TAC ENVIRONMENTAL ACHIEVEMENT AWARD 2008 SUBMISSION DELIVERED BY THE QUEBEC MINISTRY OF TRANSPORTATION *ENVIRONMENTAL MANAGEMENT TOOL "MTQ ROADWAY PROJECTS AND THE ENVIRONMENT"*

By Donald Martel – March 3, 2009
Quebec Ministry of Transportation
3950 Harvey Blvd., 1st Floor
Jonquière, Quebec G7X 8L6
(418) 695-7916, ext. 246 e-mail: d.martel@mtq.gouv.qc.ca

1.0 SUMMARY

The construction and maintenance of transportation infrastructure has the potential for significant impact on both the natural and human environment, and management of these activities is a highly complex endeavour. In keeping with its commitment to sustainable development, the *ministère des Transports du Québec* (MTQ) has produced a guidebook bearing the title *L'environnement dans les projets routiers du ministère des Transports du Québec* (MTQ Roadway Projects and the Environment – The Guidebook) as an environmental management tool to ensure a more efficient integration of environmental considerations in the roadway infrastructure project planning process. This 39,4 Mb document is available (in French only at this time) from the MTQ Website at the address below:

http://www.mtq.gouv.qc.ca/portal/page/portal/ministere/ministere/environnement#documentation

The distribution of this Guidebook to private sector design firms, municipal civil servants and other government officials, contractors and construction supervisors will contribute to protecting and enhancing the environment, as it includes numerous field-tested methods and techniques having previously obtained the requisite environmental approvals. This guidebook is destined to become the primary training manual for current personnel and the next generation of roadway designers and builders.

2.0 OBJECTIVES

In producing the Guidebook, the MTQ sought to achieve the following objectives:

- Develop a planning tool showcasing state of the art environmental best practices for the design and implementation of roadway and bridge projects.
- Develop a reference manual for MTQ staff as well as the engineering and environmental consulting firms whose services it retains.
- Provide a support document for roadway design and construction project management.
- Structure the document in a manner that replicates standard roadway project management chronological sequences and phasing.

– Include the roads and bridges maintenance component in order to make the Guidebook's environmental guidelines applicable to all MTQ areas of activity.
– Present the Guidebook content in tables and figures as much as possible, to facilitate reader comprehension.
– Include numerous photos providing concrete examples of the applicability of the tools and information presented in the Guidebook.
– Provide a reference manual for environmental training of roadway engineering personnel.
– Ensure the transfer of MTQ know-how to the next generation of roadway engineering personnel.

3.0 GUIDEBOOK CONTENTS

The Guidebook is divided into 12 chapters and 6 appendices. It includes 180 illustrations and colour photos, numerous descriptive tables and a list of references to existing documents, organized according to the key milestones in each project phase. Presented in legal format, the Guidebook is 348 pages long.

Chapter 1: Introduction

This chapter begins with a historical review of environmental legislation, and provides an overview of the MTQ's Departmental Environmental Policy, which recommends the development of technical guidelines and report in support of the Ministry's activities and as a means to communicate its' position at the forefront of transportation-related environmental planning and management.

This chapter concludes with a quote that summarizes the authors' collective mindset in producing the Guidebook:

> *« C'est une belle harmonie quand le faire et le dire vont ensemble. »*
> *[Harmony lies in bridging the gap between theory and practice]*
>
> Montaigne

Chapter 2: Context

The MTQ is responsible for Quebec's highway network, which encompasses close to 30,000 kilometers of highway and over 65,000 highway structures, including bridges, overpasses, culverts, etc. Although much of the population is concentrated along the St. Lawrence River, the increase of human activity in outlying and northern regions has led to the development of a diversified highway network running the gamut from high volume urban expressways to remote national highways crossing Quebec's vast forests.

The wide range of user needs combined with topography and climate-related constraints (including snow, wind, fog, ice and the freeze-thaw cycle) add to the challenge of building safe, efficient and environmentally sustainable roads.

It is across this vast territory characterized by the broadest geographic, climatic and faunal diversity that the MTQ must fulfill its' mission, which is "to ensure the mobility of people and goods throughout Quebec with an efficient and safe transportation system that contributes to the sustainable development of Quebec".

Chapter 3: Environmental considerations in roadway project development

MTQ roadway projects are divided into seven distinct phases:

– Opportunity study
– Preliminary design
– Plans and specifications
– Acquisition and preparation of the right-of-way
– Construction
– Project Commissioning
– Project evaluation

On average, roadway projects take approximately seven years from inception to completion. Delays at each stage of the project have been known to add up to a year to each stage. In the end, the population suffers the consequences of these delays, as they are left to drive for a longer period under uncomfortable, congested or even unsafe roadway conditions.

The main table in this chapter is a planning tool outlining the environmental components relative to each stage of the roadway project planning process. This tool is much appreciated by project managers and administrators.

Chapter 4: Definitions

The purpose of this chapter was to present clear definitions of the terms most often brought into question by our project teams. Some of these definitions are intended for use by MTQ partners who are called to specific provisions of provincial and federal legislation and who are not necessarily conversant with the technical terms used in roads and bridges design and construction, such as *road right-of-way* or *mat footing*. Conversely, other definitions will prove useful to designers, construction supervisors or roadway maintenance personnel who may not be familiar with environmental planning notions such as *natural high-water mark* or *wetland*.

Chapter 5: Legal Framework

Close to one hundred provincial and federal laws and regulations apply to the various aspects of road and bridge construction in Quebec, and a dozen or so have a direct and major impact on project timelines. This chapter begins with a summary table presenting a parallel outline of the provincial and federal environmental legal frameworks and procedures.

For ease of reference, this chapter is presented as a series of tables. Each table includes:

– Each piece of legislation and its accompanying regulations.
  For example, the Canadian Environmental Assessment Act (CEAA) and its 2007 regulation on the exclusion list.
– The boundaries of the area to which the law or regulation applies.

– The required authorizations and approvals.
  There often appears to be uncertainty as to the specific nature of the required authorization or approval. This section helps in quickly determining the type of approval required, i.e. permit, certificate of authorization, order-in-council, etc.
– The type of intervention and the extent of liability.
  Right from the start, project managers must be very clear on all legislation and regulations applying to the project, as well as their specific requirements. This section presents a list of common projects types along with the legal and regulatory requirements involved.
– A summary of procedures and accompanying timelines.
  As legally instituted procedures can be quite complex, it is essential to have an instrument that provides a clear picture of key steps in achieving approval under a specific law or regulation. The "Timelines" section is particularly useful to project managers and administrator during the project planning stage.
– Comments.
  As an example, in this section the reader will learn that in regards to the CEAA, there exists a Quebec-Canada agreement on the coordination of their respective environmental assessment processes. This agreement also provides for the establishment of joint environmental assessment panels responsible for holding public hearings.

Chapter 6: MTQ Policies

The MTQ officially adopted its Environmental Policy in 1992. This chapter outlines the Policy's origins, rationale, objectives and implementation tools. The Environmental Policy was developed to serve as a source of inspiration and a framework to assist MTQ personnel in conducting their activities. That is the rationale for including a summary of the Environmental Policy in the Guidebook.

Another policy, the MTQ Noise Policy, provides direction to MTQ senior management and project managers in assessing noise-related impacts and applying mitigation measures in that regard. The MTQ Noise Policy provides direction on the application of corrective measures to noise-related issues on existing roadways, and outlines an integrated planning approach to noise management along with application criteria for all new projects.

Chapter 7: Preliminary Design

Project managers sometimes forget how much decisions taken at the preliminary design stage can facilitate the successful integration of a project into the local environment. Indeed, the mitigation measures applied at this early stage to the roadway alignment, roadway profile and structures provide the most significant benefits.

This chapter begins with three tables describing all of the natural and human environment components that must be taken into account by designers in producing the preliminary design. This checklist is very useful in ensuring that no key factors are omitted at the design stage.

The next two sections provide reference materials for roadway alignment and for bridge and culvert design. These sections are very useful when engineering consulting firms are retained to provide design services.

The chapter concludes with a section on soil studies and the relocation of public utilities, as it is essential to assess the environmental impact of these project activities. For example,

Figure 32 describes the restoration of a disturbed site upon completion of a geotechnical survey, and Table 7.7 includes recommendations to mitigate the visual impact of a public utility facility.

Chapter 8: Plans and Specifications

The preparation of plans and specifications in the most important stage in the project planning process, as these documents are the link between the environmental assessments, the decisions of the design team, the environmental authorizations and approvals, as handed down to the contractor selected to complete the work as specified. When the plans and specifications do not clearly express the nature of the structure to be built and the means to achieve the desired results, construction issues and financial issues are sure to follow.

Therefore, this chapter includes numerous reference tables and photos to assist the design team in preparing proposal documents. It includes specific recommendations relative to the General Conditions and Responsibilities of the Contractor, Earthwork, Management of Waste Materials, Backfilling Operations Close to Water Bodies and Watercourses, Site-specific Erosion Control Measures and Landscape Treatment (sodding and planting activities).

This chapter concludes with site-specific requirements such as the protection of recreation and tourism activities in the vicinity of the project, noise abatement, fish habitat protection features and large mammal control structures.

Chapter 9: Construction Activities – Construction Site Environmental Management

Managing a construction site is a highly complex operation requiring meticulous preparation and careful monitoring. To assist the project engineer prepare the first site meeting, Chapter 9 includes a list of requirements to be supplied by the contractor, along with important recommendations relative to the environmental management of construction activities. The reference is designed for use by construction supervisors, who are expected to follow it until the end of construction activities. This chapter also includes tools and recommendations for communication with public. In addition, Figure N^{o} 177 shows a lookout area built for the public to observe bridge construction activities. This type of facility has the added advantage of preventing the curious from venturing onto the construction site, with its many dangers.

Chapter 10: Highway Salt

The management of highway salt is an environmental issue relating to the operation of the roadway network. This brief chapter outlines MTQ position in this matter.

Chapter 11: Environmental Monitoring Programs

The Guidebook is not intended to describe monitoring programs in full detail (program components, methodology, reporting requirements, etc.). However, this chapter provides an overview of the most common environmental monitoring programs for roadway projects.

Chapter 12: Bibliography

List of all documents referenced in the Guidebook.

Appendices A to F

This section of the MTQ Environmental Management Tool provides a series of templates and practical tools for project planning and implementation. It is, in essence, a standard "Environmental Protection" specification along with accompanying plans and detailed drawings, a transmittal form, an environmental journal to be kept by the construction supervisor, an environmental monitoring worksheet (including the project description, legislative requirements monitoring activities and mitigation measures follow-up), and any other project-related notes. The plans and specifications must reflect the project's key characteristics and must be supplemented by sample clauses from Chapter 8 of the Guidebook, as required.

4.0 CONCLUSION

Although the Guidebook received ministerial approval in 2008, thereby applying to the entire territory under MTQ jurisdiction, it had been fully implemented by one MTQ Regional Office in March 2007 and parts of the Guidebook were in use in other MTQ Regional Offices that same year. Therefore, it has been possible to conduct an assessment of the Guidebook based on the following criteria.

Contribution to environmental protection and enhancement

The *production* of a reference manual featuring environmental best practices for roadway projects, its *distribution* to interested parties, its *use as a training tool* for staff and providers of professional services and its *use* on construction sites are all contributing to a better quality of life for the general population and to enhanced ecosystem protection.

On construction site, erosion control measures are becoming more effective, because staff now possess a tool that helps them better understand the purpose of these measures, and that provides the means to diminish the impact of construction activities. For example, improving water quality in and around the site lessens the negative repercussions on the local population in many regards, including drinking water intake, swimming or fishing activities.

In terms of wildlife protection and control features, significant improvements and a heightened environmental awareness have been observed on many MTQ project sites. Even at the earliest design stages, it is now common to hear designers to raise a broad range of environment-related questions, from concerns relative to fish upstream migration to the required clearance for structure spanning navigable waterways.

Innovative features

– The Guidebook covers all environmental components, including all aspects of both the natural and human environment, for each project phase, including the commissioning and operation of the roadway network (checklists, reference tables and numerous photos taken on actual construction sites).
– A table showing, side by side, the key phases of a roadway project and the corresponding environmental activities (Chapter 3, *Environmental considerations in roadway project development*)
– Summary tables of relevant federal and provincial laws and regulations (Chapter 5)
– Special "Environmental Protection" specifications including a compilation of clauses facilitating contractor management (Appendix A)
– Special series of plans and drawings accompanying the Special "Environmental Protection" specifications (Appendix B)
– Environmental Monitoring Worksheet (Appendix E)

Financial impact

It is difficult to assess the financial impact of this type of environmental management tool, especially since in environmental matters, the primary objective is to achieve a level of sustainable development, whereby benefits will accrue to future generations.

Nevertheless, the implementation of environmental considerations includes producing an environmental monitoring worksheet outlining the quantities and costs of specific environmental protection activities, instead of including these expenses under the "site *preparation*" heading. This ensures that the contractor will receive fair compensation for work performed*,* thereby encouraging the contractor to do the environmental protection work as required, knowing they will be paid based on their proposal.

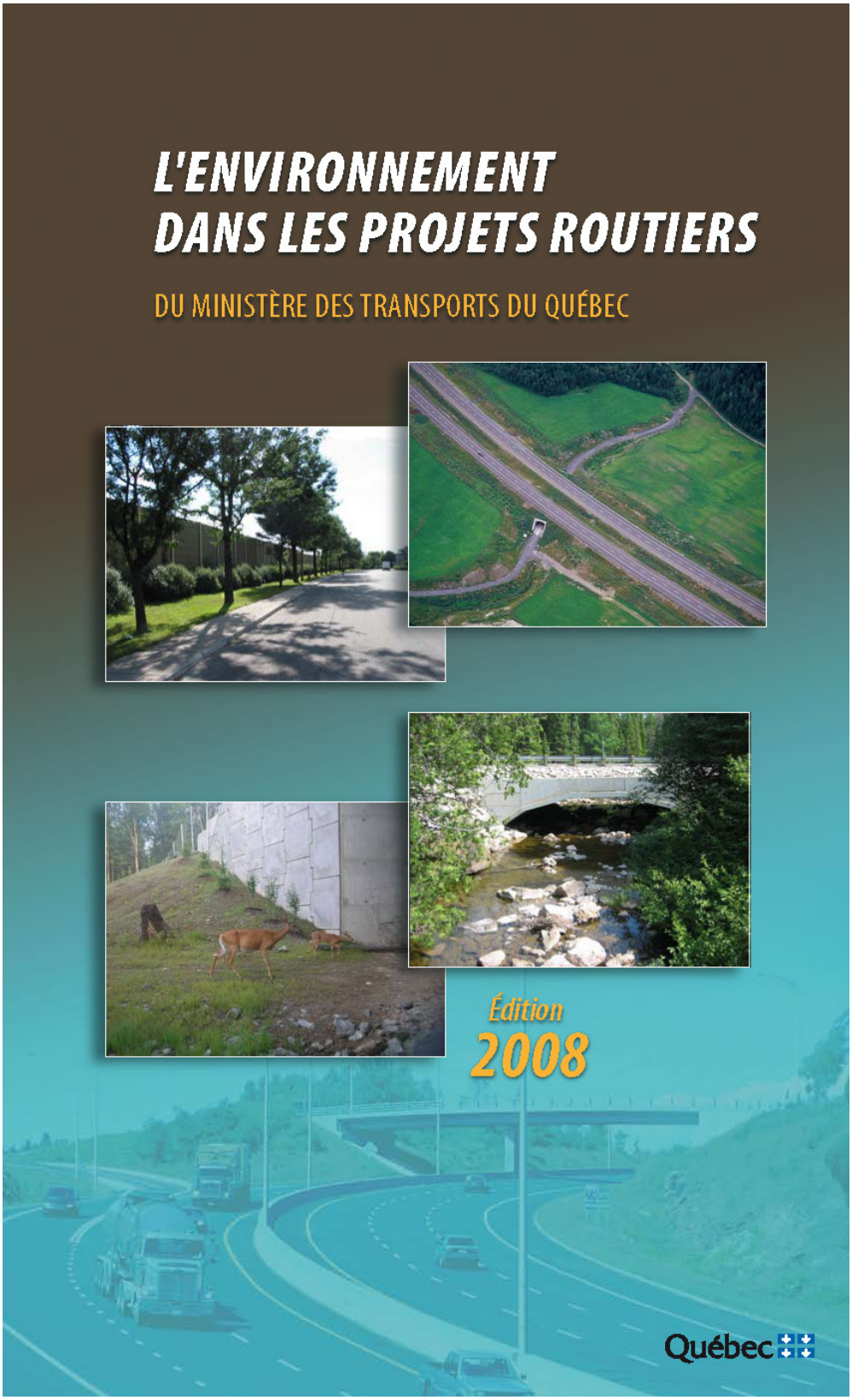
We have been compiling statistics on the prices quoted on the environmental monitoring worksheets submitted by contractors, and have noted pricing adjustments. As contractors gain more experience in implementing environmental best practices, they will be in a position to offer these services at a lower cost, which adds to the positive impact of the Guidebook.

Overall applicability

The environment knows no borders. By its structure, the Guidebook can easily be adapted for use in each Canadian province or territory, essentially by substituting the provincial/territorial laws and regulations. The MTQ has made the commitment to update the Guidebook annually. The updates will include any changes in legislation or applicable standards, and the Guidebook will be improved yearly by incorporating new information and experience acquired through roadway project planning, construction and maintenance activities.

The yearly updates will also provide the opportunity to incorporate comments and changes recommended by our partners, including private sector consulting firms, other Quebec government departments, federal departments and agencies, etc. In that respect, should other provinces choose to develop a similar environmental management tool, it could be useful for the TAC to strike a committee to collect and analyze comments across Canada, with an eye to developing national standards.

APPENDIX 1 – GUIDEBOOK COVER PAGE



APPENDIX 2 – ENVIRONMENTAL CONSIDERATIONS SCHEDULE DETAILED PROJECT OUTLINE - PART 1

3. L'ENVIRONNEMENT DANS LE CHEMINEMENT D'UN PROJET

Tableau 1 de 2

PROJET (PHASES ET ÉTAPES)	ENVIRONNEMENT
ÉTUDE D'OPPORTUNITÉ (JUSTIFICATION) – ÉTUDE DES BESOINS (CIRCULATION ET SÉCURITÉ) – ÉTUDE DES SOLUTIONS (OPTIONS ET SCÉNARIOS) **POINT DE CONTRÔLE 1**	– CADRE LÉGISLATIF – IDENTIFICATION DE LA ZONE D'ÉTUDE ET DU CORRIDOR DES TRACÉS – CONTEXTE SOCIOÉCONOMIQUE DU PROJET – DÉTERMINATION DES ATTENTES DU MILIEU – ANALYSE DES COMPOSANTES DU MILIEU NATUREL (PHYSIQUE ET BIOLOGIQUE) ET DU MILIEU HUMAIN – DÉTERMINATION DES RÉSISTANCES ENVIRONNEMENTALES DU MILIEU RÉCEPTEUR
CONCEPTION DE L'AVANT-PROJET – AVANT-PROJET PRÉLIMINAIRE (ÉTUDE DES TRACÉS ET DES PROFILS PRÉLIMINAIRES) **POINT DE CONTRÔLE 2** – Sondages et étude pédologique – Relevés géotechniques – Études de caractérisation des sols contaminés – Études hydrologique et hydraulique – Inventaire hydrogéologique – Tracé final de la variante préférable – Profil final – Révision du cadre législatif – Intégration des conditions des autorisations environnementales – AVANT-PROJET DÉFINITIF **POINT DE CONTRÔLE 3**	– DÉBUT DES PROCÉDURES LÉGISLATIVES DU QUÉBEC ET DU CANADA (AVIS DE PROJET, PORTÉE DU PROJET, ETC.) – PROTECTION DE L'ENVIRONNEMENT POUR LES ACTIVITÉS D'INVESTIGATION SUR LE TERRAIN – CONSULTATION DES AUTORITÉS RESPONSABLES DES LOIS ET DES RÈGLEMENTS – ÉVALUATION ET EXAMEN DES IMPACTS (EIE, REP, REA, ETC.) – CONSULTATION DES MIS EN CAUSE (MILIEU AGRICOLE, COMMUNAUTÉS, CITOYENS, GROUPES, ORGANISMES, ETC.) – ACCORD PRÉLIMINAIRE DE LA LPEN POUR LA CONCEPTION DES PONTS (GABARIT) – MESURES D'ATTÉNUATION ET RECOMMANDATIONS ENVIRONNEMENTALES AUX CONCEPTEURS (INCLUANT COÛTS ET BESOIN D'EMPRISE) – PROGRAMMES DE COMPENSATION – DEMANDE À LA CPTAQ – BAPE – DÉCISION DE LA CPTAQ – AUTORISATIONS GOUVERNEMENTALES (NORD-DU-QUÉBEC OU CAR ET LCEE) – AVIS D'INTERVENTION GOUVERNEMENTALE À LA MRC EN VERTU DE LA LAU
PRÉPARATION DES PLANS ET DEVIS – Emprise finale – Clauses administratives – Clauses techniques – Drainage, éclairage, etc. – Bordereaux **POINT DE CONTRÔLE 4**	– DEVIS « PROTECTION DE L'ENVIRONNEMENT » – DEVIS « ARCHITECTURE DE PAYSAGE » – DEVIS « AMÉNAGEMENTS FAUNIQUES » – CERTIFICAT D'ATTESTATION DE LA MUNICIPALITÉ OU DE LA MUNICIPALITÉ RÉGIONALE DE COMTÉ – AUTORISATIONS (QUÉBEC) - LQE (CAC–ART. 22 OU ENTENTE, ART. 32) - LCMVF - RNI (PERMIS D'INTERVENTION) – AUTORISATIONS (CANADA) - LOI SUR LA PROTECTION DES EAUX NAVIGABLES - LOI SUR LES PÊCHES

APPENDIX 3 – EXAMPLE OF A LAWS AND REGULATIONS SUMMARY TABLE

LOI CANADIENNE SUR L'ÉVALUATION ENVIRONNEMENTALE (LCEE)

– RÈGLEMENT DE 2007 SUR LA LISTE D'EXCLUSION
– RÈGLEMENT SUR LA LISTE D'INCLUSION
– RÈGLEMENT SUR LA LISTE D'ÉTUDE APPROFONDIE

GESTIONNAIRES DE LA LOI : L'Agence canadienne d'évaluation environnementale (ACEE) et l'autorité responsable principale

PAGE 1 DE 2

TERRITOIRE VISÉ

Le territoire du Canada

AUTORISATIONS

– Autorisation en vertu de l'article 20 de la LCEE à la suite d'un rapport d'examen préalable (REP)
– Autorisation en vertu de l'article 37 de la LCEE à la suite d'un rapport d'étude approfondie (REA)

INTERVENTIONS	CONTEXTE D'ASSUJETTISSEMENT
• Financement d'une autorité fédérale dans un projet. • Acquisition d'un droit foncier sur un territoire domanial administré par une autorité fédérale. • Autorisation d'une autorité fédérale (habitat du poisson, eaux navigables, chemin de fer, etc.).	• Déclenchement de la LCEE et réalisation d'un Rapport d'examen préalable ou d'un Rapport d'étude approfondie.
• Situation de crise nationale (LCEE). • Situation d'urgence (LCEE). • Entretien ou réparation d'un ouvrage. • Projet d'agrandissement ou de modification d'une route et projet d'agrandissement, de modification ou de remplacement de tout ponceau qui passe sous la route, si les conditions suivantes sont réunies : – Le projet n'entraîne pas le prolongement de la route. – Le projet n'entraîne pas l'ajout de plus d'une voie au nombre de voies existant à la date d'entrée en vigueur du présent règlement ou, si la route n'existait pas à cette date, à la fin de sa construction originale. – Le ponceau qui résulte du projet ne se prolonge pas à plus de 10 m de la plate-forme de la route. – Le projet est réalisé à au moins 30 m de tout plan d'eau. – Le projet n'est pas susceptible d'entraîner le rejet d'une substance polluante dans un plan d'eau.	• **Exclus** de la procédure d'évaluation environnementale de la LCEE en vertu du Règlement de 2007 sur la liste d'exclusion. **Sauf** si réalisé dans un parc national, une réserve foncière, un lieu historique national ou un canal historique. **Note :** Le règlement définit que « plan d'eau » inclut, notamment les lacs, les canaux, les réservoirs, les océans, les rivières et leurs affluents ainsi que les terres humides. (water body)
• Mesures de contrôle de l'érosion le long d'un plan d'eau. • Enlèvement de la végétation dans un plan d'eau ou le long de celui-ci. • Mise en valeur ou modification de plus de 500 m d'un rivage naturel continu.	• Activités concrètes non liées à un ouvrage **inclus** dans la procédure d'évaluation environnementale de la LCEE en vertu du Règlement sur la liste d'inclusion.
• Projet de construction d'une voie publique utilisable en toute saison d'une longueur de plus de 50 km située sur une nouvelle emprise OU menant à une collectivité n'ayant pas accès à une telle voie publique. • Projet de construction d'une voie publique dans un refuge d'oiseaux migrateurs.	• Réalisation d'un Rapport d'étude approfondie en vertu du Règlement sur la liste d'étude approfondie. **Note :** Le règlement définit comme « nouvelle emprise » un terrain qui est destiné à être aménagé pour une voie publique permanente et qui n'est pas situé le long d'une emprise existante, ni contigüe à celle-ci. (*new right of way*)

L'ENVIRONNEMENT DANS LES PROJETS ROUTIERS DU MINISTÈRE DES TRANSPORTS DU QUÉBEC
40 SEPTEMBRE 2008

APPENDIX 4 – EXAMPLE OF A MITIGATION MEASURE IDENTIFIED AT THE PRELIMINARY DESIGN STAGE

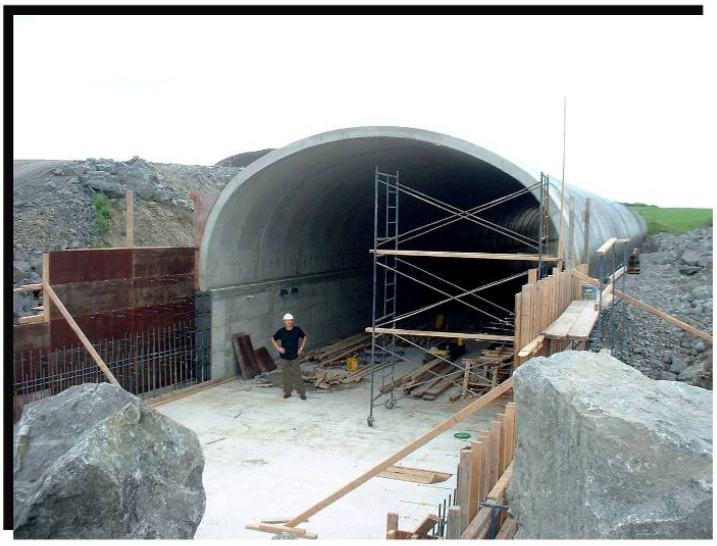


FIGURE 19 Autoroute 70 à Jonquière, secteur du rang Saint-Benoît. (2002.1016)
Structure pour la **traverse de la machinerie agricole**, ponceau voûté d'une longueur de 65 m dont le gabarit permet les dégagements minimums suivants : dégagement de 1,83 m (6 pieds) de hauteur sur 6,40 m (21 pieds) de largeur pour permettre le passage du tablier d'une moissonneuse-batteuse et dégagement de 5,18 m (17 pieds) de hauteur sur 4,27 m (14 pieds) de largeur pour permettre le passage de la cabine.
(Composante agriculture du milieu humain)

FIGURE 20 Autoroute 70 à Jonquière, secteur du rang Saint-Benoît. (2003.1074)
Structure pour la **traverse de la machinerie agricole et chemins d'accès**.
(Voir commentaires de la figure précédente)

APPENDIX 5 – EXAMPLE OF A MITIGATION MEASURE IDENTIFIED AT THE PLANS AND SPECIFICATIONS STAGE

FIGURE 138 Utilisation d'un rideau de confinement retenu au fond de l'eau au droit de travaux de remblai dans le lac Bouchard, doublé du côté des travaux d'une estacade flottante de rouleaux absorbants. Longueur de 180 m et profondeur d'eau variant de 0 à 3,5 m. Route 172 à Sainte-Rose-du-Nord. (2005.1181)

FIGURE 139 Utilisation d'un rideau de confinement retenu au fond de l'eau au droit de travaux de remblai dans le lac Bouchard. Membrane cousue sur un tuyau flottant en surface et attachée à une chaîne étalée sur le lit du cours d'eau. Route 172 à Sainte-Rose-du-Nord. (2005.1182)