Appendix 4

Business Cases to Support Capital Plan Development

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Introduction

This appendix provides a high level overview of the process that supports the development of the ministry's 3-year capital plan, and provides information on the major steps of business case development. It is based on Chapter 1 of the Ministry's MicroBENCOST Guidebook, which is also available online.

Capital Plan Development

The ministry's 3-year capital plan lists capital projects which have been approved for funding under one of the three basic stages of project development:

1. Planning and Evaluation (P&E)
2. Design and Engineering (D&E)
3. Property Acquisition and Construction (PA&C)

In order for a capital project to be considered for funding under any of these 3 stages, a business case must be submitted to the Program Development and Monitoring Branch in advance of each stage. In very simple terms, the business case will make a recommendation and provide justification to support the recommendation (more on this later). Figure 1.0 below and the text that follows, describe the basic relationship between the stages of project development and business case submissions.

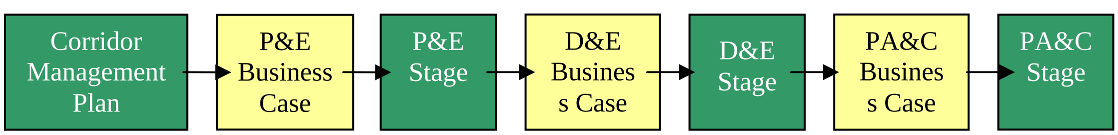

Figure 1.0 Basic Relationship between Stages of Project Development and Business Case Submissions

Before a business case is submitted for P&E funding (i.e. the P&E business case) it is preferable that a Corridor Management Plan (CMP) has been completed for the corridor on which the project is located. The CMP will have developed a corridor strategy, identified and defined specific problems along the corridor, and will provide preliminary option development and evaluation work that will form the basis of the P&E business case. It is important that subsequent project planning in the P&E stage is consistent with the corridor strategy developed through a

CMP. The P&E business case is not expected to recommend and justify a single option. Rather it will be recommending that funding be provided for a P&E study. The P&E business case should be strong in the areas of problem identification and problem definition, and it should provide a high level indication that viable options exist (i.e. high level estimates of costs, benefits and other impacts).

The P&E stage is where detailed project planning takes place – the problem is fully investigated, and all reasonable options are developed and evaluated. The detailed project planning undertaken in this stage will form the basis of the business case submitted for D&E funding (i.e. the D&E business case). The D&E business case will be recommending a specific option, and should be strong in all areas: problem identification/definition and option development/evaluation. The D&E business case is the most important because it is used to reach a decision on what will ultimately be designed and constructed.

In the D&E stage, the preferred option is designed in detail and the cost estimate is updated. The subsequent business case submitted for PA&C (i.e. the PA&C business case) basically updates the D&E business case with any new information obtained through the design stage. For example, any significant changes to the project scope are described, updated costs are incorporated, the estimate of benefits is updated if necessary, and any new information on other impacts is added.

Business Cases

A typical business case has 2 main components:

1. a recommendation (which includes an implementation plan)
2. justification for the recommendation

Recommendation Component

The recommendation component answers the questions: what, where, how much, when, how and who – answers to the latter 3 questions form the basis of an implementation plan.

For a typical P&E business case the recommendation should include:

- a funding request for a detailed project planning study
- a description of what the study will entail
- a description of where the problem is located
- an estimate of the study's cost
- a schedule for the study
- details on how the study will be carried out – in-house or consultant

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- the organizational structure of the study team

For a D&E or PA&C business case the recommendation should include:

- a funding request for design or construction of the recommended option
- a description of the recommended option
- a description of where the project is located
- an estimate of the design or construction cost
- a schedule
- details on how design will be carried out – in-house or consultant
- a description of how construction will be delivered – day labour, conventional design and tender, design-build, etc.
- the organizational structure of the team carrying out the design or construction

Justification Component

The justification component answers the question of why. Why should the decision makers approve the recommendation that has been made?

In general, the justification should include any information that supports the recommendation. At a minimum, it should address the following:

- Problem Identification
- Problem Definition
- Option Development
- Option Evaluation (MAE and benefit costs analysis)
- Uncertainty and Risk

Although each heading should be addressed in each of the 3 business cases (P&E, D&E and PA&C), the depth of analysis under each heading is generally expected to increase with each subsequent business case. For example, the P&E business case should be strong under problem identification / definition, but can take a high-level approach to option development / evaluation. It need only show that viable options exist based on a high level evaluation. The D&E business case should fully define the problem, develop all reasonable options, and provide a detailed evaluation of the most viable options to support a specific recommended option. Finally, justification in the PA&C business case is typically an update of the costs, benefits and impacts for the recommended option, and a refinement of the uncertainty and risk associated with construction of the project.

Problem Identification

Problem identification is the process of identifying deficiencies in the existing highway facility. This is done by comparing existing highway performance to threshold values for the primary highway performance measures of mobility, safety, reliability, pavement condition and bridge condition. Threshold values and further information can be found in Appendix 1 – Problem Identification for Business Case Development.

Proof that performance is below an established threshold (i.e. a problem exists) is an important part of the overall justification behind a recommendation.

Problem Definition

Problem definition is the process of carefully studying the identified deficiencies to fully understand their root causes. In many cases, the root cause(s) of a deficiency is not obvious, and a detailed study of adequate data (safety, traffic, etc.) and the site are required. This step is critical to the success of the entire process, as cost effective options can not be developed without a full understanding of the root cause(s) of the identified problems.

Clearly demonstrating that the problem has been thoroughly investigated and the root causes are fully understood is an important part of the overall justification behind a recommendation.

Option Development

Option development is the process of generating all relevant and feasible options to address the identified deficiency. The options will be evaluated in the Option Evaluation step that follows.

It is critical that all relevant and feasible options be identified. The evaluation of an incomplete or inappropriate set of options, no matter how sophisticated, will not generally assist in identifying the best course of action. It may simply serve to explain why one sub-optimal option is better than another. As previously noted, effective option development is very dependent on a good understanding of the root causes of the problem.

Often project proposals are presented in isolation and compared only to a do-nothing or status quo base case. This is generally inadequate. If there indeed is a problem, then there is every likelihood that any proposed solution may appear attractive. However, it may not be the best solution to pursue. What is required is the identification and consideration of a wide range of possible solutions to the problem at hand. Creative and innovative thinking are essential.

Following are some suggestions to enhance the generation of options:

- Begin with a clear understanding of the root causes of the identified deficiencies.
- Make use of good brainstorming techniques.
- Don’t be too quick to focus in on the most obvious or conventional options - some “lateral thinking” to identify unconventional options may yield a better solution or at least improve the more obvious solutions.
- Include diverse individuals, groups and organizations in the process. The different perspectives and expertise of users, stakeholders, and other government agencies make for a broader range of options.
- Challenge proponents of a particular option to consider what they would or could do without it.

Some times the best option will consist of a combination of a number of different actions rather than a single action. A preliminary list of possible actions includes:

- actions that moderate the need for transportation (i.e. land use, zoning and settlement planning)
- actions that encourage the use of other transportation modes (i.e. provision of additional non-road infrastructure)
- actions that use existing highway capacity more efficiently (i.e. transportation demand management and transportation system management)
- actions that preserve and protect the highway infrastructure (i.e. highway maintenance and rehabilitation, corridor protection)

The following list of preliminary options should be considered for all projects.

- alternate project scheduling (i.e. optimal timing and phasing)
- alternate project resourcing (i.e. cost-sharing, private-public partnerships, user/beneficiary pay)
- alternate design standards/geometry
- alternate design configurations within the selected route
- alternate routes within the corridor
- alternate materials and methods of construction
- non-transportation alternatives
- improvements to other modes of transportation
- enhanced maintenance and rehabilitation alternatives to delay the need for a capital improvement

The Base Case

The list of options must always include the Base Case – the existing highway receiving the minimum level of expenditure required to maintain a minimum acceptable level of service, sometimes referred to as the “do minimum”. In the option evaluation step, each option will be evaluated relative to the base case before being compared to one another.

Typically, the do minimum includes maintenance and rehabilitation funding to maintain the current standard. It is important not to overstate the scope of the do minimum, i.e. to only include in the do minimum, work which is absolutely essential to preserve a minimum acceptable level of service.

In some cases, the existing level of maintenance and rehabilitation may not be the do minimum. A lower level of maintenance and rehabilitation spending may be adequate to keep the road open, and the existing level of spending should be evaluated as an option along with other improvement options.

Similarly, replacement should not automatically be assumed to be the do minimum for a deteriorated bridge. If there are alternate routes for traffic, the do minimum may be to close the existing bridge and reroute traffic.

Clearly demonstrating that a reasonable process was followed (e.g. consultation with diverse groups) and a wide range of options were developed is an important part of the overall justification behind a recommendation.

Option Evaluation

Option evaluation is the process of evaluating the options that were generated in the option development step. If the original list of options is large, it’s advisable to carry out a preliminary screening process (high level evaluation) to reduce the list to a reasonable number for subsequent detailed evaluation.

The ministry’s detailed evaluation framework is referred to as Multiple Account Evaluation (MAE). An MAE evaluates each option under 5 different accounts: financial, customer service, environmental, economic development and social/community. The financial and customer service accounts summarize the results of a benefit cost analysis.

See Appendix 2 for a more detailed explanation of these subjects.

The evaluation of each option, including the base case, under each of the 5 accounts is the most important part of the overall justification behind a recommendation. It presents all of the important implications of each option in a consistent framework that clearly explains the trade-offs that must be made in choosing one option over another.

Uncertainty and Risk

Uncertainty is an inherent part of any capital highway improvement project. For example, there is uncertainty in many of the factors used to estimate costs and benefits, as well as uncertainty in estimating the social, environmental and economic development impacts of a project. Where there is uncertainty, there is risk of an adverse outcome. For example, the costs could be larger than estimated, the benefits could be smaller than estimated and the impacts could be worse than estimated. Clearly the level of uncertainty diminishes with the improved understanding that comes from each subsequent stage of project development. As the level of uncertainty diminishes, so too does the level of risk.

Where uncertainty and risk are significant, they should be explicitly identified and assessed in the business case. This requires a careful review of the assumptions employed in the evaluation. For example, review the uncertainty in estimates of key information, review critical assumptions, review values that were estimated versus measured, review the reliability of information sources, etc.

Sensitivity and scenario analysis are good ways to deal with uncertainty and risk. Sensitivity analysis is the process of varying an analysis input and determining the affect on the analysis outputs. The MicrobENCOST Guidebook provides information on sensitivity analysis for MicroBENCOST. Scenario analysis involves analyzing the combined effect of a change in a whole set of assumptions (e.g. “best case”, “most likely” or “worst case” scenarios).

The assessment of uncertainty and risk should serve two basic purposes:

- it should clearly identify the sources and nature of the uncertainty facing different options and the associated risk on the evaluation results
- it should evaluate the flexibility of the options to respond to uncertain, unfolding events, and comment on how this flexibility can be managed and enhanced through appropriate risk management strategies

Clearly an assessment of uncertainty and risk is an important part of the overall justification behind a recommendation.