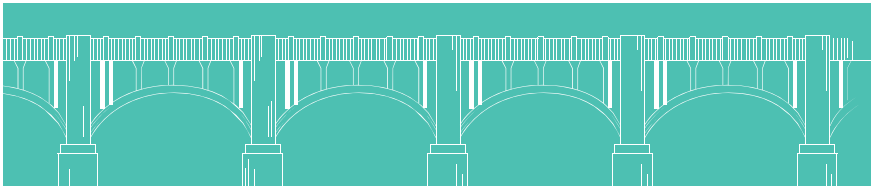


CANADIAN GUIDE FOR GREENER ROADS AND SUSTAINABILITY CONSIDERATIONS FOR BRIDGES GUIDE

2016 CANADIAN CONSULTING ENGINEERING AWARDS





PROJECT TITLE PAGE



Member Firm Submitting
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Project Title
Canadian Guide for Greener Roads and
Sustainability Considerations for Bridges Guide

Location of Project
Canada-wide

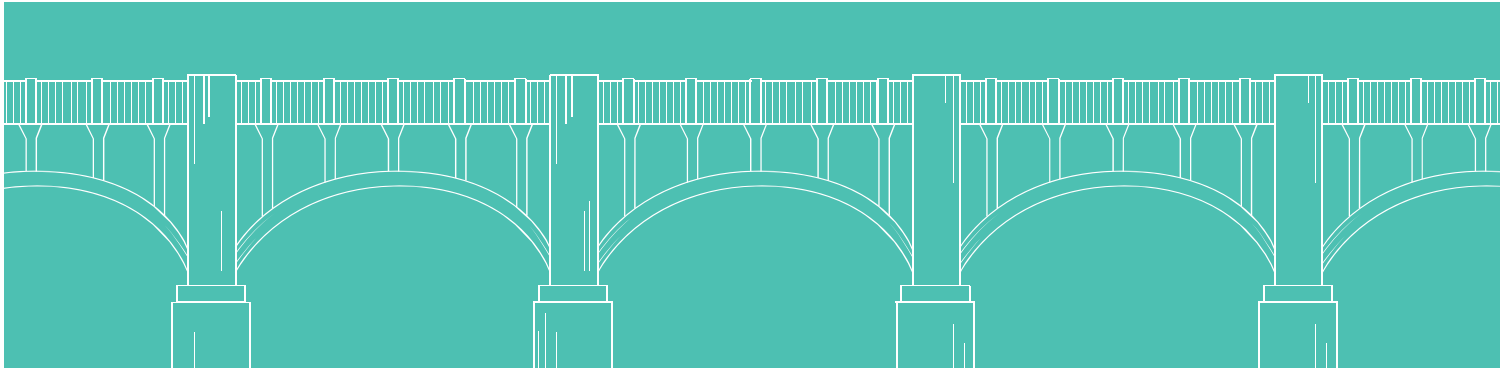
Category of Entry
F. Special Projects

Project Owner
Transportation Association of Canada

Project Client
Transportation Association of Canada

Other Consultants Involved
Not Applicable

Contractors Involved
Not Applicable



Section I

Confirmation Receipt

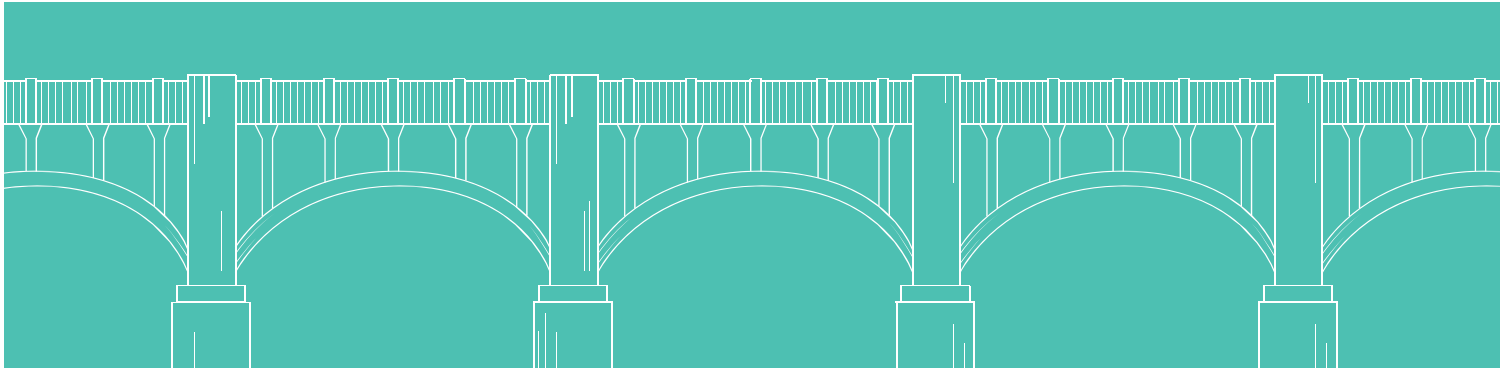
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CONSIDERATIONS FOR BRIDGES
GUIDE



Section 2

Entry Consent Form

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CONSIDERATIONS FOR BRIDGES
GUIDE



Section 3

Project Description

CANADIAN GUIDE FOR GREENER
ROADS AND SUSTAINABILITY
CONSIDERATIONS FOR BRIDGES
GUIDE

THE CANADIAN GUIDE FOR GREENER ROADS (CGGR) AND THE COMPANION DOCUMENT SUSTAINABILITY CONSIDERATIONS FOR BRIDGES GUIDE (SCBG) WERE DEVELOPED BY MMM GROUP LIMITED (NOW A MEMBER OF WSP GROUP) FOR THE TRANSPORTATION ASSOCIATION OF CANADA (TAC).

OVERVIEW

The Transportation Association of Canada (TAC) recognized the need of a national guide that provides the framework and practical direction to improve the sustainability of roads and bridges. The guides are an important step forward in the way to think about sustainability for transportation infrastructure. MMM Group Limited (MMM) was retained by TAC to carry out the research and to develop the guides.

The CGGR is comprised of 12 objectives that serve as the core values for improving the sustainability of road projects. They provide direction for improving the sustainability of infrastructure projects and the rationale for undertaking specific actions. The objectives have the additional benefit of providing a tool for clearly communicating sustainability to stakeholders. An example of an objective is: Reduce energy use.

To help practitioners meet sustainability objectives, a series of 31 practices were developed. The practices provide overviews of approaches that can be considered in the life of a road. Each practice is presented as a fact sheet and includes description, rationale and considerations for undertaking the practice and potential barriers and metrics as well as examples

where the practice has been used. The CGGR also include a set of sustainability questions that help practitioners self-evaluate the sustainability benefits of their project and point to ways to improve. The CGGR is unique in that it is an interactive tool that guides users to sustainable practices based on their unique project characteristics

The SCBG complements the CGGR, and follows the same sustainability objectives. It includes more guidance and insight on the concept of sustainability and decision making. The 22 bridge practice sheets provide clear and concise information on specific topics to be considered by owners, bridge engineering teams, and stakeholders in order to achieve one or more of the sustainability objectives.

The MMM team worked closely with the Project Steering Committees in the preparation of this comprehensive document, which included both in-depth literature review as well as input from industry experts and owners from jurisdictions nation-wide. The guides provide advice on how to improve sustainability for roads bridges anywhere in Canada, of any size, and at any life stage.

It represents the best practices on sustainability from professionals across Canada and the world.



CAMBIE STREET BRIDGE, VANCOUVER, BC

Project objectives

In recent years, broad attention has been given to making transportation infrastructure sustainable, in recognition of its impacts on the environment, and the social and economic well-being of our communities. Considering the growing awareness of sustainability, most authorities recognize that it needs to be given important consideration when making decisions, setting policies, and meeting performance goals sought by stakeholders.

The goal of TAC was to develop national guides that provides support to professionals and transportation agencies in understanding and improving the sustainable benefits (i.e. social, economic, and environmental) of their projects, and communicating those benefits to stakeholders in a consistent, objective, and credible way.

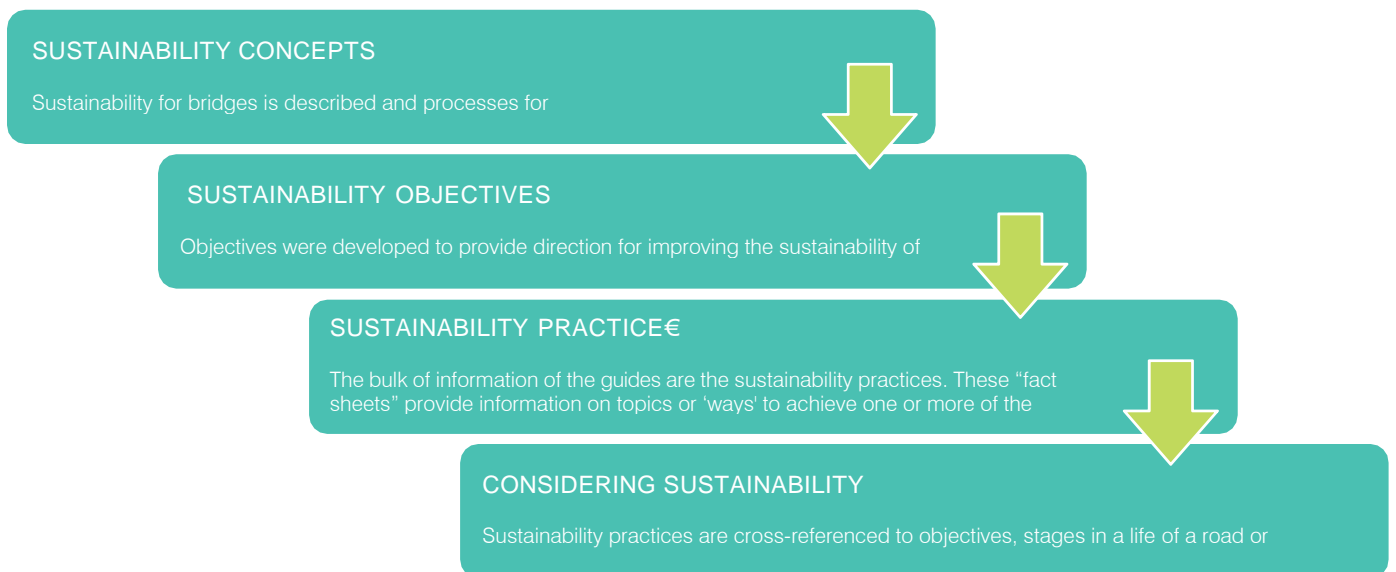
The safety and durability of roads and bridges are often prime areas of focus for the engineering community. However, these efforts are rarely coordinated with the integrated goal of improving sustainability, and are sometimes considered without a clear understanding of the positive and

negative impacts on sustainability. This is not surprising given the lack of a standard framework or guidance for examining and improving sustainability for roads or bridges.

In fact, this sentiment was echoed in a survey of more than 450 members of the road and bridge communities in Canada. Most respondents felt that “sustainability” was not well-defined and that guidance was needed on communicating sustainability practices, expanding current practices, and increasing awareness of issues and considerations.

With all this in mind, TAC recognized the need to develop national guides that provides the framework and practices to improve the sustainability benefit of bridges. The result was the Canadian Guide for Greener Roads (CGGR) and the Sustainability Considerations for Bridges Guide (SCBG). Together, they provide meaningful direction on sustainability considerations specific to road and bridge planning, design, construction, and maintenance. The content and framework of the guide is shown in [Figure 1](#):

FIGURE 1:



The CGGR and SCBG are ground-breaking, first-of-their-kind national guide intended to assist engineers and stakeholders as they work to improve the sustainability benefits of transportation projects to the advantage of communities across Canada.

The scope of the guides was ambitious from the beginning. The guides needed to explain what sustainability means for the planning, design, construction operation, maintenance, and decommissioning of roads and bridges in a meaningful and implementable way. Then best practices, or ways to move toward sustainability, needed to be defined and described so that they reflected the realities of provincial and municipal requirements. All of this needed to be done in a way that was easily understandable by stakeholders while still containing useful information for bridge engineers and other technical experts. The CGGR also included questions to self-assess the sustainability of a project. All components of the CGGR were included in an interactive tool developed in a Microsoft ACCESS database.

Developing the guides was a complex process. A large project team of MMM technical experts was assembled including 10 senior bridge engineers, road engineers, geotechnical engineers, water resources engineers, hydrogeologists, biologists, transportation planners, sustainability professionals, construction and maintenance professionals, and other experts throughout Canada. A collaborative process was developed to effectively and efficiently leverage the knowledge and expertise of the large 24 and 15-member Project Steering Committees comprised of multi-disciplinary professionals from across Canada.

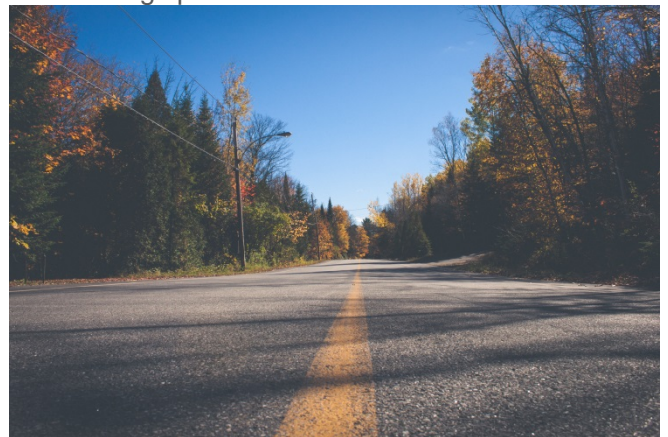
Complexity and Key Challenges

Challenge #1 First of its kind: The Canadian Guide for Greener Roads (CGGR) and its companion document the Sustainability Consideration for Bridges Guide (SCBG) are ground-breaking national guides. There are nothing like them in the world. Everything had to be created, which is even more of a challenge when the potential scope is enormous: all environmental, social and economic aspects of

the planning, design, construction, operation, maintenance / rehabilitation, and decommissioning of roads and bridges. We had to create a shared vision of the guide. Through workshops, a clear vision and understanding of expectations was developed so that all participants were comfortable with the direction of the guides.

Challenge #2 The Broad Scope: From material engineering to ecology, sustainability considerations can affect all stages in the life cycle of a bridge and influence every aspect of a bridge and its interaction with the world. In order to ensure the scope was appropriately defined, an extensive literature review was conducted alongside consultation with the Project Steering Committees. We used surveys of transportation professionals to help determine priorities with respect to sustainability. The resulting sustainability considerations were set to those most meaningful aspects that could be addressed within the schedule and budget of the project.

Challenge #3 Meaningful Definition of Sustainability: A key problem was that sustainability and its goals are not defined in an actionable way. With the PSCs, we developed the twelve sustainability objectives that to provide clear direction for improving the sustainability of infrastructure projects and the rationale for undertaking specific actions.



Challenge #4 Defining the content: the technical content needed to be accurate, applicable roads and small- and medium-span bridges in Canada, forward-thinking, understandable to stakeholders, and useful to engineers and other technical professionals. This challenge was addressed through an extensive

review of the literature of the topic areas. Input was also gathered from professionals and topic experts within MMM and the municipal and provincial government organizations comprising the Project Steering Committees.

Challenge #5 Collaboration: To meet the above challenges, an organized and logical process was developed to manage the project. Communication and consultation with the Project Steering Committees was the cornerstone of the project management for both the CGGR and the SCBG. The PSCs were large, 24 member for the CGGR and 17 members for the SCBG plus a large consultant team. It was a major challenge to align and manage expectations for the projects. Through effective project management and the passion of the Project Steering Committee and MMM project team, the SCBG was delivered on time and on budget.

Innovation

The Canadian Guide for Greener Roads (CGGR) and its companion document the Sustainability Consideration for Bridges Guide (SCBG) are ground-breaking national guides. There are nothing like them anywhere in the world. The CGGR is an innovative sustainability self-evaluation and decision-making guidance tool for the planning, design, construction maintenance and operation of roads. The CGGR enables and empowers users to: self-evaluate the sustainability “benefits” of an existing or potential road project, and determine ways to improve the sustainability “benefits” of a road project.

To do this, twelve sustainability objectives were defined and developed. They provide direction for improving the sustainability of infrastructure projects and the rationale for undertaking specific actions. The objectives have the additional benefit of providing a tool for clearly communicating sustainability to stakeholders. An example of an objective is: Reduce energy use.

To help practitioners meet sustainability objectives, a series of 31 practices were developed. The practices provide overviews of approaches that can be considered in the life of a road. Each practice is presented as a fact sheet

and includes description, rationale and considerations for undertaking the practice as well as potential barriers and metrics as well as examples where the practice has been used. The CGGR also include a set of sustainability questions that help practitioners self-evaluate the sustainability benefits of their project and point to ways to improve. The CGGR is unique in that it is an interactive tool that guides users to sustainable practices based on their unique project characteristics.

SCBG builds on the CGGR by bringing bridges into the sustainability discussion. It expands on the sustainability by addition of 24 more sustainability practices and expands on the discussion of sustainability concepts and decision making for sustainability. Together, they provide a comprehensive guide to consider and integrate sustainability into roads and bridges

The guides are innovative not only as a large leap forward in the way to think about sustainability for roads and bridges but in how it was developed. Sustainability is a very broad topic that is challenging to define in a useful manner. To tackle this problem, two surveys were sent to over 450 members of the broader road and bridge community in Canada at the start of the project. The project team used the feedback from survey recipients to set the stage for the guides, most importantly to facilitate discussion and decision making with the Project Steering Committee with respect to scope, important practices, etc. From this process, we are confident that the CGGR and the SCBG described sustainability and provided practices to improve it to meet the needs of both the Project Steering Committee and the broader transportation community in Canada.

Henry Ford said “if everyone is moving forward together, then success takes care of itself.” This was certainly true of this undertaking. The technical expertise from the broad range of professionals (over 100 individuals participated in the two guides) in Canadian transportation community was coordinated and integrated with a comprehensive review and exhaustive search of relevant literature to produce the CGGR and SCBG. They represents technical excellence as it embodies the best thinking of bridge engineers, planners, designers, and scientists from across Canada and internationally.

Meeting Client's Needs

The Transportation Association of Canada (TAC) wished to provide guidance on integrating sustainability into transportation infrastructure. The Canadian Guide for Greener Roads (CGGR) with the Sustainability Consideration for Bridges Guide (SCBG), provide twelve sustainability objectives, best practices, examples, and sustainability self-evaluation to support transportation professionals and authorities in making sustainable decisions. TAC considered the project to be a big success, which exceeded expectation. Not only did it get endorsement by all councils at TAC, webinars and workshops are being rolled out by TAC to better inform transportation professional on the guide.

Sustainability: Social, Economic and Environmental Benefits

The intent of the guides is to promote sustainability in the planning, design, construction, operation, maintenance, rehabilitation, and decommissioning of roads and bridges throughout

Canada. The guides encourage engineers and other professionals to consider the environmental, social, and economic impacts of their decisions.

As shown in the final picture of this submission, the guides promotes:

- reuse and recycling of materials
- energy conservation
- pollution reductions
- resource conservation and biodiversity
- community cohesiveness and local economies
- access and mobility
- safety
- innovation

The CGGR and SCBG not only illustrates the engineer's expanding role in society, but also provides a conduit to promote and expand an engineer's role in supporting the natural, social, and economic systems upon which we depend on for daily life (such as clean air and water, or safe and efficient transportation systems).

