Municipal Infrastructure Capital Standards and Criteria Manual

April 2012

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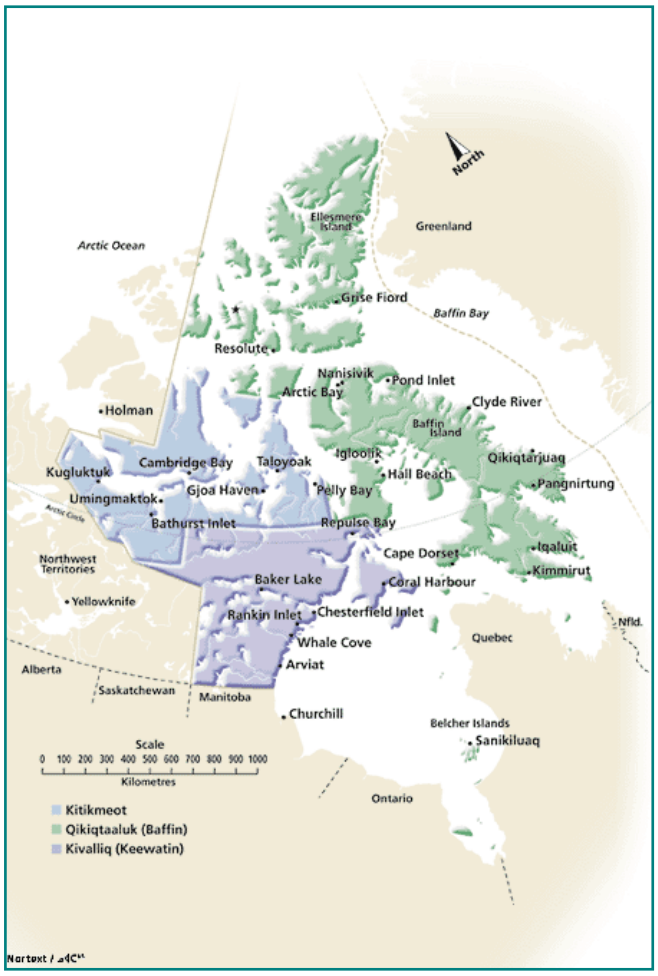
1 Introduction



Municipal infrastructure supports the social, cultural, environmental and economic dimensions of community life.

The Government of Nunavut's Department of Community and Government Services (CGS) is currently responsible for capital planning, project planning, technical reviews and delivery of municipal infrastructure in non tax based communities in Nunavut.

The challenges of planning, constructing and maintaining infrastructure in Nunavut where 27 communities are spread across a land area of nearly 2 million km^2 are very considerable. Expertise has developed over the years however and there is a record of proven methods and procedures. Standards are one of the means that can be used to capture this knowledge.

History of Municipal Standards

When the Government of Nunavut was formed in 1999, Capital Standards and Criteria (S&C) for municipal capital infrastructure were adopted that had originally been developed in 1993 by the Government of the Northwest Territories, Department of Municipal and Community Affairs (MACA). These S&C laid out what communities were eligible for in different program areas, how spending priorities should be determined, and in some cases provided specific design requirements.

In addition to the creation of Nunavut in 1999, many changes have taken place since the S&C were first developed: capital investment priorities are now determined at a Territorial level through a capital planning process; and technical design standards are established in separate guidelines such as the *Good Building Practices* document.

Revised Municipal Standards

Standards typically evolve over time. Planning for the future is easier to do when you know where you've come from. Although the Capital Standards and Criteria adopted by the Government of Nunavut in 1999 needed to be updated, they did provide a good starting point.

Updated Capital Standards and Criteria for the following types of municipal infrastructure are included in this manual:

- Water Treatment Facilities
- Wastewater Treatment Facilities
- Solid Waste Facilities
- Fire Protection Facilities
- Garages
- Community Offices
- Recreation Facilities

Dillon Consulting Limited was engaged in March, 2011 to assist the Capital Planning Division of CGS to review and update the Capital Standards & Criteria for municipal infrastructure. A number of people contributed to the development of these updated Standards and Criteria including:

Roy Green, Director Community Infrastructure
Bill Westwell, Senior Municipal Planning Engineer
Paul Mulak, Manager, Project Support
Gary Wong, Senior Facility Planner
Brian Fleming, President, Nunavut Association of Municipalities
Robert Primo, Deputy Fire Marshal
Ralph Ruediger, Director Community Development, Kivalliq
Gary Maksagak, Facilities Manager, Kitikmeot Region
Shane Slifka, Regional Project Manager, Kitikmeot Region

The primary motivation for updating the 1999 Standards & Criteria was the need to improve. Through careful consideration and discussion these updated standards:

- Are aligned with the current Government of Nunavut capital planning and project delivery process
- Provide realistic benchmarks that will allow communities to better evaluate and compare their needs and to judge if decisions are fair and equitable.
- Are organized for easy reference and come with a User Guide

2 Guiding Principles

The traditions and values of Nunavummiut influence how communities function best. Appropriate standards and criteria need to be based on sound principles that recognize the relationship between infrastructure and community functions. Some of the **principles** that have guided the new 'made in Nunavut' municipal capital standards and criteria include:

IQ

"Inuit have always lived in a harsh climate. Survival is only achieved by working together and passing on life skills and principles for living. Over the past ten years, our government has been guided by Inuit societal values, including those outlined in Pinasuaqtavut. We will continue to be guided by these principles from now into the future".

Qanuqtuurniq	Being **innovative** and **resourceful.**
Ikajuqtigiinniq	**Working together** for a common cause.
Kamatsiarniq	**Respect** and **care** for the land, animals, and the environment.

Source: Government of Nunavut, Department of Executive and Intergovernmental Affairs, Hivunikhaliurutikhat (Guiding Principles), undated.

Progress

Adequate infrastructure contributes to social, cultural, environmental and economic progress at the community level.

Results

Better standards will lead to better design briefs and building designs, which in turn should reduce and control significant design and work scope changes throughout the course of construction. Standard indicators will allow projects to be measured against benchmarks.

Relevance

To meet the **growing needs** of the territory, infrastructure needs to be relevant, appropriate, and cost effective. A standardized component approach allows flexibility for specific projects. Coordination with tangible capital asset accounting, capital planning, and project planning procedures will be possible by using measures and indicators aligned with asset management considerations

Sustainability

Standards need to take long term costs, risks, and benefits into consideration. "Given Nunavut's scarce financial resources, Nunavummiut must ask themselves whether there are practices that they can adopt, that would not negatively affect their quality of life, but would lessen the demand on infrastructure. For example, energy saving campaigns in . . . . . Greenland led to a 50 per cent reduction in water use." *Conference Board of Canada, 2004*

3 Authority and Responsibilities

The Government of Nunavut is currently responsible for planning and delivering capital infrastructure projects in non tax based communities.

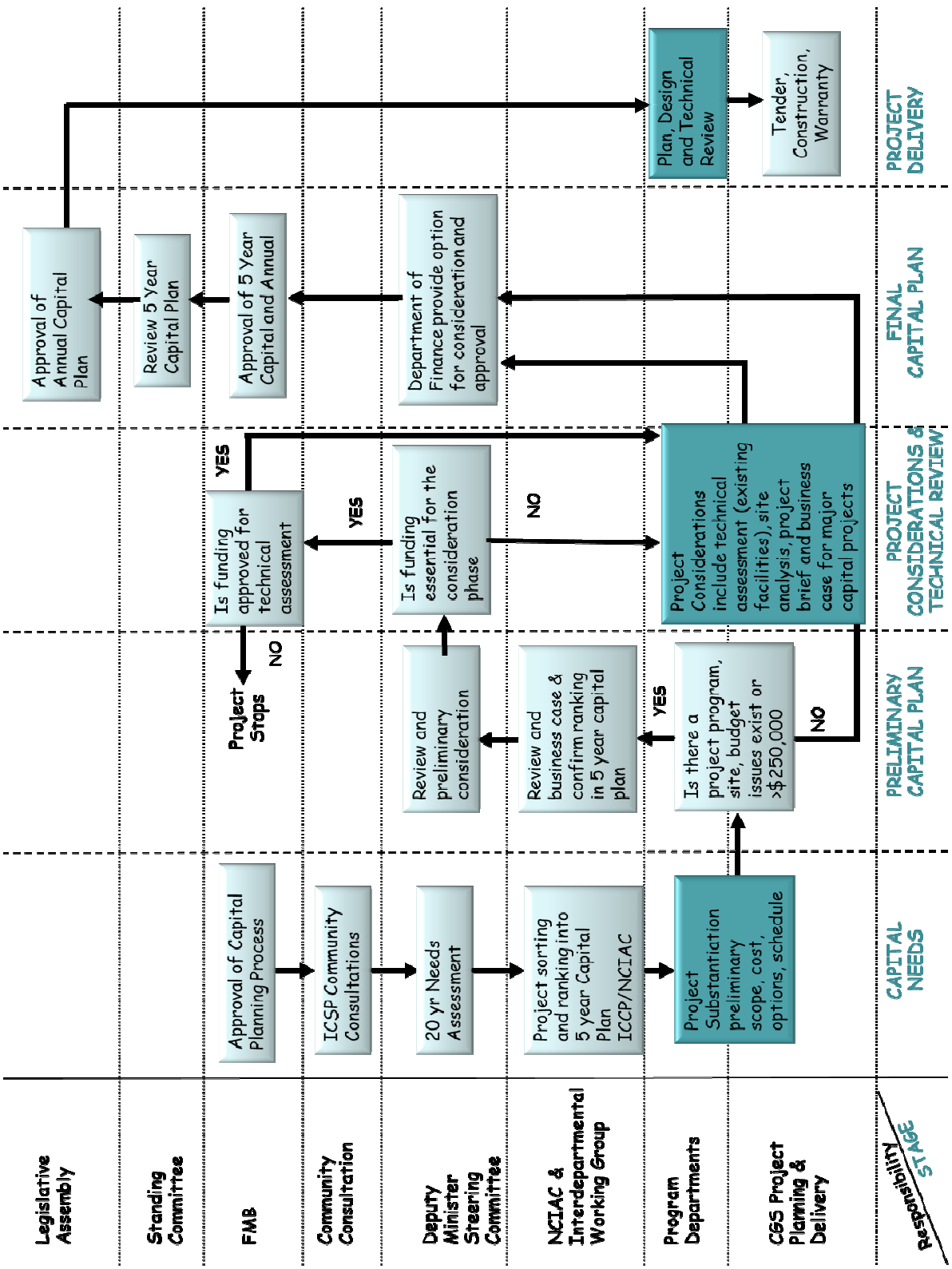
Municipalities, with support from the Government of Nunavut, are responsible for operating and maintaining capital assets.

The two levels of government work cooperatively on issues related to municipal infrastructure.

The chart on the following page provides an overview of the capital planning process. The responsibilities of specific bodies and departments within the Government of Nunavut, and the Nunavut Association of Municipalities are shown at each of the different stages of the process.

The Department of Community and Government Services (CGS) has responsibilities in most stages of the process. Divisions and Branches of the Department typically work in cooperation with program delivery departments and communities to:

- Identify capital needs
- Determine project considerations and technical requirements
- Develop Design Briefs and Terms of Reference


Legislative Assembly
Standing Committee
FMB
Community Consultation
Deputy Minister Steering Committee
NCIAC & Interdepartmental Working Group
Program Departments
CGS Project Planning & Delivery
Responsibility
STAGE
CAPITAL NEEDS
PRELIMINARY CAPITAL PLAN
PROJECT CONSIDERATIONS & TECHNICAL REVIEW
FINAL CAPITAL PLAN
PROJECT DELIVERY
Approval of Capital Planning Process
ICSP Community Consultations
20 yr Needs Assessment
Project sorting and ranking into 5 year Capital Plan ICCP/NCIAC
Project Substantiation preliminary scope, cost, options, schedule
Is there a project program, site, budget issues exist or >$250,000
NO
YES
Review and business case & confirm ranking in 5 year capital plan
Review and preliminary consideration
Is funding essential for the consideration phase
NO
YES
Is funding approved for technical assessment
NO
YES
Project Stops
Project Considerations include technical assessment (existing facilities), site analysis, project brief and business case for major capital projects
Department of Finance provide option for consideration and approval
Approval of 5 Year Capital and Annual
Review 5 Year Capital Plan
Approval of Annual Capital Plan
Plan, Design and Technical Review
Tender, Construction, Warranty

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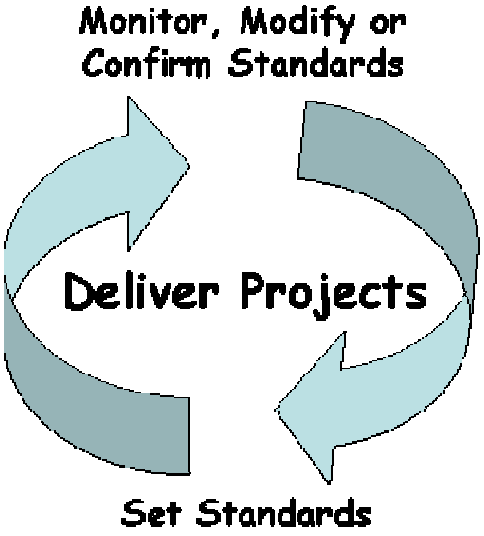
3.1 Capital Standards & Criteria

One of the inherent problems of setting standards is that when they become outdated, they become ineffective. In addition to using Capital Standards and Criteria, they need to be maintained. This will involve both learning from the past, and looking into the future.

Feedback Loop

Regular reviews and updates will help to keep standards relevant. Five years is probably a reasonable time frame: allowing enough time for lessons learned from completed projects to be evaluated.



The practical experience and knowledge of CGS, in particular operations and maintenance personnel, should be used to determine whether standards and criteria are relevant, or should be modified.

Future Oriented

Since standards will be used to define projects that will be built in the future, it is important to think ahead. From the time a project is identified, to the time it is constructed, 5 to 10 years may have passed. Standards can't only be based on what has worked well in the past, but must also consider:

- technological change
- regulatory change
- climate change
- changes in public expectations
- changes to public behaviours

It is difficult to design for the future with certainty. Decisions about how to prepare for change will need to be made by evaluating costs, risks, and benefits. Two examples

Public Behaviour Change
Increased per capita water consumption will increase the size and cost of adequate water and wastewater facilities. Depending on how water is being used, there may be health benefits associated with increased consumption.

Technology Change
With increased use of electronic documents, far less paper is used in daily business. The amount of space needed in buildings to store annual supplies will decrease. However, space and costs for equipment needed for electronic storage may increase.

below demonstrate how things will need to be considered.

3.2 Other Related Standards

Design Standards, operational standards, performance standards, standards of acceptance, standard operating procedures: there are many kinds of standards. It is easy for people to confuse them.

The S&C originally developed in 1993 included a mix of both capital and design standards. Since that time the GN has either adopted, or is developing, separate design standard documents for different types of infrastructure such as:

- The GN "Good Building Practices" serves as a 'companion' to the S&C for building construction projects.
- "Solid Waste Best Management Guide" dated March, 2011 provides a review of the current state of solid waste management and recommends best practices for communities in Nunavut.

Both capital planning and design standards will need to be referenced when developing Design Briefs, in addition to other codes, guidelines and regulations: the Capital Standards and Criteria are not intended to duplicate or contradict any of these.

Example

Capital Standards identify area allocations for washrooms in municipal buildings.

The National Building Code sets out the minimum number of fixtures that must be provided.

GN 'Good Building Practices" provides guidelines about the types of fixtures that should be provided, based on evidence from past performance.

4 Capital Standards & Criteria Users Guide

4.1 Audiences and Users

This manual, including Standards and Criteria, is intended to be used by

- CGS staff responsible for Capital Planning and Facility Planning
- Community governments and administrators
- Nunavut Capital Infrastructure Advisory Committee (NCAIC)

4.2 Format and Content

Capital Standards and Criteria for each different type of infrastructure are presented using the same format.

Each capital standard includes 10 common categories of information:

- Program Statement
- General Description of Activities
- Goals and Principles
- Technical Codes, Acts and Guidelines
- Design Capacity and Measures
- Component Options and Criteria
- Indicators
- Change
- Precedents or Comparisons
- Additional Information

Program Statement
This statement describes the intended *purpose* of the infrastructure. It provides the rationale behind the program or operation that the infrastructure is related to.

General Description of Activities
An understanding of *how* municipal services are delivered helps to establish what kind of infrastructure is needed. There are typically several different activities involved in delivering one type of service. A general description of each is provided.

Goals and Principles
The goals describe the service that communities need to deliver. Because there are often different ways to meet the goals, principles are provided to guide the selection from optional components.

Regulations, Codes, and Guidelines
Examples of technical codes that *must* be used in the design process, and guidelines that *may* be followed are included in the section. In many cases the referenced documents include references to other regulations, codes and guidelines: the listing provided here is not intended to be exhaustive.

Design Capacity and Measures
This section describes the parameters that must be known in order to determine the appropriate size or type of facility or asset. Parameters may include such things as population, topography, water quality, or number of vehicles.

Components and Criteria
Each type of infrastructure is made up of a number of different components. A separate table is provided for each functional grouping of components (related to the General Description of Activities). Criteria are provided to guide selections using parameters previously explained in the Design Capacity and Measures section. A brief description of each component explains generally what will need to be designed. Area allowances are also provided, which may be for planning purposes only, or may set maximum areas. Each individual facility will be comprised of components selected from each functional grouping.

Indicators
Quantities and qualities are identified that can be used to determine, or indicate, whether a facility plan or an existing facility is consistent with the benchmarks established in the S&C. An attempt has been made to select indicators that use easy-to-find information. Although population will not always be the perfect choice, credible and regularly updated population data, including projections, is available. Population thresholds for different services typically use 10 or 20 year projections.

Change
Most infrastructure has a service life of between 30 to 40 years. When planning for the future, it is always important to consider the kind of change that may occur over the course of time. Examples of potential changes relevant to specific infrastructure types are provided for guidance when developing project plans and Design Briefs.

Additional Information
Information that could help readers better understand specific infrastructure types. This may include descriptions of operations, construction methods, or potential design solutions.

4.3 Capital Planning

Municipal Standards and Criteria can be used as a capital planning **tool** to:

- **compare** existing infrastructure to an acceptable benchmark to substantiate needs
- **determine** a general scope of work so that a preliminary budget can be established

New Facilities

Example

A community is currently storing its' mobile equipment outdoors.
Applying the Standards and Criteria, it is determined that the community should have a 5 Bay Garage.

A project to construct a new 5 bay garage is justifiable.

Additions and Renovations

Example

A community has a 3 Bay Garage that was constructed 10 years ago.
Applying the Standards and Criteria, it is determined that the community should have a 5 Bay Garage.

A project to add 2 bays to the existing garage is justifiable assuming the existing building is in reasonable condition.

Replacement Facilities

Example

A community has a 3 Bay Maintenance Garage that was constructed 30 years ago.
Applying the Standards and Criteria, it is determined that the community should have a 5 Bay Maintenance Garage.

A project to construct a new 5 bay garage is justifiable, and the scope of work would include the demolition of the existing building.

As demonstrated in the examples above, common sense, good judgment and technical information are also needed in addition to the Standards and Criteria. Sometimes tradeoffs or minor adjustments will need to be made to suit local conditions.

Capital spending priorities are determined at a Territorial level through the Capital Planning Process, and not by the S&C. However, S&C can be used to help **substantiate priorities**. The example below explains the concept, on the understanding that the following order of priority is generally given to:

1. Projects that provide essential facilities to communities with no existing facility
2. Replacement of substandard existing facilities
3. Repairs and or upgrades to substandard existing facilities

> ***Example***
>
> Communities A, B, and C all have demonstrated needs for a Community Office building project.
>
> *Community A has an existing Community Office constructed 7 years ago, but compared to S&C it is shown to be too small.*
>
> *Community B does not have a Community Office.*
>
> *Community C has an existing Community Office building and compared to S&C the total area is adequate, but the lobby is too small.*
>
> *Priority would normally be given to the project in Community B.*

Complexing of compatible facilities can be a way of meeting needs more efficiently than constructing two separate facilities. Capital Standards and Criteria can be used to:

- Identify potentially compatible projects
- Determine the parameters for each facility
- Identify any duplication and potential for shared use of components

> ***Example***
>
> Community A has identified the need for a new community hall to be constructed in 5 years, and a new arena in 7 years.
>
> The user groups are similar and activities compatible.
> Several building components are the same including: vestibules, lobbies, public washrooms. The area allocations for arenas are greater than for a community halls.
>
> *A combined arena and community hall should be considered. The area allocation for similar components should be based on the larger of the two. The combined area of the complex must be less than the sum of the 2 area allowances.*

Capital Standards and Criteria alone will not determine whether complexing will be the best approach. Other technical aspects of the project will also need to be considered.

4.4 Project Planning

Once a capital project has been approved, CGS Facility Planners can use S&C to develop a **Design Brief** and/or **Terms of Reference** for designers.

- The S&C *Program Statements* and *General Description of Activities* provide text that can be copied directly into a Design Brief.
- Relevant component descriptions can be selected from the *Components and Options* sections of the S&C and copied into Design Brief.
- *Goals and Principles*, *Regulation, Codes and Guidelines*, and *Design Capacity and Measures* sections of the S&C can be copied directly into the Terms of Reference or Design Brief.

Designers will not generally refer to S&C. Design Briefs developed by CGS should help to 'interpret' how S&C apply to specific projects. Some judgement will always be required to apply S&C to renovation and addition projects, and when complexes are being considered.

New Facilities

The general scope of a project is determined using S&C during capital planning. Once a project has been approved, more detailed information about the project will usually become available including site information. A review of the S&C should be done at the project planning stage to confirm parameters and capacity, or to consider any other new information. For example, there may be new opportunities for building a complex that were not considered during the capital planning stage.

Renovations and Additions

Substantiation for a renovation project typically considers the cost of repairs and the resulting extended useful life of the facility, versus the cost of a new facility. For capital planning purposes the S&C can be used to provide a reasonable estimate of the scope of work for a renovation project. However it must be recognized that it is not always possible or practical for a renovation to meet standards entirely. This is similar to how the NBC applies to renovation projects. A review of the project substantiation based on the S&C is advisable at the Project Planning stage when more detailed assessments are completed of the building proposed for renovations. For example, on closer examination it may be determined that one component cannot be expanded as anticipated, and therefore an alternative to meeting capacity must be found. In this case the choice of a renovation project may need to be reconsidered.

Complexed Facilities

Similar to the considerations for new facilities or renovations, the implications of complexing may not be entirely understood until a project progresses into the design stage and technical requirements can be studied in more detail. For example, if more stringent regulations need to be met total project costs could be affected. In this case, choice of a complexed project may need to be reconsidered.