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The Evolution of Asset Management L'évolution de la gestion des actifs

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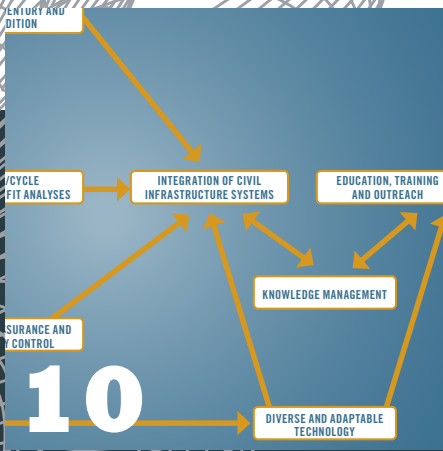
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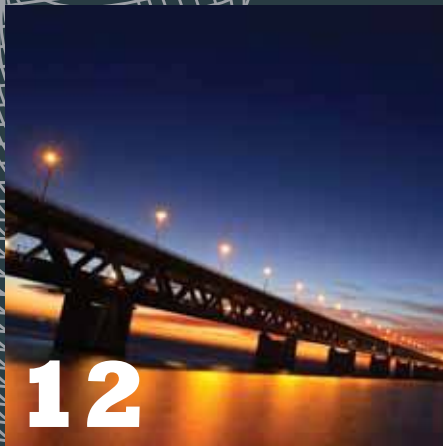
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FROM THE EDITORS / MOT DES RÉDACTEURS

LOUISE NEWMAN LOUISE@CSCE.CA

GUEST EDITOR: REG J. ANDRES P.ENG., FCSCE



It has been 7 years since the Civil Infrastructure Systems Technology Road Map (TRM) was published by four (4) national associations – CSCE, CPWA, NRC and CCPE (now Engineers Canada). The TRM or the Road Map, as it became known, was a “call to action”. It identified the challenges and the technological needs that would influence the infrastructure community during the subsequent 10 years. The goal was to facilitate the introduction of new technologies and improved management practices that would ensure the sustained prosperity of Canadian municipalities. This vision was captured in a national consensus of 10 primary objectives and 10 recommendations for action.

This publication is dedicated to the efforts of the TRM visionaries and provides an insight to what has happened to the objectives and recommendations over the past 7 years. The achievements of the infrastructure community are highlighted in this issue of CIVIL from a number of perspectives. A general overview of the TRM objectives suggests we have made some good progress, but there is still much to be done to meet the original Road Map objectives. A review of the results of implementing the recommendations demonstrates that remarkable achievements are possible when the efforts of a disparate and diverse community of infrastructure stakeholders are consolidated and focused on a common vision. Perhaps the best representation of what has happened to the TRM “vision” over the past 7 years is reflected in the tangible changes that have occurred within one particular community (Fredericton) as a case study.

We would like to challenge the infrastructure community one more time. We have survived a global recession. We have progressed a long way from where we were when discussions originated the concept of

Il y a maintenant 7 ans que la Carte routière technologique (CRT) pour les systèmes d'infrastructures civiles a été publiée par quatre (4) associations nationales : la SCGC, l'ACTP, le CNR et le CCI (devenu Ingénieurs Canada). La Carte routière était un appel à l'action. Elle cernait les défis et les besoins technologiques qui allaient influencer le monde des infrastructures au cours des 10 prochaines années. L'objectif consistait à faciliter l'introduction de nouvelles technologies et de meilleures pratiques de gestion susceptibles d'assurer la prospérité des municipalités canadiennes. Ce programme a donné lieu à un consensus national sur 10 objectifs de base et 10 recommandations d'action.

Ce numéro est consacré aux efforts des créateurs de la CRT et donne une idée de ce qui est arrivé aux objectifs et aux recommandations au cours des 7 dernières années. Ce numéro de L'ICC porte sur les réussites du secteur des infrastructures. Un survol des objectifs de la CRT indique qu'il y a progrès, même s'il reste beaucoup à faire pour atteindre les objectifs. Une étude des résultats de la mise en œuvre des recommandations prouve qu'il est possible d'obtenir de remarquables résultats lorsque les efforts d'un groupe varié et disparate d'intervenants sont coordonnés en vertu d'un idéal commun. Le meilleur exemple de ce qui est arrivé à l'idéal exprimé par la CRT au cours des 7 dernières années est peut-être la série de changements qui se sont produits au sein d'une communauté précise (Fredericton) qui a fait l'objet d'une étude de cas.

Nous aimerions lancer un défi de plus aux personnes qui s'occupent d'infrastructures. Nous avons survécu à une récession mondiale. Nous avons fait beaucoup de chemin depuis les premières discussions sur la première Carte routière. L'idée de créer une unité de voix et d'action pour tout ce

“It is time to re-visit the road map and this time, to take it to another level...”

« Il est cependant temps de revoir la CRT et de lui donner une nouvelle dimension... »

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the first Road Map. The vision for a unity of voice and action representing the broad, disparate and diverse aspects of infrastructure is still a need as strong as it was 7 years ago. It is time to re-visit the road map and this time, to take it to another level by incorporating not just “technology” but the broader concept of an “infrastructure road map”, a national action plan for infrastructure.

We thank all those who contributed to this issue and, as always, we welcome your comments. ■

suite de la page 4

qui concerne l'univers vaste et disparate des infrastructures demeure une nécessité aussi pressante qu'il y a 7 ans. Il est cependant temps de revoir la CRT et de lui donner une nouvelle dimension en y incorporant non seulement le volet technologique mais aussi le volet plus vaste de « carte routière d'infrastructures », un véritable plan d'action national en matière d'infrastructures.

Nous remercions toutes les personnes qui ont contribué à ce numéro, et, comme toujours, nous attendons vos commentaires. ■



*Our very best wishes for
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I hope that 2010 has been a successful year for everyone and I would like to take this opportunity to wish you all an enjoyable holiday season. As 2011 looms closer, it is time to reflect on the past – the lessons learned – and set our goals for the future.

2010 was certainly a year of change for CSCE as we worked through our visioning exercise and rolled out our new vision 'Leadership in Sustainable Infrastructure'. However, a new vision does not single-handedly change an organization, nor does the change or new vision become a reality quickly or without a lot of hard work by everyone. During 2011, as CSCE develops its road-map for the new vision, I expect members and the public will start to see changes in CSCE's behavior and its messages both in terms of the quantity of messages and the content of the message. CSCE as a representative voice of Civil Engineers in Canada needs to be a strong voice for advocating the proper attention and resources to be allocated to infrastructure – the infrastructure that provides our quality of life. The single biggest challenge that CSCE faces in 2011 is to develop the correct message and to consistently communicate that message to the public and government.

This issue of the Canadian Civil Engineer, with a theme of 'The Evolution of Asset Management – where are we and where are we going?', is an excellent example of communications and programs that are aligned with CSCE's new vision. 'The Evolution of Asset Management' is all about achieving sustainable infrastructure. It is impossible to answer the question 'where are we going?' without demonstrating leadership. As you read through this edition of the CCE, you will notice that the focus of the articles is consistent with our new vision.

As we start 2011, there is much work to be done to put us on the road to our vision and it won't all necessarily be easy. During 2011, I look forward to working with everyone and serving our profession.

In closing, I wish to thank all of the CSCE volunteers and the headquarters staff for their dedication and hard work during 2010. It is only through their untiring dedication that CSCE can progress on the road to success.

I am committed to working hard, with the ability that I have, and with your help will move the CSCE towards its vision of 'Leadership in Sustainable Infrastructure'. ■

J'espère que l'année 2010 a été une excellente année pour chacun de vous, et je profite de l'occasion pour vous souhaiter de belles fêtes. À l'aube d'une nouvelle année, il est bon de réfléchir sur le passé, sur les leçons à retenir et sur nos objectifs pour l'avenir.

Pour la SCGC, 2010 a été une année de changement au cours de laquelle nous avons repensé notre vision et élaboré notre nouvel idéal de « Leadership en matière d'infrastructures durables ». Toutefois, ce nouvel idéal ne suffit à lui seul à changer un organisme, et un changement ou un nouvel idéal ne devient pas une réalité du jour au lendemain sans qu'un peu tout le monde ne mette la main à la pâte. En 2011, pendant que la SCGC se donnera un plan pour réaliser son idéal, je m'attends à ce que le public commence à voir du changement dans le comportement et les messages de la SCGC, qualitativement et quantitativement. À titre de représentante des ingénieurs civils au Canada, la SCGC a besoin d'une voix forte pour imposer l'attention et les ressources qu'exigent ces infrastructures qui assurent notre qualité de vie. Le plus gros défi de la SCGC en 2011 sera de mettre au point le bon message et de le communiquer en permanence au public et au gouvernement.

Ce numéro de L'ICC, dont le thème est « l'évolution de la gestion des équipements – où en sommes-nous et où allons-nous? », est un bel exemple de communications et de programmes axés sur le nouvel idéal de la SCGC. « L'évolution de la gestion des actifs » traite de la façon d'en arriver à des infrastructures durables. On ne peut répondre à la question « Où allons-nous? » sans faire preuve de leadership. En parcourant ce numéro, vous remarquerez que la teneur des articles témoigne de notre nouvel idéal.

À l'aube de l'an 2011, il nous reste beaucoup à faire pour atteindre notre idéal, et ce ne sera probablement pas facile. C'est pourquoi je compte sur tous et chacun pour faire un effort pour la profession.

En terminant, je remercie les bénévoles et les permanents de la SCGC pour leur travail et leur dévouement pendant l'année 2010. C'est grâce à ce dévouement que la SCGC peut progresser.

Avec votre aide, nous parviendrons à incarner l'idéal de la SCGC, qui est d'exercer « le leadership en matière d'infrastructures durables ». ■

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The 2010 Award of Academic Merit from the Transportation Association of Canada recognizes individuals who have made a long-term contribution to the advancement of academic research and to the development of transportation leaders of the future. This year's recipients are Dr. Said Easa, FCSCE, CSCE Vice-President (Administration Coordinating Council), Director of Quality Assurance, Faculty of Engineering, Architecture and Science at Ryerson University, and Dr. Tarek Sayed, MCSCE, Professor and a distinguished university scholar, Department of Civil Engineering at the University of British Columbia.

The 2010 Canadian Transportation Awards were presented at the closing banquet of the Transportation Association of Canada's annual conference in Halifax, Nova Scotia, on September 29, 2010.

The Transportation Association of Canada is a national association with a mission to promote the provision of safe, secure, efficient, effective, and environmentally and financially sustainable transportation services in support of Canada's social and economic goals. ■



TOP: Said Easa / **RIGHT:** Tarek Sayed; with Anita Biguzs, Associate deputy minister of transport, Infrastructure and communities for Canada; Ray Mantha, executive director of provincial highways management, Ministry of transportation of Ontario, and vice-president of TAC.



Second International Conference on Waste Engineering and Management (ICWEM)

TODD CHAN PH.D., FCSCE, CHAIR CSCE IAC

The second ICWEM, jointly organized by the China Civil Engineering Society (CCES), the Canadian Society for Civil Engineering (CSCE), the Hong Kong Institution of Engineers (HKIE) and Tongji University (local organizer) was held October 13 to 15, 2010 at the Sino-French Conference Centre at Tongji University in Shanghai, China. The conference goals were to (1) to advance the understanding and applications of engineering with respect to sustainable development, environmental engineering and management, (2) to advance integrated approaches to waste management for different waste streams and (3) to promote



ABOVE: ICWEM 2010

the exchange of technical, scientific and professional knowledge on waste engineering and management.

About 150 delegates participated in this International Conference with about 40 delegates coming from outside of China, including delegates from 11 countries: Canada, USA, Japan, Australia, Brazil, Germany, etc. At the opening



ABOVE: Prof. Ghani Razaqpur

ceremony, Prof. Ghani Razaqpur, CSCE Past President gave a welcoming speech on behalf of the CSCE, together with senior representatives from the HKIE and CCES. As well, Prof. Razaqpur presented an invited keynote lecture in the plenary session on October 13.

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This column is called “Profiles” because it gives me the opportunity to focus on CSCE activities that exemplify our Vision 2020 – Leadership in Sustainable Infrastructure. I have three initiatives to introduce you to in this issue.

1 First, I want to tell you about the work of SNC Lavalin in Haiti. Shortly after the January, 2010 earthquake, CSCE extended an offer to Lawrence Cannon, the federal Minister of Foreign Affairs, to assist in developing earthquake- and hurricane-resistant building codes for Haiti. At almost the same time, our corporate member SNC Lavalin was already engaged in exactly that task, through its Haitian affiliate LGL S.A. On page 22, Denis Beaulieu, past president of CSCE (2002–03), reports on the work he has been doing as a consultant to SNC Lavalin in Haiti. Denis has completed his assignment but there is essential follow-up work to be done. In particular, local builders and inspectors need to be trained in the safer building techniques Denis has recommended. CSCE will be developing proposals to help with this work.

2 On October 12, I invited non-student members of CSCE to volunteer as mentors for Engineers Without Borders. EWB has a cadre of committed young field engineers who could use the guiding hand of experience – the kind of experience that CSCE members have in abundance. EWB identified a need for technical assistance in relation to agricultural production, distribution and marketing as well as general managerial advice, education and training for a project in Ghana. Lauren Quan of the Schulich School of Engineering at the University of Calgary reported on the Ghanaian project in the last issue of CIVIL. I will keep you advised on this initiative but please contact me directly if you would like to act as a mentor to EWB.

3 Turcot Interchange: The Turcot Interchange links three major Montreal highways. Built in time for Expo ‘67, it was designed for a maximum of 50–60,000 vehicles per day. The interchange currently handles 290,000 vehicles daily into and out of downtown Montreal. It is on the verge of becoming unsafe. Two

visions are competing for how to rebuild the Turcot Interchange – one from the City of Montreal and one from Transports Québec. One vision would see an expansion of the interchange to handle more vehicles; the other favours public transit and would force a reduction in personal vehicle traffic. These two visions have vastly different capital and maintenance costs and would result in different benefits in terms of potential social, environmental and economic impacts. CSCE has approached the City and the Province with an offer to create a panel of experts under the leadership of CSCE past president Saeed Mirza (1985–86) to review both proposals and to compare them on an equal basis – using an interdisciplinary team and full cost/benefit analysis. I will keep you up to date on this offer.

My point with respect to these initiatives is that they are all complicated and difficult and not purely technical in nature. They are as much political challenges as they are technical challenges. If, however, civil engineers want to be leaders in the provision of sustainable infrastructure – if we want to be more than technicians – we must be willing to break out of the design/build role and contribute to the development of long term, informed solutions to today’s challenges.

No one profession has all of the skills needed to conceptualize and then manage these kinds of projects but I strongly believe that civil engineers have a better perspective to bring to bear than any other professionals. If we don’t lead in these circumstances, who will? I would rather that civil engineers be entrusted to bring together all of the disciplines necessary to create truly sustainable infrastructure than the often short sighted opportunists we normally see standing at the ribbon cutting ceremonies. These leaders-by-default take credit for the projects we build but they are nowhere to be found when the project fails, needs to be replaced or results in some horrible social or environmental disaster.

Civil engineers are not going to be given a larger role in building Canada’s future unless we demonstrate the ability to take on *continued on page 9*

SUSTAINABILITY: NEW PERSPECTIVES FOR MANAGING INFRASTRUCTURE

Doing what is effective vs doing what is expedient

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Cette chronique porte le titre « Profils » parce qu'elle me donne l'occasion de traiter des activités de la SCGC qui témoignent de notre objectif d'assurer « le leadership en matière d'infrastructures durables ». Dans ce numéro, je vais vous parler de trois initiatives.

1 En premier lieu, je veux vous parler du travail effectué par SNC Lavalin à Haïti. Peu après le séisme de janvier 2010, la SCGC a offert au ministre des Affaires extérieures, Lawrence Cannon, d'aider à élaborer pour Haïti des codes de construction tenant compte des séismes et des ouragans. Presqu'au même moment, SNC Lavalin, qui est une entreprise membre de la SCGC, s'était déjà attaqué à ce travail, par le truchement de sa filiale haïtienne LGL S.A. À la page 22, Denis Beaulieu, ancien président de la SCGC (2002–2003), parle du travail qu'il a fait à titre de conseiller auprès de SNC Lavalin à Haïti. Denis a terminé sa mission, mais il y a encore un suivi à faire. Il faut notamment que les constructeurs et les inspecteurs locaux soient initiés aux bonnes techniques de construction recommandées par Denis. La SCGC élaborera des propositions en vue de l'aider à faire ce travail.

2 Le 12 octobre, j'ai invité des membres de la SCGC à faire du bénévolat comme mentors pour Ingénieurs sans frontières. Ingénieurs sans frontières est une équipe de jeunes ingénieurs de chantiers engagés qui pourraient bénéficier des conseils de gens expérimentés, de ce genre de personne que l'on retrouve au sein de la SCGC. Ingénieurs sans frontières a identifié un besoin d'assistance technique dans les domaines de la production, de la distribution et de la commercialisation de produits agricoles, ainsi que dans la gestion en général et la formation pour un projet au Ghana. Lauren Quan, de la Schulich School of Engineering, à l'Université de Calgary, a parlé du projet ghanéen dans le dernier numéro de L'ICC. Je vous tiendrai au courant de ce dossier, mais si vous êtes intéressé à agir comme mentor pour Ingénieurs sans frontières, prenez contact avec moi directement.

3 L'échangeur Turcot : l'échangeur Turcot relie trois grands axes de circulation de Montréal. Construit pour l'Expo '67, il avait été conçu pour un maximum de 50–60 000 véhicules par jour. L'échangeur assure présentement le passage de 290,000 véhicules par jour qui entrent ou sortent de Montréal. Il est sur le point de devenir dangereux pour la circulation. Deux conceptions s'affrontent pour la reconstruction de l'échangeur Turcot : celle de la ville de Montréal et celle de Transports Québec. L'une d'elles se traduit par une expansion de l'échangeur pour permettre le passage de plus de véhicules, tandis que l'autre privilégie le transport en commun et imposerait une diminution de la circulation de voitures de particuliers. Ces deux solutions comportent des coûts d'investissement et des frais d'entretien bien différents et entraîneraient des avantages bien différents en termes d'impacts sociaux, environnementaux et économiques. La SCGC a offert à la ville et à la province de créer un panel d'experts, sous le leadership de l'ancien président de la SCGC, Saeed Mirza (1985–86), pour étudier les deux projets et les comparer selon des critères égaux, à l'aide d'une équipe multidisciplinaire et d'une analyse coût/bénéfice. À suivre!

Mon idée, à propos de ces initiatives, c'est qu'il s'agit de dossiers très complexes et difficiles, et dont la nature n'est pas strictement technique. Les défis sont autant d'ordre politique que d'ordre technique. Toutefois, si les ingénieurs civils tiennent à être des leaders en matière d'infrastructures durables, si nous tenons à être plus que des techniciens, nous devons être prêts à dépasser notre rôle de concepteur/constructeur et contribuer à l'élaboration de solutions éclairées, à long terme, pour les défis contemporains.

Aucune profession n'est en mesure d'offrir toutes les compétences exigées par la création et la gestion de ces projets, mais je crois fermement que les ingénieurs civils sont en mesure d'offrir un meilleur éclairage que tout autre professionnel. Dans ces circonstances, qui exercera le leadership si nous ne le faisons pas? Je préfère voir les ingénieurs civils exercer la responsabilité de réunir toutes les disciplines nécessaires pour

créer des infrastructures vraiment durables plutôt que d'y voir les opportunistes habituels à courte vue que l'on voit lors des cérémonies de coupage de rubans. Ces leaders-par-défaut prennent le crédit pour des travaux que nous faisons, mais ils disparaissent dès que l'ouvrage subit des échecs, doit être remplacé ou provoque d'horribles catastrophes pour la société ou l'environnement.

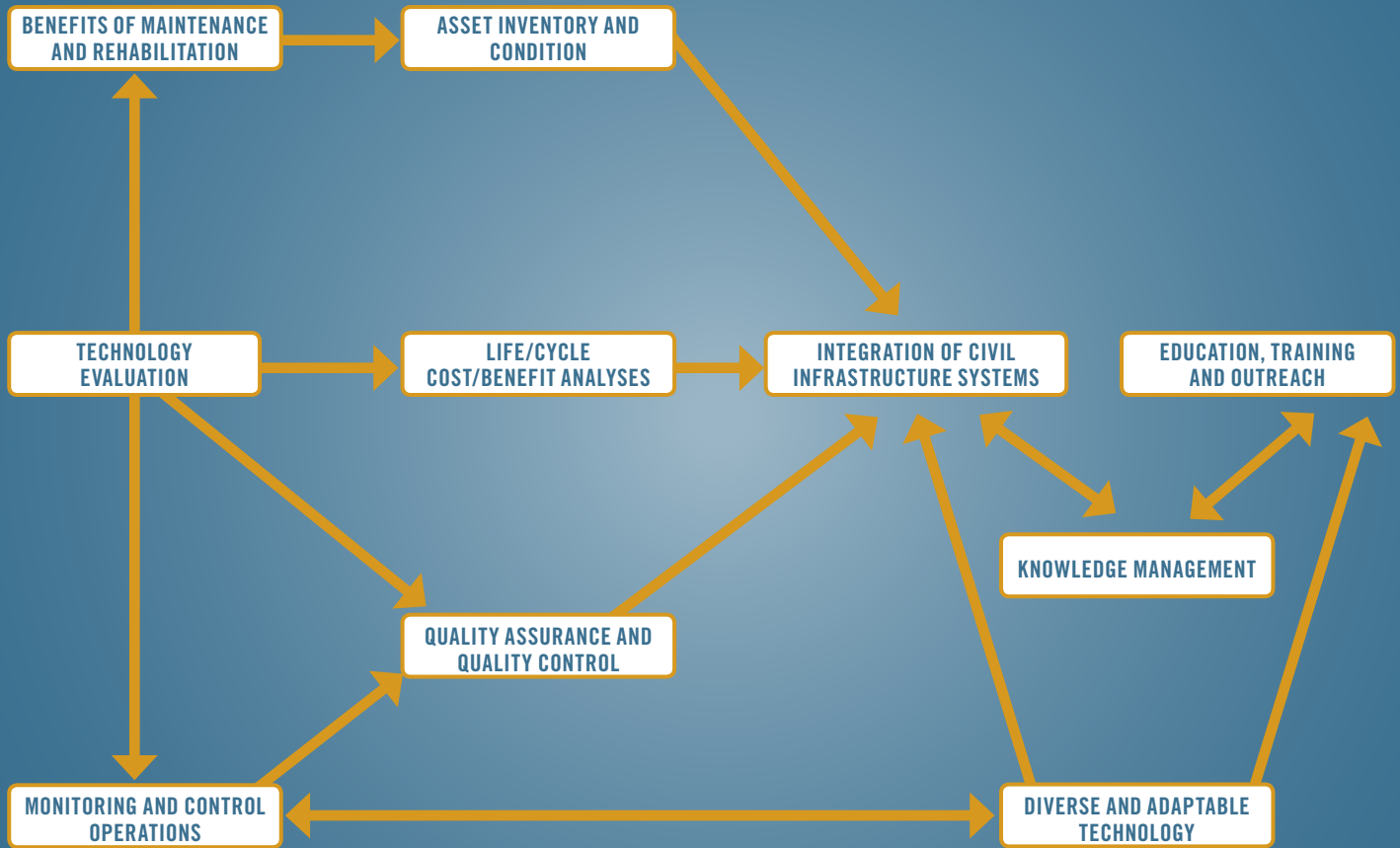
On n'accordera pas aux ingénieurs civils un rôle élargi dans la construction du pays à moins que nous fassions la preuve que nous sommes capables d'en faire plus. Nous ne pouvons agir comme des leaders et continuer d'accepter le rôle technique limité qui nous est généralement confié. L'une des stratégies évidentes dans ce domaine consiste à permettre aux ingénieurs civils de se faire entendre avant même que les critères de conception de base pour les grands projets d'infrastructure ne soient édictés par nos politiciens. J'entends bien reparler de ce thème au cours des mois et des années à venir.

Qu'en pensez-vous? J'attends vos commentaires. ■

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more. We cannot be leaders while accepting the limited technical roles we are normally given. One obvious strategy is for civil engineers to be heard before the basic design criteria for major infrastructure projects are handed down by our politicians. I intend to develop this theme over the coming months and years.

What do you think? I would like to hear from you. ■



Dr. Guy Félio P.Eng.
Infrastructure Strategies & Research Inc.

The Civil Infrastructure Systems Technology Road Map – Are We Reaching its 2013 Vision?

It seems like yesterday that the 2003–2013 infrastructure technology road map was presented to the Deputy Head of Infrastructure Canada, Mr. André Juneau, at the CSCE's annual convention in Moncton. The sponsors of the project, CSCE¹, Engineers Canada², CPWA³ and NRC⁴ were enthusiastic when the report was well received by the Federal Government and all the stakeholders that had participated in its preparation.

The road map was, and still is, an invitation to action, to mobilize resources in order to achieve a series of objectives to improve the planning, design, construction, maintenance and management of Canada's infrastructure. These objectives are illustrated below.

To achieve these objectives, the road map recommended actions to be undertaken by stakeholders. The first recommendation called for the creation of a National Round Table for [sustainable] Infrastructure (NRTSI) that would develop a National Infrastructure Action Plan. Engineers Canada took the lead on this initiative, bringing together public and private interests to establish committees and a financial and governance plan. Several provinces and territories, universities, municipalities, public utilities, national and regional associations, and other non-governmental organizations participated in a number of meetings to define the table's action plan. The NRTSI also was provided funding for a joint project with the NRCC to create a framework of

The road map was, and still is, an invitation to action, to mobilize resources in order to achieve a series of objectives to improve the planning, design, construction, maintenance and management of Canada's infrastructure.

indicators for the condition and performance of core public infrastructure [Model Framework for the Assessment of the State, Performance and Management of Canada's Core Public Infrastructure published by the NRTSI and NRC in May 2009]. However, even though several provinces and a number of organizations proposed to provide some financial support to the NRTSI, funding for the table's secretariat could not be secured from the Government of Canada.

After close to six years of leading the initiative, Engineers Canada passed the torch to CSCE and CPWA to jointly spearhead the NRTSI.

Did PS 3150 fulfill the second recommendation of the TRM, which is to develop a cost-effective mechanism by which data on infrastructure inventory and condition assessment are collected?

Originally, the intent was for the collection of data from municipalities and from other infrastructure owners as they applied to infrastructure programs. Meanwhile, the Public Sector Accounting Board (PSAB) developed new infrastructure [tangible capital assets] reporting requirements that came into effect. The Round Table had, through the National Asset Management Working Group (NAMWG), already commented on the draft of the PS 3150 standard. However, it was evident that interactions between financial and engineering or public works groups on the subjects of asset accounting (and reporting) and asset management could be enhanced within municipalities.

NAMWG obtained in 2009, through the NRTSI, funding from Infrastructure Canada to establish the linkages between PS 3150 and asset management. The project was managed by CSCE and involved a National survey of 123 municipalities in all Provinces. The results, available at www.NAMWG-GTNGA.ca, show that linkages between asset accounting and asset management, and by extension asset financ-

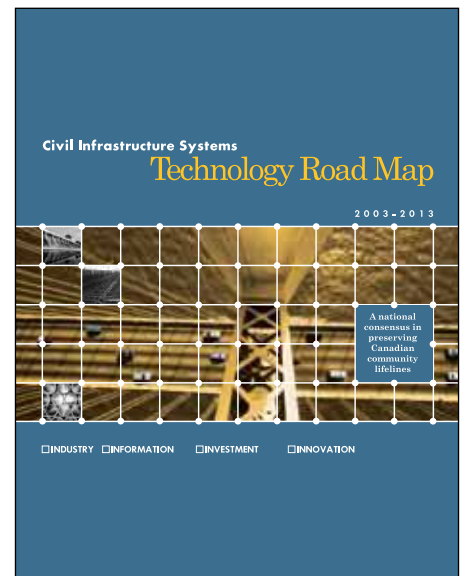
ing, could benefit from greater interactions between finance officers, accountants, engineers and public works departments.

Although municipalities that have produced tangible capital asset reports for 2009 will have inventory and condition information, there are no mechanisms I am familiar with that aggregate these data at a regional, provincial/territorial or national level. The PS 3150 reports thus only fulfill, at this time and in most cases, an accounting requirement.

In terms of the other eight recommendations that included research and innovation, curriculum development and the adoption of best practices by municipalities in the areas of for example, life-cycle analysis, there has been little movement at the national level. However, it is noteworthy that what has not happened nationally is happening in various regions of the country.

Over the past two years, the practitioners involved in and witnessing the decline of National activity, decided to place their energies at the local and regional levels. In British Columbia for example, a multi-stakeholder group was created – the Local Government Asset Management Working Group (LGAMWG) known now as Asset Management BC (see <http://www.asset-managementbc/> for details) which is modeled after the national NAMWG. The latest information is that Saskatchewan will soon have a similar group, and so will Alberta. In Quebec, the Centre of Expertise and Research for Infrastructure (French acronym CERIU – see <http://www.ceriu.qc.ca/> for details) has established a Committee to look at the feasibility of a similar group.

We have also seen the birth of a new association – the Canadian Network of Asset Manager (CNAM – see <http://cnam.ca/>) which is growing in membership and fills part of the gap left by the defunct *InfraGuide*.



ABOVE: Civil Infrastructure Systems Technology Road Map 2003–2013.

In conclusion, to the question “will the vision of the TRM for 2013 be fulfilled?” I would answer a qualified NO. Qualified because the spirit of the TRM has lived through the infrastructure community. The environment has evolved and where national efforts did not yield the expected results, regions took over. In three years hence, how many of the objectives will be achieved or underway is difficult to predict. However, while regional initiatives can flourish, there is a void at the National level that can only be filled with the presence and support of the Government of Canada. ■

REFERENCES

- 1 Canadian Society for Civil Engineering
- 2 At the time the Canadian Council of Professional Engineers – CCPE
- 3 Canadian Public Works Association
- 4 National Research Council Canada



2010

2011

2012

2013

2014

2015

Reg Andres P.Eng., FCSCE
R.V. Anderson Associates Limited

Infrastructure Management – Challenges for the Next Decade

ROAD MAP FOR ACTION

In 2003 the Civil Infrastructure Systems Technology Road Map (CIS-TRM) challenged the infrastructure community with ten (10) technology improvements identified in the form of objectives to be achieved over a 10 year period to 2013. The TRM was an invitation to action... to have an impact on the future. That was 7 years ago. A review of what has been achieved over the past seven years and what needs to be done to meet the objectives provides a challenge for the years ahead.

It would not be reasonable to attempt to create a comprehensive listing of achievements for each of the TRM objectives in that no single person or group has fully researched and identified all that has been accomplished across the various sectors of infrastructure. That being said the observations that follow provide a sense of how some of the technology objectives of 2003 have been advanced.

Some important steps forward have been made. However, much is left to be done to address all the objectives... to meet the challenge of sustainable infrastructure.

ADVANCEMENTS IN INFRASTRUCTURE MANAGEMENT TECHNOLOGIES

One of the significant achievements for infrastructure management in the past 7 years has been the new “tangible capital assets” financial reporting requirements introduced by the Public Sector Accounting Board. This is defined in Section 3150 of the PSAB Manual. As a result of this requirement, every public body across Canada has or is preparing an inventory and valuation of all owned assets. A key aspect of one of the TRM objectives has been addressed through this national initiative. The challenge going forward will be to develop a mechanism to assemble and make this information accessible nationally and or regionally for purposes of strategic planning.

With regards to condition, a new collaborative initiative of a number of national associations, including CSCE, is currently underway to develop a national infrastructure report card, similar to the familiar Infrastructure Report Card prepared by the American Society of Civil Engineers in the USA. This will provide some indication

ENVIRONMENTAL

2016

2017

2018

2019

2020

of the state or condition of Canada's infrastructure on a national scale.

Condition assessment processes at the local level within individual municipal organizations, are evolving as well. The collection of condition data is probably one of the more active current management practices across the country including the development of condition rating systems, new tools to collect condition data and assessment of this data to support investment decisions.

The knowledge of how much a preventative maintenance management system and/or investments in rehabilitation technologies actually increase the life expectancy of a particular asset is still very much a theoretical exercise. The life cycle assessment used to make decisions on increasing investments in O&M or in a particular rehabilitation technology for the most part, still rely on estimates in terms of changes in life expectancies as a result of implementing a particular technology or process. Often the best that can be done is to model the impact of different life expectancies as a sensitivity analysis to help make investment decisions. As more regular condition ratings are implemented over time, the actual feedback of this information from the field begins to define deterioration rates more accurately. This is an evolving area of infrastructure practice. The ability to accelerate this process is an important challenge over the next short period of time, given the importance of optimizing investments between capital and O&M.

Links between global sustainability objectives and triple bottom line – economic, environmental and social – measurement to the management practices of civil infrastructure systems are not clear-cut. While environmental action plans and economic action plans abound, significant work is required to integrate these and additional social factors into a decision framework that truly addresses sustainability in all its facets. Most recently the financial sustainability issue has been “front and centre” with the identification of “infrastructure deficits” clarifying, at least, the financial magnitude of our national infrastructure challenge. The identification of different financial mechanisms and innovation has been one result. The challenges and technology needs identified in the TRM have not changed... difficulties estimating intangible costs (e.g. environmental, social), methodologies to incorporate life-cycle costs into procurement systems and procedures, tools to determine factors that influence service life of assets... many areas still need to be addressed.

No single agency or association has taken on the task to search out, document and share the knowledge that has built up over time in the all sectors of the infrastructure business. Any documentation or publication of new knowledge is managed through dozens of trade and technical magazines and on-going workshop/training sessions. The end of InfraGuide™ was a significant loss in terms of addressing the knowledge management objective of the TRM. The



current CSA Municipal Infrastructure Solutions Program (MISP) has been initiated in recent years as a process to validate knowledge obtained from case studies and lessons learned in the infrastructure community. The ability to expand and sustain this type of program is an important question to establish on-going knowledge transfer mechanisms.

New and innovative technologies are being invented, tested and developed for implementation into mainstream infrastructure practice. It requires vision and a willingness to invest in R&D and pilot projects. This continues to be a challenge given the general risk aversion nature in the expenditure of public funds and a major hurdle to meet a number of the TRM objectives that require the development of new technologies for design, construction, maintenance and rehabilitation of infrastructure. The diversity and disparate nature of the infrastructure stakeholders continues to challenge the ability to develop new

Civil Infrastructure Systems Technology Road Map

OBJECTIVES for 2013

ASSET INVENTORY AND CONDITION

a reliable and accessible inventory of Canada's infrastructure, including location, condition and valuation, that supports integrated asset management

BENEFITS OF MAINTENANCE AND REHABILITATION

an accurate understanding of the relationship of proper maintenance and rehabilitation practices to the life expectancy of infrastructure

LIFE-CYCLE COST/BENEFIT ANALYSIS

integrate technical, economic, environmental and social factors into sustainable CIS investment decision-making processes that are based on life-cycle cost-benefit analyses

INTEGRATION OF CIVIL INFRASTRUCTURE SYSTEMS

manage infrastructure as a system of interdependent assets

TECHNOLOGY EVALUATION

tools to evaluate the field performance of existing infrastructure systems and to predict the performance of new technologies and materials

KNOWLEDGE MANAGEMENT

implement processes to properly manage and share knowledge

DIVERSE AND ADAPTABLE TECHNOLOGY

increase the diversity of and access to technologies for the design, construction, maintenance and rehabilitation of infrastructure, adapted to local conditions

MONITORING AND CONTROL OPERATIONS

implement technologies to optimize the operation and maintenance of infrastructure through real-time monitoring and control

QUALITY ASSURANCE AND QUALITY CONTROL

expand the use of tools and processes to improve the quality of design, construction, rehabilitation, management and operation of infrastructure systems

EDUCATION, TRAINING AND OUTREACH

ensure that educational, training and public outreach programs meet the needs of decision-makers, the workforce and the industry

technologies through multi-disciplinary teams in partnership with public, private and research groups to fast-track acceptance and use of new technologies.

AN INFRASTRUCTURE ROAD MAP

The advancements and technology improvements that have taken place since the 2003 Technology Road Map was introduced have been significant. Much has been learned in the past 7 years. A new perspective of the issues is emerging as we see things from a vantage point of knowing more than we did before. So where do we go from here? Is it time to update and expand the road map?

In the process of developing the 2003 Technology Road Map, a number of additional issues were identified as key elements of an infrastructure framework. The following issues were identified but not addressed at the time:

Policy and standards – including performance specifications, procurement and fiscal framework

Legislation – potential for regulating issues around valuations, accounting, life-cycle costing, etc.

Resources – involving financial, human, natural and material resources

These are the elements that establish a framework for a national policy that can respond to the needs of Canada's infrastructure needs. Together with the technology issues identified in the TRM, these need to be addressed in an integrated fashion. Such is the challenge going forward. There may be other issues that need to be added to this list.

Change inherently involves the addition of "new" and the abandonment of "old". New technologies emerge as old technologies obsolesce. New processes take over as old processes fade away. The resistance to this change will be the challenge to overcome and will be personified in a variety of seemingly impassible obstacles.

Not enough money

No political will or mechanism to increase revenues for infrastructure

Community willingness to pay/affordability

Not knowing how to convince senior management, Council and public to commit to change

Inability to move/change in face of unknown risk of who or what may need to be confronted

Lack of a national leadership structure that ties together a disparate and diverse stakeholder community that addresses the full scope and scale of infrastructure issues

The question is whether we are up to the challenge. The 2003 TRM was identified as an invitation to action. The infrastructure stakeholders responded in many ways with some important successes. A new "infrastructure" road map would confirm or re-direct the efforts of the infrastructure community as we continue our journey down this path. ■

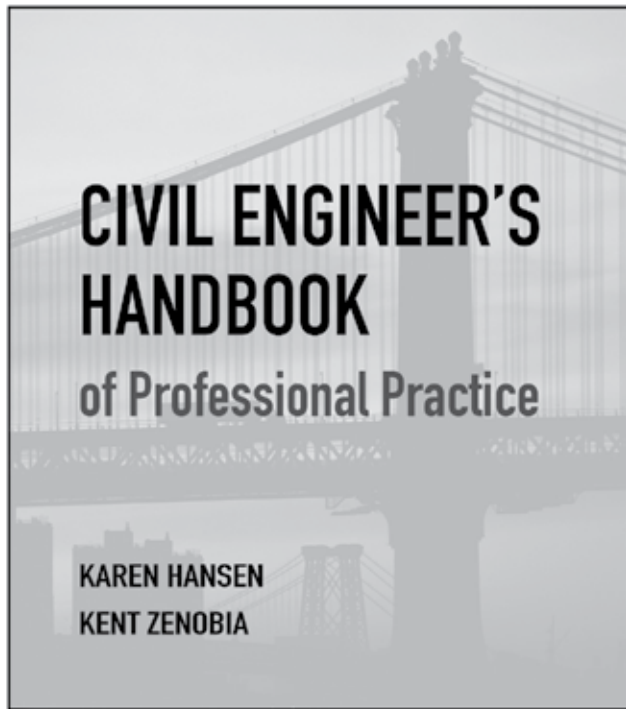
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All 93 accepted papers have been published in the conference proceedings (RILEM Proceedings PRO 73, ISBN: 978-2-35158-102-5), but only about half of the papers were verbally presented. The topics of the technical papers pertained to construction wastes, sustainable development of civil engineering, air quality and wastewater treatment technologies and management.

On October 15, 2010, a site visit was arranged for the conference delegates to the Shanghai EXPO 2010, which gave the delegates an appreciation of the marvellous engineering design of many pavilions at the EXPO Park.

ICWEM was successfully held and has given the CSCE much publicity among civil engineers from many countries and in particular those from China. The event has strengthened the relationship among the CSCE, the CCES in China and the HKIE in Hong Kong. ■

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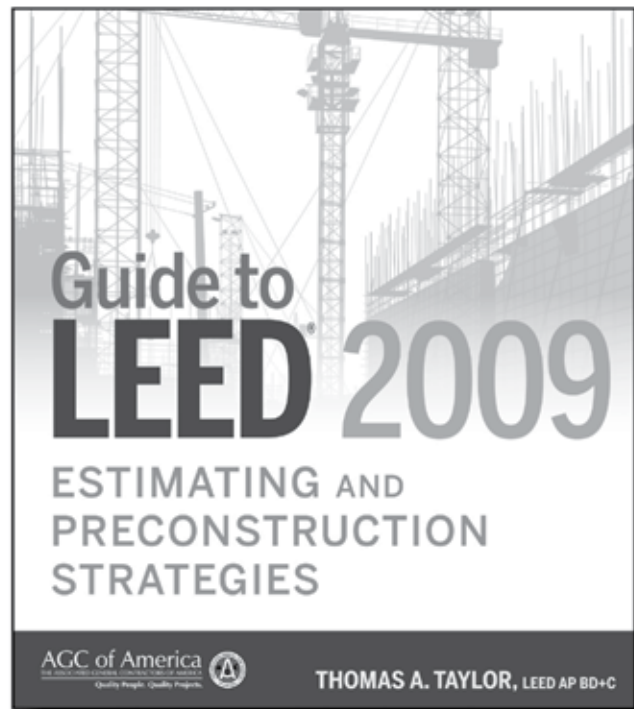
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Asphalt Resurfacing in Fredericton

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City of Fredericton

Infrastructure Management – Developments In Fredericton, N.B.


INTRODUCTION

Fredericton is a city of 50,000 people located in central New Brunswick on the banks of the St. John River. It is the capital city of New Brunswick and is the home to two universities, the University of New Brunswick and St. Thomas University. Fredericton has long enjoyed a reputation as being “clean and green” and it is also well known for its beautiful tree lined streets. In recent years, the City of Fredericton has developed more than 80 kilometres of scenic walking trails, which allow residents and visitors the opportunity to explore the City in a pastoral setting.

The municipal structure of the City of Fredericton is similar to that of other

municipalities in New Brunswick. There is a Mayor and 12 elected councillors. The staff leader is the City Administrator and there are 7 departments, namely Engineering & Public Works, Police, Fire, Community Services, Development Services, Finance, and Corporate Services. Services are provided to the public from City Hall, located in the downtown, as well as from several remote operation’s depots and service stations.

Many municipalities in New Brunswick have struggled with infrastructure issues and Fredericton is no different in this regard. There are many demands on the municipal budget and infrastructure is just one of those demands. Municipal



decision-makers (Mayor and Council) must balance the funding needs that are identified to them by staff and they must also try to satisfy the wishes of their constituents, most of whom would have no idea about the importance of funding infrastructure. Unless the need for infrastructure funding can be clearly articulated, it is common to see infrastructure spending relegated to the “back burner”. Over the years, Fredericton has gained the reputation as a City that pays attention to the maintenance of its physical assets.

Traditionally, the management of municipal infrastructure in Fredericton has been considered to be more the responsibility of the “engineers” or those directly responsible for the maintenance of the infrastructure and not really a corporate issue. Those directly responsible for infrastructure (engineers, building maintenance managers, parks managers, etc.) would not generally work that closely with those responsible for municipal budgets (treasurers and finance directors). In this arrangement, infrastructure would only become a major priority when failure was imminent or had already occurred. This is not an ideal way for infrastructure assets to be managed.

In New Brunswick, there is also a significant issue of sprawl development. As a result of a lack of planning outside of municipalities, it is possible to live immediately beyond the municipal boundaries and to use the various municipal services without paying for them. There has been significant growth in New Brunswick in the unincorporated areas outside of the municipalities. This puts more pressure on municipalities to keep their costs low in order to compete for housing starts. Keeping costs low may mean not spending enough to maintain and replace infrastructure according to best practise.

When resources are scarce, as they are in New Brunswick, proper management of infrastructure assets is even more critical and, at the same time, even more challenging. The theories about saving money by replacing infrastructure at the right time are well known. However, it is still a difficult task to actually secure funding at the right time to save infrastructure from failing and thereby avoid even more expensive repairs.

This article tells the City of Fredericton's infrastructure management story, starting in the late 1990s and continuing to 2010, both before and after becoming compli-

ant to the Public Sector Accounting Board (PSAB) 3150.

FREDERICTON'S MANAGEMENT PRACTICES BEFORE PSAB 3150

The City of Fredericton's current organizational structure was established in 1998 with a reorganization that resulted in fewer departments and which featured the grouping of the various internal services under a newly created Corporate Services Department. This structure allowed the City's operational departments to focus on their external customers, with Corporate Services providing the support services required by the operational departments. Soon after the reorganization, “City Hall” embarked on an ambitious initiative to become ISO 9001 certified for all of the City's services. The ISO process started in 2000 and the City became ISO registered in 2004, with re-registration in 2007 and again in 2010. ISO helped remove departmental silos and provided a quality management framework for the municipal organization.

In the late 1990s, the Engineering & Public Works Department developed an Infrastructure Renewal Program based on the life cycle of the various departmental infrastructure assets. The motivation for initiating this renewal program in the 1990s can be traced back to 1973, when Fredericton was amalgamated with a number of nearby smaller communities. Following the amalgamation, considerable effort was made to improve the infrastructure in the newly amalgamated areas and, as a result, the infrastructure in the older parts of Fredericton suffered. The infrastructure renewal program (late 1990s) provided a focus on replacing infrastructure that was now at the end of its useful life. The City had decent drawings and records of the infrastructure available and so it was relatively easy to establish the total amount of infrastructure in place and to develop yearly programs based on the life cycles for each infrastructure element. In time, this methodology for infrastructure renewal was picked up by other City departments.

Also at this time, emphasis was placed on developing the various GIS infrastructure layers. Initially, the Engineering & Public Works Department was responsible for the corporate GIS and had developed layers for both Engineering & Public Works and for other City departments. Responsibility

for corporate GIS was then placed with the City's IT Division, which allowed Engineering & Public Works to focus on its own departmental layers within an overall corporate context.

There was no corporate-wide strategy on financing or managing tangible capital assets. Each department made their “pitch” for budget funding based on their knowledge of their infrastructure assets and the condition of these assets. In the absence of an overall strategy for financing or managing existing infrastructure, it was difficult to balance the priorities of maintaining the existing infrastructure in good condition with creating the new infrastructure that the public was demanding. It was also difficult to evaluate competing infrastructure funding requirements from the various departments.

The selection of particular infrastructure renewal projects to be funded was not based on any sophisticated technical criteria. Rather, selection was based on doing the “worst first” for each particular type of infrastructure.

Fredericton developed a strong and very successful “green” initiative after the turn of the millennium. This initiative featured a greenhouse gas reduction campaign and a “Green Matters” marketing campaign to engage the community. The City was successful in reducing greenhouse gas emissions and in meeting the Federation of Canadian Municipalities' Partnership for Climate Protection Goals. One of the side benefits of the green initiative was that it focussed attention on the issue of sustainability. Being “green” and being sustainable go hand in hand. For a municipality to be sustainable, it must have sustainable infrastructure. This link between “green” and sustainability helped move the funding and management of infrastructure to a more prominent role on the City's overall corporate agenda.

PSAB 3150

Perhaps the most significant step to date in Fredericton's journey to improve infrastructure funding and management came with the City's move to PSAB 3150 compliancy in 2009. The City's Finance Department recognized the importance of moving to PSAB, initially because the Province of New Brunswick had indicated that all municipalities in New Brunswick would have to become PSAB compliant. The



ABOVE AND RIGHT: Installing new infrastructure in Fredericton.

Finance Department also saw the benefit of having a comprehensive understanding of all of the City's tangible capital assets.

Initially, the various departmental managers were sceptical about the amount of time that the PSAB exercise would take and they wondered whether the City, or their respective departments, would benefit. Taking the lead from the Finance Department, the departments ultimately came on line and worked cooperatively with Finance.

The first task in becoming PSAB compliant was to arrive at an initial valuation of all the City's tangible capital assets. This meant that staff in every department had to identify the size and location of all of their assets, determine the year that these assets were created, and then try to determine the cost of the asset in the year that it was created. Although Fredericton's records were fairly good, this was a huge task, with City staff relying on drawings, annual reports, the GIS layers, and whatever other information was available. The City also hired a consultant (RV Anderson Ltd.) to assist with this project. This consultant had considerable experience with this type of work and was able to offer advice in situations where there were gaps in historical infrastructure data. For example, in cases where the year of construction of an asset was known but the initial construction cost was not known, the consultant was able to calculate an estimate of the initial construction cost by "working backwards" from what a similar asset would currently cost. The consultant also assisted with calculating the depreciation of the asset since the time it was first constructed and thereby arriving at the current residual value of the asset. With this data, the City's financial statements could now include the value of all of the City's tangible capital assets. Fredericton became the first PSAB-compliant municipality in New Brunswick in 2009.



Some of the immediate benefits of the PSAB exercise would be obvious. The City gained an appreciation for the value of its infrastructure and it became possible to compare the value of the capital assets from one year to another. There were many other benefits to this PSAB exercise. The relationship between the Finance Department and the Engineering & Public Works Department was strengthened as each department became aware of the importance of the other department's role in funding and managing infrastructure.

Probably the most important benefit of PSAB was that the City now had the data required for improved long term financial planning. The City's infrastructure deficit was identified (\$52 million for the "General Fund" and \$134 million for the Water & Sewer Fund in 2009). This provided the context for more accurately planning infrastructure expenditures in relation to expenditures as identified in strategic plans, tactical plans, and operational plans. This information improved Council's understanding of the City's total financial picture.

Working through PSAB established, or reinforced, the importance of funding infrastructure renewal and it provided the foundation for a more comprehensive asset management system.

ASSET MANAGEMENT AFTER PSAB

Immediately following the exercise where the valuations of all the tangible

capital assets were identified, the City of Fredericton's Finance Department used the PSAB information to create a formal long-term financial plan integrating the requirement for infrastructure expenditures with the various other spending priorities of the City of Fredericton. This long term financial plan was completed prior to the budget process for 2010 (fall of 2009). For the first time, City Council was able to see the long term impact of increasing or decreasing expenditures on infrastructure. Council was advised that there is an optimal time to replace aging infrastructure and that missing this optimal time can often result in increased costs. The long term financial plan identified the need for additional capital funding for infrastructure renewal and City Council provided the additional capital funding requested for the 2010 budget.

Another discussion with Council since the PSAB exercise was completed has centred around efficiency in service provision. The City's bi-annual Citizen's Attitude Survey indicates that the public is satisfied with the services they receive from the City (i.e. that the City is effective in service provision) but it is less clear whether the existing service provision is efficient. Having more data on the amount and value of the capital assets is useful in making efficiency comparisons with other similarly sized municipalities. A considerable amount of effort has been allocated to determining efficiency in 2010. It is expected that



ABOVE: Bliss Water Treatment Plant.

improving efficiency in service provision will be a major focus for the City in the next few years.

During 2010, additional effort was made to take asset management to the next level. Using the work done for PSAB as a foundation, staff looked at each infrastructure element and estimated the probability of failure, as well as the consequence of failure. This allowed the various infrastructure funding requests, from within a particular department and from all the departments, to be analyzed and compared to each other on the basis of the risk associated with their failure. This made it easier for departments to agree on capital funding requirements and where any additional funding should be directed.

There was recognition that the PSAB/Asset Management work fits nicely into the City's objective to be sustainable and to make key decisions on the basis of sustainability. The City's aim is to increase density and encourage developments that are affordable and sustainable. An important part of any city's sustainability is to have infrastructure that is properly maintained and sustainable.

The City of Fredericton is now investigating supporting technologies for asset management such as asset accounting and asset management systems (software), work order system, etc. There is now recognition that asset management is not a "one-time event"; it is an ongoing management process.

The focus on identifying capital assets and better managing these assets has also put more of a focus on better coordination of water/wastewater work with other infrastructure projects. There is now a long term plan for infrastructure renewal of street assets and a long term plan for infrastructure renewal of water & sewer assets. Long term planning tends to minimize scheduling and construction conflicts.

SUMMARY OF THE CITY'S ADVANCEMENTS IN THE AREAS SPECIFIC TO THE 10 TRM OBJECTIVES

It has been more than seven years since the Technology Road Map (TRM) was completed as a result of a partnership of the Canadian Society for Civil Engineering, the Canadian Council of Professional Engineers, the Canadian Public Works Association, and the National Research Council of Canada. In that time, the City of Fredericton has moved closer towards meeting the objectives outlined in the TRM. A summary of the TRM objectives and the City of Fredericton's advancement is as follows:

Asset Inventory and Conditions – Each of the City's municipal departments was forced to identify the location, condition, and value of all capital assets. While it is recognized that the accuracy of the valuation will improve in the future, the work to date represents a significant step.

Benefits of Maintenance and Replacement – The City now has a better understanding of this relationship although, again, more work is required.

Life-Cycle Cost/Benefit Analysis – A long term plan financial plan was established for the City of Fredericton. City Council now looks at infrastructure renewal in context with new programs and various other required expenditures.

Integration of Civil Infrastructure Systems – There is now an umbrella for the assets in all the City departments and no one expenditure is looked at in isolation of another.

Technology Evaluation – The City has not done very much at this point to implement field evaluation tools.

Knowledge Management – Improved knowledge of the overall infrastructure issue, at various levels of the City of Fredericton's organization, has been a major benefit of PSAB.

Diverse and Adaptable Technology – This has not been a major focus for the City of Fredericton to this point although a very good GIS system is

part of the City's foundation for infrastructure management.

Monitoring and Control Operations – The City had developed a strong GIS tool before PSAB and further strengthened the GIS layers as a result of the PSAB exercise. The City is working on tools for updating infrastructure expenditures and depreciation of assets.

Quality Assurance and Quality Control – Some of the new tools and processes include computer controls on salt spreaders, GIS system, and revised storm water guidelines. Basically, the new tools have impacted every part of the organization from the design office to the front line operation's crews.

Education, Training and Research – The decision makers at the City of Fredericton now have very good information upon which to base their budget decisions. There is better information available for all staff, as well as for the general public, about the condition of the City's assets and the financial implications of this issue.

While the City of Fredericton is not a perfect organization and is still working diligently towards better infrastructure management, it has made some important and significant initial steps forward in the development and evolution of asset management processes. Even at the early stages of this evolution, these efforts have already had significant impacts on the investment and related management processes and policies that impact decisions for infrastructure in Fredericton. These activities are viewed as the first steps of an on-going process that the City believes will continue to improve the investment decisions in the future. While the relevant objectives in the Technology Road Map have not been fully met, many are on their way in Fredericton – progress has been made. On a strategic planning level, it has been recognized that each small step has provided a new perspective on the next step to take. This has accelerated the progression for the City with each next step easier to take than the previous step. ■

Historic Events in Niagara Falls, Ontario



The two Presidents and the Aero Car. / Les deux présidents et l'Aero Car.

Historic Oak Hall, Headquarters of the Niagara Parks Commission in Niagara Falls, Ontario, was the site of a “double” historic event on Thursday September 30, 2010. In the splendid location of the Great Hall of Oak House, some thirty guests comprising members of the CSCE Board, the Hamilton/Niagara Section, the National History Committee and Niagara Parks executives together with members of the local media were in attendance as President Vic Perry signed an “Agreement of Cooperation” between CSCE and our Spanish counterparts, the Asociación de Ingenieros de Caminos, Canales y Puertos de España (AICCP), which aims to promote a closer working relationship to the benefit of members of both organizations and for the benefit of the Civil Engineering profession. This will facilitate the interchange of information and publications and will enable members visiting or temporarily resident in either country to participate in the activities of the relevant organization. Signing on behalf of the Spanish Association was the AICCP President, Leonardo Torres Quevedo. Oak Hall was the former residence of mining millionaire Sir Harry Oakes and contains many valuable paintings and historic items of furni-

ture including the magnificent hand carved teakwood table on which the two Presidents signed the Agreement. It was on this very table that the Treaty that ended the Boxer Rebellion in China was signed in 1901.

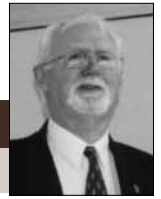
The second part of the day’s celebration was the commemoration of the “Niagara Spanish Aero Car” as an International Historic Civil Engineering Work. Of special significance is that the Aero Car was designed by the grandfather of the AICCP President who bears the same name as his illustrious predecessor, the distinguished Spanish Engineer, Leonardo Torres Quevedo (1852–1936). The commemoration ceremony, included short presentations from the CSCE and AICCP Presidents, Sherman Zavitz (Niagara Parks Historian), Jorge Rubio (Spanish Consul) and Bob McIlveen, (Executive Director, Niagara Parks Commission) followed by the unveiling of a plaque by the two Presidents recognizing the Historic Engineering significance of both the Aero Car and its designer. Following a “working” lunch, CSCE President Vic Perry and the guests accompanied AICCP President Leonardo Torres Quevedo in travelling across the Niagara Whirlpool in his grandfather’s engineering creation. The day’s events were concluded

by media interviews with Vic Perry and Leonardo Torres Quevedo.

The Aero Car is suspended on six 25 mm interlocking steel cables and is powered by an electric 50 horsepower (37 kW) motor with a backup generator in case of power failure. It carries 35 passengers over the Whirlpool Rapids on the Niagara River at a speed of approximately 7 km/h. Although it is suspended between two Canadian points, it actually crosses the Canadian and American borders four times on a full trip. The Aero Car is believed to be the sole remaining example of Torres Quevedo’s design for an aerial ferry. It is of international importance in that although constructed and operated in Canada it was a Spanish project from beginning to end: devised by a Spaniard and constructed by a Spanish company with Spanish capital. It was officially inaugurated on 8 August 1916 and opened to the public the following day. The cableway, with small modifications, has continued to run satisfactorily to this day. It is the only work in Canada of one of the most outstanding and prolific thinkers and innovators in the history of engineering. In addition to Civil Engineering design, Torres Quevedo initiated several significant developments in dirigible design, in radio control and in analytical calculating machines.

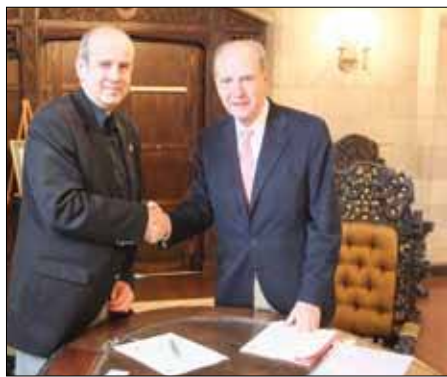
The Aero Car is the sixth International Historic Civil Engineering Work to be commemorated by the Society as part of its History of Civil Engineering Program. The total of all commemorated Historic Civil Engineering Works, National, International or Regional is now fifty-seven. Details of all these sites may be found on the National History Committee’s Web Site <http://history.csce.ca>

It may be worth reminding members that in 2002 the Society was presented with the prestigious Pierre Berton History Award by Canada’s National History Society for CSCE’s work in publicizing, popularizing and bringing Canadian History to a wider audience. The National History Committee is pleased to add the Aero Car to the list of commemorated sites and proud to continue its efforts to promote the history of the profession. ■



Des événements historiques à Niagara Falls

C'est au vieux « Oak Hall », qui sert de quartier général à la « Niagara Parks Commission », à Niagara Falls, en Ontario, que s'est déroulé un double événement historique, le jeudi 30 septembre, 2010, alors qu'une trentaine d'invités comprenant des administrateurs de la SCGC, de la section de Hamilton/Niagara, du comité des affaires historiques, et des dirigeants des Parcs de Niagara se sont réunis dans la grande salle pour assister, en compagnie de la presse, à la signature, par notre président Vic Perry, d'un accord de coopération entre la SCGC et nos homologues espagnols (Asociación de Ingenieros de Caminos, Canales y Puertos de España (AICCP)), pour promouvoir des relations plus étroites entre nos membres et pour le bien de notre profession. Cet accord facilitera l'échange d'information et de publications et permettra aux membres visiteurs ou aux membres résidants temporairement dans l'autre pays de participer aux activités de l'autre organisme. C'est le président de l'AICCP, Leonardo Torres Quevedo, qui a signé l'accord. Oak Hall est l'ancienne résidence de l'ancien magnat des mines, Sir Harry Oakes, et renferme nombre de peintures de grande valeur et de meubles historiques, dont la superbe table sculptée en tek sur laquelle les deux présidents ont signé l'entente. C'est sur cette même table que fut signé, en Chine, en 1901 le traité qui devait mettre fin à la révolte des Boxers.



Vic Perry and Leonardo Torres Quevedo on completion of the signing of the Agreement of Cooperation. / Vic Perry et Leonardo Torres Quevedo paraphant l'Accord de coopération.

La deuxième célébration de la journée a été la commémoration du téléphérique espagnol Aero Car, à Niagara, qui est devenu un ouvrage historique de génie civil d'intérêt international. Détail important, l'Aero Car a été conçu par le grand-père de l'actuel président de l'AICCP, qui porte le même nom que son illustre ancêtre, le célèbre ingénieur espagnol Leonardo Torres Quevedo (1852–1936). La cérémonie de commémoration comportait de brèves allocutions des présidents de la SCGC et de l'AICCP, de Sherman Zavitz (historien des parcs du Niagara), de Jorge Rubio (le consul d'Espagne) et de Bob McIlveen (directeur exécutif de la « Niagara Parks Commission »), suivies du dévoilement, par les deux présidents, d'une plaque soulignant l'importance historique de l'Aero Car et de son concepteur. Après un déjeuner de travail, le président de la SCGC, Vic Perry, et les invités ont accompagné le président de l'AICCP, Leonardo Torres Quevedo, pour une randonnée au-dessus des rapides du Niagara à bord de l'ouvrage réalisé par son grand-père. La journée s'est terminée par des rencontres de presse avec MM. Vic Perry and Leonardo Torres Quevedo.

L'Aero Car est suspendu à six câbles d'acier entrecroisés de 25 mm et il se déplace grâce à un moteur électrique de 50 c.v. (37 kW) muni d'une génératrice d'appoint en cas de panne d'électricité.



The commemorative plaque. / La plaque commémorative.

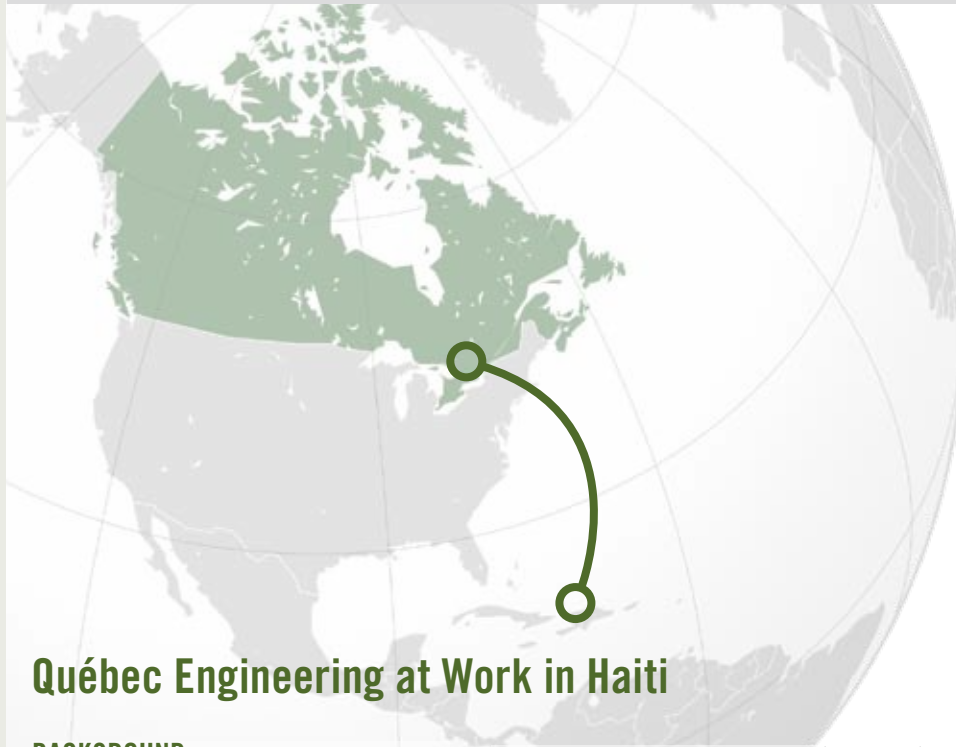
Il transporte 35 passagers au dessus-des tourbillons des chutes Niagara à une vitesse d'environ 7 km/h. Bien qu'il soit suspendu entre deux points situés en sol canadien, le téléphérique traverse la frontière canado-américaine à quatre reprises pendant son trajet. L'Aero Car serait le dernier téléphérique encore en usage conçu par l'ingénieur espagnol Torres Quevedo. Il présente une importance internationale dans la mesure où, même s'il s'agit d'un ouvrage construit et exploité au Canada, c'était un chantier espagnol du début à la fin, conçu par un Espagnol et construit par une entreprise espagnole, grâce à des capitaux espagnols. Inauguré officiellement le 8 août 1916, le téléphérique ouvrait ses portes au public le lendemain. Le téléphérique a poursuivi ses opérations jusqu'à aujourd'hui, subissant à peine quelques petites modifications. Il s'agit du seul ouvrage au Canada de l'un des plus remarquables et prolifiques penseurs et innovateurs de l'histoire du génie. Torres Quevedo a également amorcé d'importants développements en matière de dirigeables, de contrôle radio et de machines à calculer analytiques.

L'Aero Car est le sixième ouvrage international historique du génie civil à faire l'objet d'une commémoration par la SCGC dans le cadre de son programme d'histoire du génie civil. Le total des ouvrages de génie civil d'importance nationale, internationale ou régionale atteint maintenant 57. Vous trouverez des détails sur tous ces ouvrages en consultant le site web du comité des affaires historiques, à l'adresse <http://history.csce.ca>

Soulignons qu'en 2002, la SCGC a reçu le prestigieux prix d'histoire Pierre Berton attribué par la Société d'histoire nationale du Canada pour souligner les travaux de la SCGC afin de faire connaître l'histoire du Canada d'un plus grand public. Le comité national des affaires historiques est fier d'ajouter l'Aero Car à la liste des lieux commémorés et il est fier de poursuivre son travail de promotion de l'histoire de la profession. ■

DENIS BEAULIEU PH.D., P.ENG. / PH.D., ING., CONSULTANT

MARTIN LACHANCE M.SC., P.ENG / M.SC., ING., SNC-LAVALIN



Québec Engineering at Work in Haiti

BACKGROUND

In December 2009, a group made up of SNC-Lavalin International Inc., LGL S.A., a subsidiary of SNC-Lavalin in Haiti, and Norbati Consultants signed an agreement with the Project Coordinating Unit of the Emergency Preparedness Division of the Ministère de l'Intérieur et des Collectivités Territoriales (MICT) for the development of an "Étude de Code de construction" for Haiti. Ironically, the project was to start on January 13, and only one of the two employees who had arrived in Haiti on January 12 managed to come back, albeit somewhat dazed.

Local authorities as well as the international community had already agreed that Haiti had to adopt as quickly as possible a building code and a legal framework governing the management of construction activities. The January 12 earthquake underlined the urgency of the situation but it also delayed the implementation of the initial project, which was replaced by a series of emergency procedures.

Therefore, the Project Coordinating Unit of the Emergency Preparedness Division of the MICT, in cooperation with the Ministère des Travaux Publics,

Transports et Communications (MTPTC), asked the same group to recommend tools allowing Haiti to regulate, as quickly as possible, all reconstruction efforts.

It became obvious that a clear distinction had to be made between smaller constructions and other types of construction. Smaller constructions are buildings with a maximum of two levels and limited horizontal dimensions, generally used for residential purposes or for small stores. Their construction is usually rudimentary and used to escape any government control. The other types of construction include commercial, service, institutional and residential buildings of greater dimensions, as well as industrial buildings.

In the absence, for the time being, of a *Building Code* in Haiti and in order to oversee reconstruction efforts in the very short-term, the group recommended the following:

- For smaller constructions built without professional help, the group recommended the preparation of a *Guide to sound practices* so as to make sure that future constructions would resist exceptional loads such as earthquake and hurricane loads without causing loss of life.



ABOVE: Front page of the Guide to sound practices. / La page couverture du guide de bonnes pratiques.

- For other constructions that may eventually be designed and built not only by Haitians themselves but also by foreigners from various countries, the group has recommended the adoption of *interim design and performance load requirements* that designers would apply while using their own building code.

GUIDE TO SOUND PRACTICES

The general consensus in the aftermath of the earthquake is that concrete structures with back filling performed very poorly during the earthquake on January 12, compared to lighter structures made of clay or intertwined branches. The poor performance of buildings made of concrete or non-reinforced concrete blocks (single-family dwellings, multi-levels, apartments, commercial, public and industrial buildings, etc.) can be attributed to various factors that will have to be corrected in the short-term: sub-standard concrete, mortar and blocks, columns that are too small and underreinforced, smooth bars, excessively wide stirrups without a 130° return, etc. In addition to the poor quality of materials and construction, the absence of a building

continued on page 24

Le génie québécois au service d'Haïti

MISE EN SITUATION

En décembre 2009, un regroupement constitué de SNC-Lavalin International Inc., LGL S.A., une filiale de SNC-Lavalin en Haïti, et Norbati Consultants signait une entente avec l'Unité de Coordination de Projet de la Direction Civile du Ministère de l'Intérieur et des Collectivités Territoriales (MICT) pour la réalisation d'une *Étude de Code de construction* pour Haïti. Le projet devait ironiquement débiter le 13 janvier et des deux représentants du regroupement qui venaient d'arriver la veille en Haïti pour le démarrage des travaux, un seul est revenu en vie, mais passablement amoché.

Il était donc déjà admis par les autorités locales et la communauté internationale qu'Haïti devait de toute urgence se doter d'un code de construction et d'un cadre législatif pour la gestion des activités de construction. Le séisme du 12 janvier a eu pour effet d'amplifier cette nécessité mais aussi de repousser à plus tard la réalisation du projet initial qui a été remplacé par des mesures d'urgence.

Ainsi, l'Unité de Coordination de Projet de la Direction de la Protection Civile du MICT, de concert avec le Ministère

des Travaux Publics, Transports et Communications (MTPTC) a mandaté le même regroupement de proposer, en marge de son mandat, des outils permettant à Haïti d'encadrer dans les plus brefs délais les travaux de reconstruction.

Il est clairement apparu qu'il fallait faire une distinction nette entre les petites constructions et les autres types de construction. Les petites constructions sont des bâtiments d'au plus deux étages et de dimensions horizontales modestes généralement destinées à l'habitation et aux petits commerces, dont la réalisation artisanale échappe généralement au contrôle de l'État. Les autres types de construction incluent les bâtiments commerciaux, de services, institutionnels et résidentiels de plus grande importance ainsi que les bâtiments industriels.

En l'absence, pour le moment, d'un *Code du Bâtiment* en Haïti et afin d'encadrer la reconstruction à très court terme, le regroupement a proposé ce qui suit :

- Pour les petites constructions dont la réalisation est exécutée sans professionnel, le regroupement a proposé de préparer un *Guide de bonnes pratiques*

afin de s'assurer que les prochaines constructions soient en mesure de résister aux charges exceptionnelles, telles les séismes et les ouragans, sans causer de perte de vie.

- Pour les autres constructions, qui pourront être conçues et construites non seulement par les haïtiens, mais aussi par des intervenants provenant de plusieurs nations, le regroupement a proposé d'établir des *exigences intérimaires de charges de conception et de tenue* que les concepteurs pourront appliquer tout en utilisant leur propre code de construction.

GUIDE DE BONNES PRATIQUES

Le constat général, suite au séisme, est que les structures de béton avec maçonnerie de remplissage ont très mal performé lors du séisme du 12 janvier, comparées aux structures plus légères en lattes et branches tressées ou en terre battue. La piètre performance des bâtiments constitués d'ossatures de béton et de murs de blocs de béton non armés (résidences unifamiliales, multi-étagés, appartements, bâtiments commerciaux, publics, industriels, etc.) est imputable à de nombreux facteurs qu'il faudra obligatoirement corriger à court terme : bétons, mortiers et blocs de béton de mauvaise qualité, poteaux trop petits et sous-armés, barres lisses, étriers trop distants et non retournés de 130°, etc. À la piètre qualité des matériaux et de la construction, s'ajoute l'absence de code de bâtiment, de contrôle de la qualification des intervenants, de contrôle de la qualité, de gestion des risques et surtout de préoccupation pour le génie parasismique en Haïti.

Nous avons pris pour acquis que les auto-constructeurs ont davantage besoin d'être guidés dans la construction de

suite à la page 24



The confined masonry concept was developed in order to avoid such tragedies. / C'est pour éviter de telles tragédies que le concept de maçonnerie chaînée a été développé.

continued from page 22

code, of any control over the qualifications of the various persons involved, the lack of quality control and risk management, and, above all, the disregard for earthquake engineering in Haiti resulted in the situation we know.

We did take for granted that self-builders need more help and guidance in constructing concrete and masonry structures than in other types of light dwellings currently seen in Haiti.

A short document was prepared to be used as a guide by self-builders in the production of small residential housing units or small commercial buildings. There is no clear limit to the length and width of the buildings covered by the guide, but their height is limited to two levels.

The type of construction favoured in the guide is the *Confined Masonry*. This type of construction is already quite common in other parts of the world and has proven its worth with earthquakes. It involves construction techniques and materials already used in Haiti. It nevertheless requires that close attention be paid to quality in the execution of the work, in construction details and in building materials.

The guide is illustrated. It contains a minimum of words and is designed to be understood by illiterates. Its use requires some formal training. The guide includes three sections. The first section contains several warnings concerning safety and the correct operation of the building. The second section describes the concept of confined masonry, and the last section guides the builder through the various stages of his building project.

INTERIM CONSTRUCTION REQUIREMENTS

Buildings and other projects not covered under the Guide to Sound Practices must require the presence of qualified persons at all levels: architects, engineers, builders, technicians, inspectors, etc. Recommended interim requirements, while waiting for the Building Code, broadly include the following: (1) identification of international standards and codes that can be used in Haiti, (2) a global and safe assessment of loads

involved (gravity loads, wind loads and seismic loads) that the Haitian Government may impose upon foreign or Haitian engineers for reconstruction, while allowing them to use, for their calculations, foreign codes and standards adopted by the state and (3) a very basic recommendation concerning the legal system to be adopted for all construction work in Haiti (act governing construction, building code, regulations concerning the qualification of all agents in the field of construction). Experts have been hired in order to recommend realistic wind and earthquake loads for Haiti.

OTHER AREAS OF INTERVENTION

This article is illustrative of the way Quebec engineers are already at the forefront of reconstruction efforts in Haiti. SNC-Lavalin and its subsidiary LGL SA, like several other Quebec-based engineering firms, are participating in the evaluation, repair, design and rebuilding of various infrastructures such as public buildings, roads, bridges and wharves that were damaged or ruined when the earthquake struck on January 12. ■

suite de la page 23

bâtiments faits de béton et de maçonnerie que dans la construction de tout autre type de bâtiment d'habitation léger d'usage courant en Haïti.

Un document concis a été produit pour guider les auto-constructeurs dans la réalisation de bâtiments résidentiels de dimensions modestes ou de petits bâtiments commerciaux. Il n'y a pas de restriction sur les dimensions horizontales des bâtiments couverts par le guide, mais la hauteur est limitée à deux niveaux.

Le type de construction retenu porte le nom de *Maçonnerie Chaînée*. Ce type de construction est déjà largement répandu ailleurs dans le monde et il a démontré son efficacité face aux séismes. Il fait appel à des techniques de construction et à des matériaux déjà utilisés couramment en Haïti. Il nécessite toutefois qu'on se préoccupe de la qualité de la mise en oeuvre, du respect de détails constructifs particuliers et de la qualité des matériaux lors de son application.

Le guide est imagé. Il contient un minimum de textes et est conçu pour être compris des analphabètes. Une formation sera

prérequise à son utilisation. Le guide est composé de trois sections. D'abord une section contenant plusieurs mises en garde pour assurer la sécurité et le bon fonctionnement du bâtiment. Ensuite, une autre expliquant le concept de maçonnerie chaînée et une dernière accompagnant le constructeur dans les différentes étapes de la réalisation de son projet.

EXIGENCES INTÉRIMAIRES EN VUE DE LA RECONSTRUCTION

Les constructions autres que celles couvertes par le Guide de bonnes pratiques doivent nécessairement impliquer des intervenants qualifiés à tous les niveaux : architectes, ingénieurs, constructeurs, techniciens, inspecteurs, etc. Les exigences intérimaires proposées, en l'attente d'un Code de construction, incluent principalement (1) une identification des normes internationales pouvant être utilisées en Haïti, (2) une évaluation globale mais sécuritaire des charges de calcul à considérer (surcharges dues à l'usage, charges de vent et charges sismiques) que le gouvernement haïtien pourra imposer aux ingénieurs étrangers ou haïtiens pour la reconstruction, en leur permettant d'utiliser pour leurs calculs les normes et codes étrangers retenus par l'état et (3) une proposition très sommaire de la structure du système légal à mettre en place pour la gestion du secteur de la construction en Haïti (loi sur la construction, code de construction, règlement sur la qualification des intervenants en construction). Les services d'experts ont été retenus pour proposer des valeurs réalistes de charges de vent et de charges sismiques pour Haïti.

AUTRES SECTEURS D'INTERVENTION

Le présent article illustre de quelle façon des ingénieurs québécois sont déjà des joueurs de premier plan dans l'effort de reconstruction en Haïti. SNC-Lavalin et sa filiale LGL S.A., tout comme plusieurs autres firmes d'ingénierie du Québec, procèdent à l'évaluation, la réparation, la conception et la reconstruction de diverses infrastructures telles des bâtiments publics, des routes, des ponts et des quais endommagés ou ruinés lors du séisme du 12 janvier. ■



WELCOME NEW MEMBERS 2010

Please join me in welcoming the following new members who joined the Society throughout 2010.

BIENVENUE AUX NOUVEAUX MEMBRES 2010

Accueillons ensemble les nouveaux membres qui se sont joints à la SCGC au cours de l'année 2010.

Abdi Ali, Isse — Montreal, Quebec
 Afif, Tarek — Ottawa, Ontario
 Alam, A.H.M. Zarful — Edmonton, Alberta
 Al-Attar, Rasha — Toronto, Ontario
 Allen, Nicole P. — Saskatoon, Saskatchewan
 Al-Salihi, Auday — Mississauga, Ontario
 Alshawabkeh, Mahmud — Doha, Qatar
 Anaya, Hector — Edmonton, Alberta
 Andrejevic, Dragan — Edmonton, Alberta
 Andrishak, Robyn — Edmonton, Alberta
 Anthony, Robert — Battleford, Saskatchewan
 Azez, Emad H. — Hamilton, Ontario
 Bagheri, Ali — Coquitlam, British Columbia
 Bastien, Josee — Quebec, Quebec
 Bayat, Alireza — Edmonton, Alberta
 Beaulieu, Patrice — Quebec, Quebec
 Bengassem, Jamal — Calgary, Alberta
 Bernier, Martin — Quebec, Quebec
 Blain, Line — Ottawa, Ontario
 Borowiecki, Christopher — Oshawa, Ontario
 Bourne, Jared C — Calgary, Alberta
 Brooks, Jamie — Whitby, Ontario
 Bruneau, Stephen — St. John's, Newfoundland & Labrador
 Bruyere, Todd — Fort Frances, Ontario
 Bryant, Carla Renee — St. John's, Newfoundland & Labrador
 Buckley, Kerry — Ottawa, Ontario
 Button, Tim — Edmonton, Alberta
 Cacciotti, Dan M. — Lively, Ontario
 Carrier, Sylvain — Quebec, Quebec
 Chen, Haibo — Saskatoon, Saskatchewan
 Chou, Zoulong — Edmonton, Alberta
 Choudhary, Muhammad Ahmad — East York, Ontario
 Cote, Jean — Quebec, Quebec
 Da Silva, Lucas — Calgary, Alberta
 De Guise, Claude — Longueuil, Quebec
 Demirdjian, Sevak — Montreal, Quebec
 Desmarais, Yvan — Ottawa, Ontario
 Dichoso, Adonis — Edmonton, Alberta
 Difuntorum, Rolando — Scarborough, Ontario
 Dolanay, S. Sinan — Toronto, Ontario
 Dwyer, Bill — Ottawa, Ontario
 Ebofin, Olufemi T. — Abuja, Nigeria
 Emir-Ahmet, Dean — Edmonton, Alberta
 Eseonu, Vitalis Emeka — Regina, Saskatchewan
 Eugene, Tse — Calgary, Alberta
 Fafard, Mario — Quebec, Quebec
 Farago, Paul S. — Surrey, British Columbia
 Feeg, Curtis H. — Calgary, Alberta
 Fisher, Matthew — Burlington, Ontario
 Ford, John — Calgary, Alberta
 Franchuk, Cameron — Edmonton, Alberta
 Garibaldi, Bill — Waterloo, Ontario
 Ghorbani, Behzad — Esfahan, Iran
 Girdhar, Vikas — Toronto, Ontario
 Godat, Ahmed Mohammed — Sherbrooke, Quebec
 Goel, Rahul — Brampton, Ontario
 Grieder, Jeff — Edmonton, Alberta
 Guenette, Mario — Thetford Mines, Quebec
 Harsha, Prahlad — Edmonton, Alberta
 Hernandez, Nerissa — Markham, Ontario
 Hewitson, Philip — Waterloo, Ontario
 Hobson, Michael — Calgary, Alberta
 Hodge, Edwin — Spruce Grove, Alberta
 Hong, Hanh — Edmonton, Alberta
 Hornbruch, Jens — Calgary, Alberta
 Hosseini, Mohammad — Montreal, Quebec
 Hussey, Mark — St. Albert, Alberta
 Idone, Domenic — Ottawa, Ontario
 Jagdat, Rameshwar — Scarborough, Ontario
 Joly, Olivier — Laval, Quebec
 Kerr, Dennis W. — Dundas, Ontario
 Kidd, Tracy — Georgetown, Ontario
 Kim, Byung — Toronto, Ontario
 Koza, Kyle — Edmonton, Alberta
 Koziol, Mike — Edmonton, Alberta
 Kuo, Chun-Chao — Edmonton, Alberta
 Lachance, Martin — Quebec, Quebec
 Lahti, Leo — Gilford, Ontario
 Lee, Sanghyn — Edmonton, Alberta
 Leithead, Dana — Edmonton, Alberta
 LeLacheur, Keith — Edmonton, Alberta
 Lessard, Denis — St-Augustin-de-Desmaures, Quebec
 Levau, Buu — Montreal, Quebec
 Liscio, Nicholas — Newmarket, Ontario
 Lizee, Maurice — Edmonton, Alberta
 Logan, John — Winnipeg, Manitoba
 Logue, Clint — Vancouver, British Columbia

Mahabir, Chandra — Edmonton, Alberta
 Mailloux, Alexis — Quebec, Quebec
 Marjerison, Brent — Saskatoon, Saskatchewan
 Marshall, Akemi — Mississauga, Ontario
 Mathieu, Jean-Marie — Quebec, Quebec
 McCartney, Daryl M. — Edmonton, Alberta
 McKay, George — Thunder Bay, Ontario
 Mehta, Suresh Kumar — Dubai, United Arab Emirates
 Myrholm, Brian — Edmonton, Alberta
 Naderikia, Mohammad — Calgary, Alberta
 Orendorff, Bryan — Ottawa, Ontario
 Ormson, Ron — Waterloo, Ontario
 Owonikoko, Sikiru Adetona — Abuja, Nigeria
 Paquet, Paul — Toronto, Ontario
 Passarelli, Peter — Cambridge, Ontario
 Paulsen, Michael — Edmonton, Alberta
 Pelletier, Genevieve — Quebec, Quebec
 Philibert, Alain — Sherbrooke, Quebec
 Qiu, Zhi-Jun — Edmonton, Alberta
 Rabanal, Roy — York, Ontario
 Rajlic, Biljana — Toronto, Ontario
 Raza, Muhammad — Calgary, Alberta
 Robinson, Brandon — Bowmanville, Ontario
 Ross, Heide-Marie — Frankford, Ontario
 Roy, Nathalie — Sherbrooke, Quebec
 Sakr, Mohammed — Edmonton, Alberta
 Samoilov, Gleb — Almaty City, Kazakhstan
 Samson, Dominic — Quebec, Quebec
 Schaub, Guenter — Winnipeg, Manitoba
 Schindelka, Sheila — Saskatoon, Saskatchewan
 Segal, Daniel — Regina, Saskatchewan
 Shafi, Qasim — Saskatoon, Saskatchewan
 Siddique, Syed K. — Calgary, Alberta
 Siemens, Gregory Allen — Kingston, Ontario
 Siva, Sunda — Waterloo, Ontario
 Sorelli, Luca — Quebec, Quebec
 Steeves, Matthew — Ottawa, Ontario
 St-Georges, Eric — Sherbrooke, Quebec
 St-Laurent, Suzanne — St-Augustin des Desmaures, Quebec
 St-Pierre, Godfroy — Lachine, Quebec
 Su, Lijun — Calgary, Alberta
 Subramanian, Rajkumar — Edmonton, Alberta
 Thapar, Jiwan — Brampton, Ontario
 Tumi, Hadi Omran — Tripoli, Libia
 Vanry, Janine — Collingwood, Ontario
 Wall, Daniel — Hamilton, Ontario
 Ward, Chris — Edmonton, Alberta
 Wilson, Matthew — Edmonton, Alberta
 Wirtz, Robert — Edmonton, Alberta
 Zarrabi, Mohsen — Mont-Royal, Quebec
 Zhang, Baiyu — St. John's, Newfoundland & Labrador

1. CHBDC 2010

January 2011 / Janvier 2011

CSCE will offer a one-day course covering the significant changes contained in the 2010 edition of the Canadian Highway Bridge Design Code. Members of the CHBDC technical committees and authors of the code will present this course throughout Canada. Participants will be able to obtain a copy of the new code from the Canadian Standards Association at a 20% discount. Please visit www.csce.ca for full details.

La SCGC offre une formation d'une journée sur les modifications apportées au Code canadien sur le calcul des ponts routiers 2010. Des membres de différents comités techniques CHBDC et auteurs de ce code présenteront cette formation dans tout le Canada. Les participants pourront obtenir une copie du nouveau code de l'Association canadienne de normalisation avec un rabais de 20 %. Vous trouverez les détails à www.csce.ca.

2. ASCE Webinars

CSCE offers its members the opportunity to attend ASCE webinars at ASCE member fees. Over 200 webinars covering all areas of civil engineering are available. To review the list of these webinars, please visit www.asce.org. To register, please contact mahmoud@csce.ca.

La SCGC est heureuse d'offrir à ses membres la possibilité de s'inscrire aux webinars de ASCE au tarif de membre ASCE. Plus de 200 webinars présentés en anglais et couvrant toutes les disciplines du génie civil sont disponibles. Pour en consulter la liste, veuillez visiter www.asce.org. Pour vous inscrire, veuillez contacter mahmoud@csce.ca.

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