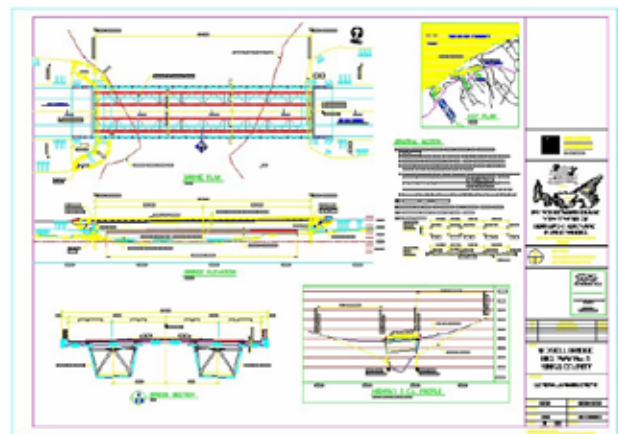
- 1. Clear span - 60 m structure, Integral Abutment.**
This option would include the design, fabrication and construction of a 60 metre (200 ft.) clear span, integral abutment structure. The girders would most probably be steel with a concrete deck.
- 2. Two span - continuous 60 m total span structure.**
This option involved the design, fabrication and construction of a two span structure with a centre pier. The spans would be 30 m each and the girders could be either concrete or steel. The abutments could be integral with the deck, or they could be conventional abutments, with bearings and expansion joints.
- 3. Three span - continuous 60 m total span structure.** Span lengths would most likely be 16,

28 and 16 metres respectively. Girders again could be concrete or steel and the abutment could be integral or conventional with two sets of piers.

In all cases, the abutments and piers would be founded on steel piles with a reinforced concrete pile cap.

DESIGN & STRUCTURE DETAILS

The design portion of the work was awarded to CBCL Limited. After some review, the proposed solution was a 60 m (200 ft.) single span trapezoidal steel box girder system with a reinforced concrete deck. The abutments were designed as semi-integral and the steel girders bear on pot bearings. The steel girders were 100 tonnes each measuring 2100 mm high, 2400 mm wide at the bottom and 3400 mm wide (web-to-web) at the top, with a total length of 60.7 metres end-to-end.



General Arrangement

The deck is a conventional cast-in-place concrete deck having a total width of 14.3 metres out-to-out, with 3.7 metre wide traveled lanes and 3.0 metre wide shoulders on each side of centreline. The deck is coated with a waterproofing membrane and 75 mm of asphalt.

The substructure consists of conventional reinforced concrete abutments founded on steel pipe piles approximately 20 metres deep into bedrock. The abutments are semi-integral i.e., the concrete deck extends over the top of the abutment breastwall, eliminating the need for expansion joints.

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TRAFFIC ISSUES

During the planning stages, the Department knew that construction would probably last in the order of four to five months, depending on time of year, superstructure design, method of construction, etc. Route 2 East is classified as a major arterial highway connecting Charlottetown to St. Peter's and Souris, handling on average 4200 vpd during peak season. Closing the road down for months at a time meant forcing motorists to endure a 17 km detour on a local road, which is unpaved for a portion. This was deemed unacceptable and we proposed two additional options to consider during construction. These are as follows:

1. **Construct temporary structure along side of existing.** This method allows for the construction of a temporary structure to allow for traffic flow to continue regardless of construction practices.
2. **Construct new structure alongside existing and slide/jack into place.** This method involves constructing the new structure on temporary abutments alongside the existing structure, keeping the old structure as a temporary bridge structure. Once the new structure is complete, we can construct temporary approaches, reroute traffic on the new structure while the permanent approach roads are being constructed and existing structure is being demolished, then slide/jack new structure into place.

The Department opted to go with option 2 in order to minimize traffic disruptions. This also saved the Department fiscally in terms of temporary structure costs, i.e., we only have to construct temporary abutments, not the temporary structure.

CONSTRUCTION

Tenders were called in July of 2005 and the project was awarded to HR Civil Contracting Ltd. from Fredericton, NB. Construction began in late August, 2005 with construction of the temporary abutments. These were pipe piles driven to bedrock and a steel cap beam placed over the piles as a temporary bearing seat. The abutments were closed with a steel channel supporting pile system sheathed with 200 x 200 timber members and tied back to a timber deadman anchor. The temporary cap beam was fitted with a steel channel to allow for the horizontal launching, which will be discussed a little later.



Temporary Abutment Construction

Girders were fabricated at Maritime Steel and Foundries Limited in Dartmouth, NS. The girders were transported to the site in November, 2005 in three pieces each and they were erected within three days onto the temporary abutments. This was completed using 450 tonne and 120 tonne cranes at either end of the girder. The existing bridge was used as a temporary platform to erect the girders, therefore traffic was re-routed around the detour for this time.



Erecting girder on existing bridge

Lifting girder into Temporary Position

The deck was formed and construction was shut down for the winter months. The Contractor returned to the site in May of 2006 and completed placing the concrete deck on the girders. The temporary approach fills were constructed and the traffic was then re-routed onto the new bridge in its temporary location.



Forming for new Concrete Deck

Placing Concrete Deck

Work then began on demolition of the existing structure and construction of the new permanent abutments and approach roads. New steel pipe piles were driven and reinforced concrete bearing seat, breastwall and wingwalls were poured at each end of the bridge. The new bearing seat was also fitted with a steel channel.

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COUNCIL ELECTION 2006 CANDIDATES

The candidates for election as Officers and Councillors in the upcoming Association's election are:

For
President



William (Bill) Courtney, P.Eng.

For
Vice
President



Luc Van Hul, P.Eng.

F o r C o u n c i l l o r s



Lokesh Garg, P.Eng.



Alisa Saciragic-Mrehic, P.Eng.



Mark Victor, P.Eng.

Ballots will be sent out shortly. Votes must be received at the Association Office no later than:
3:00 pm Monday, November 20, 2006

WHAT'S IN IT FOR ME?

Not all of the benefits of being a professional engineer are financially quantifiable. Many are important but intangible.

The pride that comes from knowing you are part of a larger, ethical profession; the prestige of being recognized as a member of the professional class; and the respect you receive as a result of many years of quality work by your predecessors and peers — it's hard to put a price tag on those benefits.

Difficult to measure or prove, these benefits are sometimes recognized by others.

One of the most visible forms of recognition comes in the form of the trust accorded professionals by the federal government. For many years now, professional engineers have been able to act as a guarantor for domestic Canadian passport applications.

The guarantor provides an invaluable service in the passport issuing process, attesting to the identity of the person applying for the passport by signing the back of the passport photo. In this age of increased security concerns, identity theft and terrorism, this role carries even greater responsibility.

PASSPORT GUARANTOR

Most Canadians cannot serve as a guarantor. Only the legally registered members of regulated professions (including doctors, dentists, pharmacists, lawyers, accountants), members of law enforcement (including judges, magistrates and police officers), legally recognized religious ministers, and a few select others qualify.

Simply stating that you are a qualified to serve as a guarantor is not enough. Passport Canada checks the eligibility of each guarantor against the appropriate membership roster. Retired professionals are only eligible if their name continues to appear on the roster (as well as life member in APEPEI's case). Engineers-in-training are not eligible.

There is no financial benefit to this trust; the guarantor must provide the service free of charge. Trust and respect are like that — intangible — but in this case they are at least demonstrable.



More Information:

Visit www.ppt.gc.ca/can/guarantor.aspx

Replacement of the Midgell River Bridge.... continued

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Traffic Re-routed onto Bridge



Placing Concrete Abutments

During the launching process, asphalt paving was being conducted on the approach road and the waterproofing membrane was being installed on the bridge deck. Once the bridge was in position, the final paving was conducted and the bridge was opened to through traffic once again. The length of road closure was 15 days for this portion of the work for a total of 18 days for the project. This is significant, since a project of this magnitude would undoubtedly caused a road closure lasting at least 5 to 6 months.

Horizontal Launching

What makes this project unique is the method in which the bridge was erected into its permanent location. Once the permanent abutments were in place, it was time to begin planning for the horizontal launching of the bridge into its final resting position.



Jacking Bridge Up



Placing Hillman® Rollers



30 tonne jack



Half way home



Finally resting on Pot Bearings



Applying Waterproofing Membrane

Once everything was ready, the bridge was closed to through traffic. The temporary approach fills were removed to the least extent possible in order to facilitate launching. The bridge was then jacked up, the temporary bearings removed, and jacked back down again onto four (4) Hillman® rollers at each end (total of 8) each having a capacity of at least 150 tonnes. The rollers were guided with the steel channels mention earlier. The weight of the bridge is approximately 750 tonnes.

The contractor cored a hole through the curtain walls on the north end of the bridge abutments and installed a 30 tonne jack at each end. The jacks were connected to a Dywidag® threaded rod, which connected to the bridge superstructure at the other end. The bridge was then “jacked” over 100 to 150 mm at a time. The whole jacking process took approximately four (4) days to complete. After which, the bridge was jacked up, the steel channel removed form the concrete bearing seat, the new pot-bearings were installed and the super-structure was lowered and connected to the bearings.

FINANCIAL

The project costs were estimated at \$ 3.6 million dollars for construction, with an additional \$60,000 for design.

The construction cost breakdown is as follows:

Steel superstructure	- \$ 1.1 Million
Concrete Deck	- \$ 0.3 Million
Concrete Abutments	- \$ 0.55 Million
Steel Reinforcement	- \$ 0.1 Million
Temporary Abutment	- \$ 0.4 Million
Environmental	- \$ 0.15 Million
Roadwork	- \$ 0.9 Million
<u>Miscellaneous</u>	- \$ 0.1 Million
TOTAL	\$ 3.6 Million

The costs construction was broken up between fiscal years, IE \$ 1.8 M in FY 2005/06 and \$ 1.8 M in FY 2006/07.

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Of note, construction of a temporary structure would have added approx. \$ 1.0 Million to the cost of the project, while rental of a Bailey bridge would have added \$ 0.7 M to the project cost (rental rate of \$50,000 per month over 13 months)

An important factor to note is the estimated user costs. While the Department does not explicitly look at user costs during estimating, we do review the potential impacts to users of the system. In this case, the detour was 17 km; which was considered too large an impact on users, thus the Department opted for the construction strategy stated above.

If the department did calculate user costs explicitly, it may look something like the following:

- Lets say that, on average, a vehicle will consume approx. 10 L / 100 km of fuel.
- For a 17 km detour, the average fuel consumption would be 1.7 L.
- Multiple by an average of 4200 vpd (both lanes) equals 7,140 L of fuel per day.
- Lets say that fuel costs averaged \$1.00 per L, this gives us \$ 7,140/day on fuel costs alone.
- If we were to conduct a 5 to 6 month detour, user costs for fuel alone would be \$ 7,140 / day x 7 days / week x 4 weeks/ month x 6 months . \$ 1.2 Million.
- The actual length of this project was 13 months, as we decided to span it over two construction seasons. This relates to a user fuel cost of \$ 2.6 Million

ENVIRONMENTAL

In all of our projects of this nature, we spend a great deal of time and effort in minimizing the environmental effects

of silt laden water run-off into our waterways. The Department has taken a very pro-active approach to ensure that environmental controls are specified in the contract documents and are adhered to on site.

In conjunction with this, there have been significant environmental savings by utilizing this form of bridge construction by the reduction of CO₂ emissions which would be caused from the lengthy detour.

CONCLUSION

In conclusion, this is the second such bridge launching the Department has undertaken, The first was in Murray River, PE.

The Department will look at other sites which may be suitable for this type of construction method; however, these tend to be site specific, as there are a few factors involved in making such a decision; such as, the availability of land, access for equipment to erect temporary facilities, length of detour, traffic volumes, etc.

The Department wishes to acknowledge the following companies for their hard work and dedication to the

Engineering Consultant:	CBCL Limited
General Contractor	HR Civil Contracting Limited
Heavy Civil Subcontractor	Island Coastal Services Limited
Steel Fabrication & Erection	Maritime Steel & Foundries Limited
Crane Services	A.W. Leil & Tim's Crane
Bridge Launching	Marid Industries Limited
Asphalt Subcontractor	Island Construction Ltd.

REPORTS ON-LINE

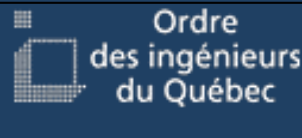
The following reports are located under the Publication Page of the APEPEI website (subheading Other):

- Consultation on Sustainable Development in Atlantic Canada (Final Report)
- A Strategy for Post Secondary Education and Skills Training in Canada

DID YOU KNOW?

*The tallest road bridge is the **Millau Bridge** over the River Tarn in the Massif Central mountains in France. It stands at over 300 m (984 ft) high- 23 meters taller than the Eiffel Tower.*





Collapse of the De la Concorde overpass: The Ordre des ingénieurs du Québec welcomes the announcement of a public inquiry into its cause

Montréal, October 1, 2006 - The Ordre des ingénieurs du Québec is deeply grieved by the deadly toll that resulted from the partial collapse yesterday in Laval of the De la Concorde overpass on Highway 19, and welcomes the announcement that a public inquiry will be held to shed light on the causes of this tragic occurrence.

Zaki Ghavitian, Eng., president of the Ordre des ingénieurs du Québec, declared the Order's distress at this exceptional event and the circumstances surrounding it. "We are saddened for the victims, those injured and their families, and we would like to extend our heartfelt sympathy to them."

Mr. Ghavitian was also anxious to emphasize the extraordinary work that had been carried out, under extremely difficult conditions, by all the members, including engineers, of the rescue teams whose operations enabled the clearing of the two vehicles from the debris the night of the collapse. "I wish to salute their courage and professionalism."

Although it is premature to draw any conclusions about the causes of this disaster, many questions certainly must be considered. Mr. Ghavitian explained that "The Order

will, of course, do its work very thoroughly, within the framework of the laws governing us. We will rely on the public inquiry ordered today by the Québec government, the coroner's inquest and the findings of the investigations that will be conducted to clarify the circumstances around this event."

As concerns the work of the Order in a situation like the one that has now arisen, it should be remembered that if the Order's syndic has reason to believe that an engineer has violated the Code of Ethics, a disciplinary process is set in motion with the initiation of an investigation. An engineer's work is guided by the Engineers' Code of Ethics, as well as the various regulations contained within the Engineers Act and the Professional Code, and the Order must see to it that all engineers respect their provisions.

As engineers' field of practice involves structures like that of the De la Concorde overpass, the Order can consider a number of avenues, particularly in relation to the illegal practice of engineering, the checking of qualifications and ethical behaviour.

Engineers Call for Sustained Infrastructure Funding



CANADIAN COUNCIL OF PROFESSIONAL ENGINEERS
CONSEIL CANADIEN DES INGÉNIEURS

October 4, 2006, Ottawa (Ontario) – The overpass collapse in Laval, Quebec, which killed five, strengthens the engineering profession's call for a long-term approach to infrastructure funding. "It is unfortunate that it takes events such as that of September 30 to get Canadians to pay attention to issues such as infrastructure renewal and maintenance. Our thoughts are with the families of the victims," says Marie Lemay, P.Eng., ing., Chief Executive Officer for the Canadian Council of Professional Engineers (CCPE). "Hopefully this tragic event did not happen in vain and we, as a society, will learn from it and make the conscious decision to re-invest in infrastructure using a long-term, holistic approach as well as life-cycle management guidelines."

Ms. Lemay added that long-term adequate financial resources are needed from all levels of government in order to support a sustainable and planned approach over the full life cycle of any infrastructure project.

For the past three years, CCPE has taken a leadership role in calling for the creation of a National Round Table on Sustainable Infrastructure (NRTSI), an independent, multi-stakeholder, advisory body that aims to facilitate decision-making on sustainable infrastructure.

With an initial focus on public works, the NRTSI would bring together an important, yet highly diverse community of more than 35 representatives of organisations, including all orders of government.

"The NRTSI can provide a broad perspective that can draw upon the expertise of a range of stakeholders from both inside and outside government," noted Ms. Lemay.

Ms. Lemay added that there is a need to re-educate Canadians on the importance of infrastructure maintenance and the urgent need to invest in renewing the roads, sewers, and water systems on which we rely daily. Construction of newer buildings and roads are often signs of economic prosperity in a community. Infrastructure renewal is not as appealing to tax payers who often only see continuous increase in their taxes.

CCPE is the national organization of the 12 provincial and territorial associations/ordre that regulate the practice of engineering in Canada and license the country's more than 160,000 professional engineers.



APEPEI GOLF TOURNAMENT WINNERS

Despite the blustery conditions, 62 golfers challenged Stanhope Golf Course on Friday, September 29th.

The winning team was **Doug Matheson, Chad MacCallum, Ross Wheatley and Adam MacKenzie** with an amazing score of 62.

Ladies Longest Drive winner was **Maria Burge, P.Eng.**

Ladies Closest to Hole winner was **Krista Gill, EIT**

Men's Longest Drive winner was **Steve Champion, P.Eng.**

Men's Closet to the Pin winner was **Blair MacLauchlan, P.Eng.**

Many thanks to the following for providing great prizes!

- Stewart McKelvey
- PEI Business Development
- ADI Limited
- Island Coastal Services
- CBCL Limited
- Jacques Whitford
- Atlantic Turbines
- MCA Consultants
- Delcom Engineering Limited
- Diversified Metal Engineering Limited
- Stanhope Golf Course

WANTED: HOCKEY PLAYERS!

The Engineering Marvels have confirmed their ice time for this season.



They have back at the **CARI center, Sunday evenings at 10:15 pm.**

They plan to start **Sunday Nov 12** and play until the end of March.

All skill levels are welcome! Full gear is the only requirement and they play with no slap shots.

Come out and meet some other engineers you might not otherwise have a chance to meet.

This year's annual tournament is set for Newfoundland.

For more information, contact:

Aaron MacDonald, P.Eng

email: aaronmac@city.summerside.pe.ca

2006-2007 Scholarship Summary

CEMF scholarships are awarded based on leadership, community involvement and extra-curricular activity. High marks or grade average is not a criterion. All winners are expected to act as role models and mentors to youth and especially to young women. In that regard, they are required to make a presentation to at least one pro-university audience, promoting engineering as a career choice for women.

The Claudette MacKay-Lassonde Graduate Engineering Scholarship

One \$15,000 Scholarship is offered annually by CEMF to a woman enrolled full-time in a graduate engineering program at the Ph.D. level of study. This Scholarship is meant to encourage women to act as mentors, to remain as university teachers in engineering and to recognize the contribution they bring to society through research, teaching and community involvement.

The Inco Limited Masters Engineering Scholarships

In partnership with CEMF, Inco offers four annual \$10,000 Scholarships for women enrolled full-time in a mining or metallurgical engineering or related engineering program at the master's level. Successful applicants may be offered summer employment at one of Inco's Canadian facilities.

CEMF Undergraduate Engineering Scholarships

CEMF awards five \$5,000 Undergraduate Engineering Scholarships annually to women enrolled in an accredited engineering program in Canada. A scholarship is awarded in the British Columbia, Prairie, Ontario, Quebec and Atlantic regions.

The AMEC Scholarships in Engineering

In partnership with CEMF, AMEC offers one \$10,000 scholarship to a female student studying engineering in Canada at the master's level of study. Summer employment may also be offered. In addition, AMEC also offers one \$5,000 scholarship to a Canadian Aboriginal woman studying engineering in an accredited program.

IBM Canada Undergraduate Scholarship in Engineering

IBM Canada offers two \$2,500 scholarships to be awarded to female students enrolled in accredited electrical, computer, software or computer systems design engineering program in their second or third year of study.

P.O. Box 370, 1-247 Barr Street, Renfrew, Ontario K7V 1J6
Toll Free: 1-866-883-2363 www.cemf.ca

Welcome

New Member
Jonathan Robert Fraser, EIT

ADVERTISING RATES

The A.P.E.P.E.I. Newsletter is a 4-16 page publication. Due to space limitations, all requests for advertising will not necessarily be accepted. Advertising rates for accepted advertisements are as follows:

Full Page	7 1/2" x 10"	\$250.00
Half Page	3 3/4" x 10" or 7 1/2 x 4"	\$125.00
One-Third Page	2 1/3" x 10" or 3 1/3" x 7 1/2"	\$100.00
Quarter Page	3 3/4" x 4 3/4"	\$75.00
Business Card	3 1/2" x 2"	\$50.00

The Newsletter is published 5 times annually with a circulation of approximately 310. The deadlines for submission are: February 1, April 15, August 15, October 10, and December 1. Ads (except for inserts) are to be submitted in an electronic format; .EPS or .PDF files are preferred. To submit a request for advertising, contact the Association office in writing with details of the ad content, by fax at (902) 566-5551, or by e-mail at apepei@apepei.com.



THIS IS YOUR EXPERTISE.
RETIREMENT PLANNING IS OURS.

Whatever your retirement dreams may be, you can benefit from consolidating your retirement financial planning with the CCPE-sponsored Financial Security Program administered by Group Retirement Services. You'll enjoy the advantages of lower-than-market retail fees while tapping into a comprehensive investment selection. With enhanced interest rates and flexible solutions through personalized financial advice, we have everything you need to make the right plan for what's ahead. Go to www.ccpe.ca/e/prog_services_4.cfm or call 1-800-724-3402 and get us working for you.

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