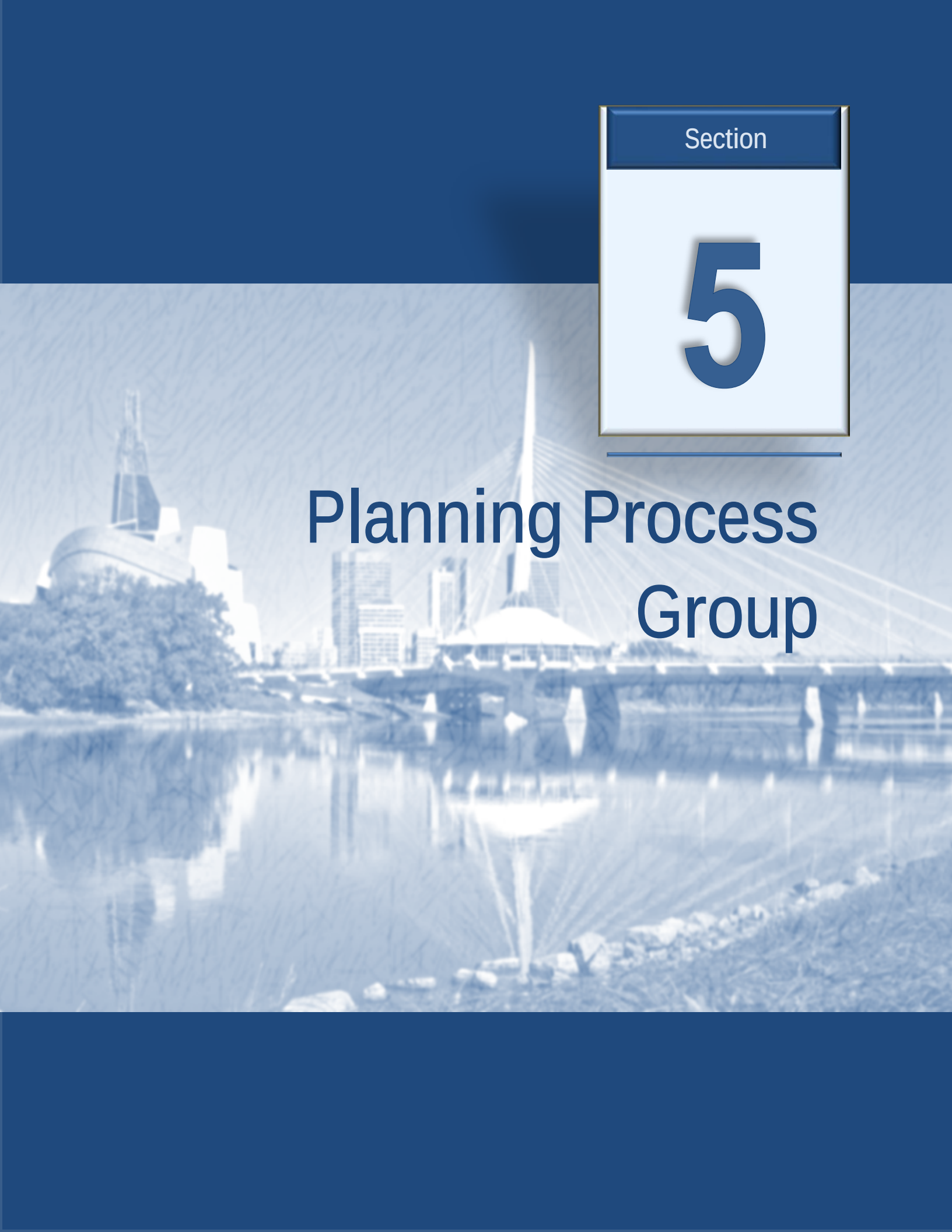


Section

5

Planning Process Group

Project Management Manual Sections

Section 1: Introduction

Section 2: Project Management Governance

Section 3: Project Delivery Framework

Section 4: Initiating Process Group

Section 5: Planning Process Group

Section 6: Executing Process Group

Section 7: Monitoring and Controlling Process Group

Section 8: Closing Process Group

Section 9: Contract Administration

5 Planning Process Group

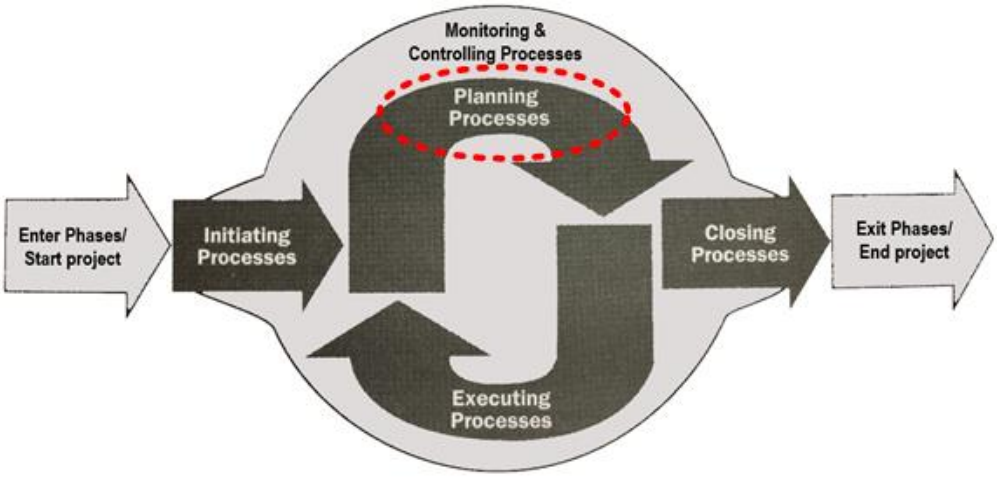
Planning is the second of the five project management process groups. Planning is a critical component in Project Delivery. While improper planning is the number one reason for poor performance, high-quality planning is the most effective way to increase the chance of exceeding expectations.

The purpose of this process group is to establish the total scope of effort, define and refine the objectives, and develop the course of action required to attain those objectives.[6] These processes develop the Project Delivery Plan and the project documents used to manage the project.

The Project Delivery Plan is continually refined through progressive elaboration as more project information are collected and understood and by incorporating the changes that occur throughout the project lifecycle.

The Project Delivery Plan and its compendium of sub-plans that must be continually updated throughout the Execution and Close-out Phases and are used as the basis for monitoring and controlling the project.

Figure 5-1. Planning Process Group



5.1 Develop Project Delivery Plan

Project Delivery Plan template

Download from the City's Infrastructure Planning Office website

The Project Delivery Plan (PDP) is a comprehensive document that describes how processes will be executed for a specific project management process in the delivery of a project. The PDP is a compendium of subsidiary plans based on the project management processes.

The initial Project Delivery Plan is where the Project Manager presents their project understanding and project delivery approach, to the Project Sponsor.

[6] Project Management Institute (2017). *Guide to the Project Management Body of Knowledge,* Sixth Edition, p. 565

Project Management Checklist template

Download from the City's Infrastructure Planning Office website

In reviewing and approving the Project Delivery Plan, the Project Sponsor accepts the project delivery approach and project resource requirements. The Project Sponsor may reject all or parts of a Project Delivery Plan and request revisions for better alignment of resources with the Business Case.

After approval, the Project Delivery Plan becomes the roadmap for executing, monitoring, controlling, and reporting on project work.

Use the Project Management Checklist tool to assist Project Managers by verifying whether everything required for a successful project has been considered and/or planned for.

5.1.1 Project Delivery Approach

The Project Delivery Plan applies to two project delivery approaches:

1. Consultant Delivered Projects:

   The Consultant has a sub-project within the City's project.

   The City's Project Delivery Plan defines the nature and extent of the Consultant's services; however, the Consultant provides the details of the product planning and associated Project Management in a Project Execution Plan (PXP), which complements the Project Delivery Plan (PDP);

2. In-House Delivered Projects:

   The Project Delivery Plan includes product planning and delivery details.

In either project delivery approach, the Project Delivery Plan encompasses the City's Project Planning.

5.1.2 Project Delivery Plan and Project Execution Plan Relationship

If the project is to be Consultant-delivered, the Consultant will develop a detailed Project Execution Plan (PXP) also known as Consultant Delivered Project Delivery Plan with a WBS, schedule, and task descriptions for their specified deliverables based on the Project Management Manual.

The City's Project Delivery Plan will identify the Consultant's deliverables (i.e.: Preliminary Design Report), the City's deliverables and tasks associated with each Consultant deliverable, for example, Consultant contract (deliverable) – soliciting, awarding, and contract administration (activities).

5.1.3 How to Prepare a Project Delivery Plan

The Project Delivery Plan describes how project management processes will be executed for a specific process and provides the Project Manager, Project Sponsor, Project Delivery Team, and stakeholders a common understanding of the work plan and planning requirements throughout the project.

Project Managers have two choices to describe the project management processes right within the Project Delivery Plan template or to describe them in a separate subsidiary plan document.

The Project Delivery Plan is articulated by developing project specific, detailed processes, based on the following processes, listed below:

- Scope Management
- Requirements Management (future to be developed)
- Schedule Management (including identification of the critical path)

- Cost Management (budget and cost per deliverable)
- Quality Management
- Resource Management (human & other material resources)
- Communications Management (Public Engagement)
- Risk Management
- Issue Management
- Procurement Management
- Change Control Management (integrated change control)
- Issue Management
- Health, Safety, Security, and Environment (HSSE) Management
- Commission
- Close-out

The Project Delivery Plan provides the baselines that are used for monitoring and controlling the project.

5.2 Plan Scope Management

Scope is an important aspect in project management, as without scope being defined, it is difficult to estimate cost or time required to complete the project.

Scope management documents how the project scope will be defined, validated and controlled throughout the project.

5.2.1 Plan Requirements Management (future to be developed)

5.2.2 Define Scope

Scope Management is the collection of processes used to ensure that the project includes all the tasks required to complete the project while excluding all work which is out of scope. The Scope Management Plan details how the project scope will be defined, developed, monitored, controlled and validated.

The Project Manager is responsible for developing details of the scope defined in the Business Case and Project Charter. As noted in *PMM Section 4.5 – Project Charter*, the Project Charter describes the product, service, or result to be delivered, and may identify key project objectives and deliverables. Further project development includes identification of the project delivery approach, project implementation phases, and support service requirements.

All project definitions begin with a scope statement. The scope statement is an overview that describes the project and its product, service, or result. It provides a common understanding of what is included and what is not included in the project.

5.2.2.1 How to Develop a Scope Statement

The Project Sponsor, Project Advisory Committee (if applicable), and other relevant stakeholders should be involved in developing the scope statement. Often the author of the Business Case and members of the Project Delivery Team contribute to or are involved, to at least review the draft scope statement.

Since the sole purpose of the project is to meet the needs expressed in the Business Case, the scope statement must be consistent with the Business Case.

The scope statement should be a narrative describing the scope and its deliverables, cost and time elements of the project, and should provide any needed clarifications, including out-of-scope work or deliverables, constraints, assumptions and acceptance criteria.

The scope statement must have sufficient detail and clarity to be used as a metric for performance reporting. It is usually based on levels of service and defined in terms of products or services.

If the deliverables change during the project, a review using the change control process is warranted.

5.2.3 Plan Work

Planning work involves development of a number of project management and product work plans for a defined scope. The work plan is a collection of all the project components, arranged according to a Work Breakdown Structure (WBS).

The work planning process requires hands-on effort by the Project Manager, expert judgement and preferably with input from an experienced team.

A commonly used project planning tool is Microsoft Project. The intent is for Microsoft Project to be applied to PMBOK-based project management processes and procedures. In general, this can occur seamlessly. However, one of the cases where Microsoft Project cannot be modified to match terminology from PMBOK is with the use of the term task.

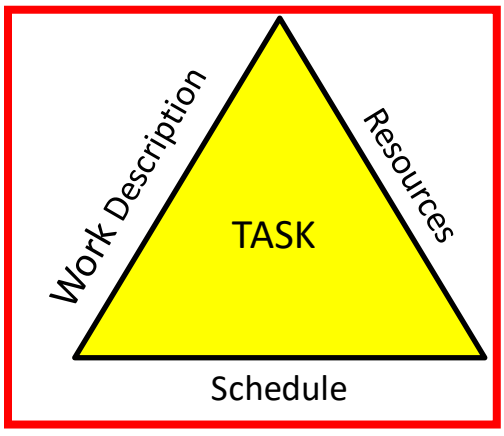
For Microsoft Project, the task can refer to phases or deliverables or work packages. Each phase can be broken down to deliverables, a deliverable to work packages, etc.

The tasks or activity for each deliverable will have:

1. a work description which defines the effort required for specific outcomes or deliverables;
2. resources (people and time) required; and
3. a schedule.

Each of these three parts is essential for effective planning, monitoring, and controlling of projects. A change to any one of these will result in a change in one or both of the others. The three parts are integrated in the project management approach shown in Figure 5-2.

Figure 5-2. Task Components Integrated into the Project Management Approach



5.2.4 Work Breakdown Structure

The Work Breakdown Structure (WBS) is a deliverable-oriented representation of the work. It presents a hierarchal view of the project comprising the total project as defined in the scope statement. The WBS subdivides the project into smaller packages for effective planning, management and delivery of the work. It defines, in explicit terms, what deliverables the customer/stakeholder will receive when the project is completed and also the specific project deliverables that are produced for the project itself, for example, a Project Delivery Plan.

All projects require a Work Breakdown Structure.

Creating a WBS is the process of sub-dividing the deliverables and project work into increasingly smaller and more manageable components. Work packages are at the lowest level and are defined such that they can be scheduled, estimated, monitored and controlled.

The WBS provides the formal record of deliverables and associated costs. Deliverables for a project are fixed and can only be changed through the change control process. Activities, on the other hand, are what is required to produce the deliverables; and, within limits, can change during the delivery of the work.

Various layouts are commonly used for the WBS. Selecting a WBS layout depends on the type and nature of the project, with the level of detail being based on the complexity of the project.

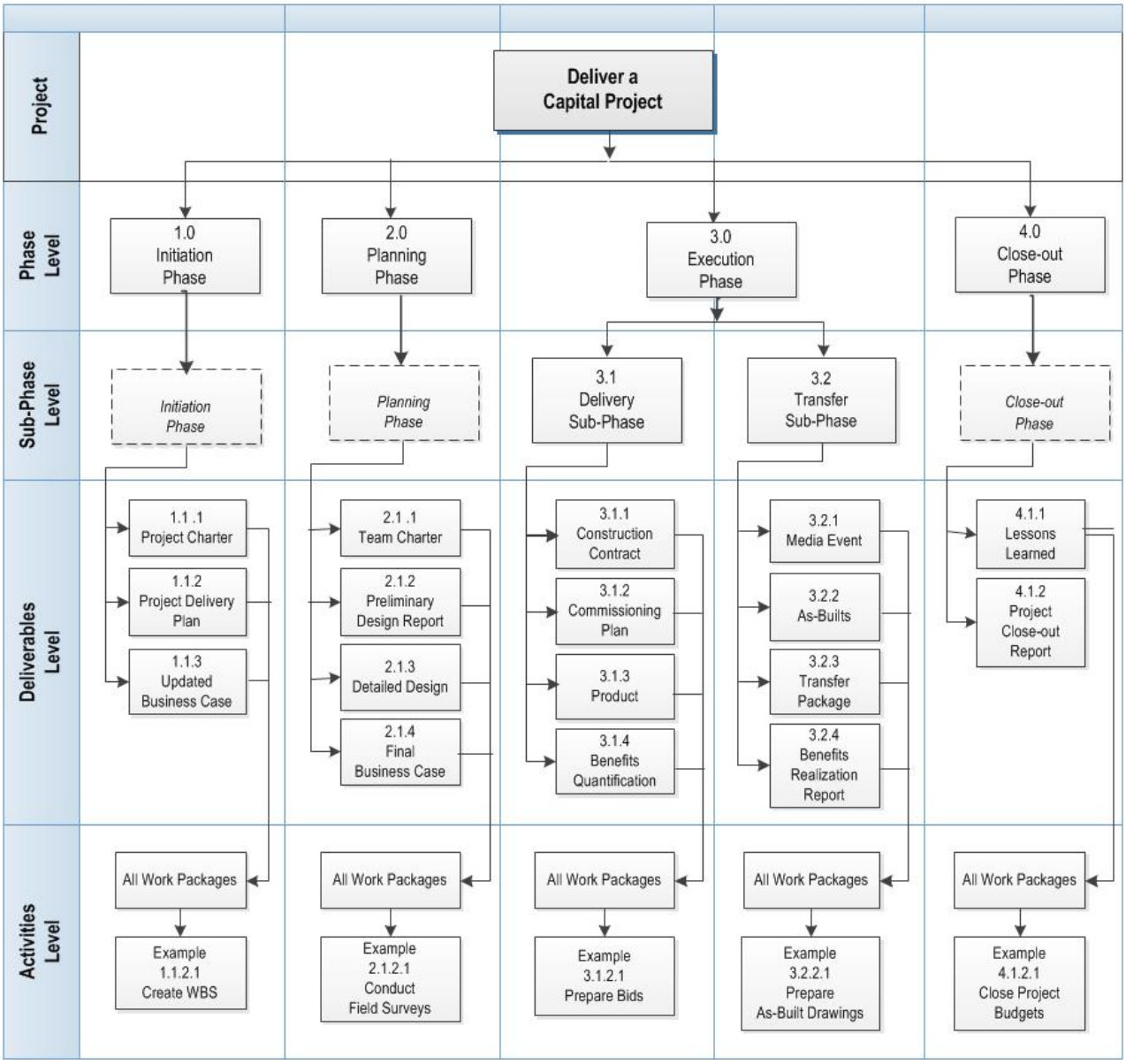
The Project Management Manual structure for project delivery aligns with the Project Delivery Framework as presented in the “Deliver a Capital Project” example in Figure 5-3: *WBS Tree Structure organized by Project Phases,* which is for a typical Design-Bid-Build (DBB) project. It includes a series of levels, starting from the top and cascading down.

- Top level is the project
- Next level down is project phases
- Next level down is specific project or product deliverables
- Next level down is work packages at the lowest level

The example has been prepared for illustration and explanation purposes; it is not intended to be complete, and the illustration includes features not normally shown on a WBS:

- Swim lanes for levels and the vertical bars for project phases are included for clarity
- The deliverables are shown in a vertical orientation to accommodate the page size
- The activities are not detailed, however, and just shown as placeholders

Figure 5-3. WBS Tree Structure organized by Project Phases



5.2.4.1 Levels of a Work Breakdown Structure

Table 5-1. Work Breakdown Structure levels

Level	Description
Project	The top-level of the WBS is the project itself; often referred to as Level 0.
Phase	The level immediately below the Project is the project phases, often referred to as Level 1. The Project Delivery Framework includes four top-level project phases.
Sub-Phase	The execution phase for the Project Delivery Framework is further subdivided into two sub-phases. The actual number of phases and sub-phases in the WBS will depend on the project requirements. • The use of phases and sub-phases must also be accommodated by phase gates. • In some cases, additional sub-phases may be required for intermediate cost estimates, project reviews and decision-making. • For more information, refer to *PMM Section 5.2.4.4 – How to Select Delivery Sub-phases.*
Deliverables	The deliverables level must include all project and product/service deliverables. • The deliverables must be tangible items that can be quantified when delivered; and should not be task activities. • The degree of breakdown and size of the end packages may vary by project size and type. • More than one level of deliverables may be used. That is, a large deliverable may be broken down into more deliverables. • It is critical to ensure that all deliverables are included.
Activities	The activities are not known for each deliverable at the early stages of the project, and therefore are not included, unless they are known at this stage. The activities are the detailed steps necessary to complete the deliverable as defined. The activities may be in terms of the work to be done for the deliverables, or in terms of defined work packages. All activities must roll up into a deliverable.

5.2.4.2 Rolling Wave Planning Technique

The refinement of the work breakdown structure occurs progressively in each phase, which is known as the Rolling Wave Planning technique.

In the example, the Consultant and Contract sub-projects have been included at the highest level in the early stages of the project and will be broken down into more refined deliverables and activities as the project progress.

The Rolling Wave Planning technique often results in the earlier phase WBS having less detail than the WBS in the later phases, specifically at the activity level. An important design principle for work breakdown structures is called the **100** percent rule.

The **100 percent rule** states that the WBS includes **100 percent** of the work defined by the project scope and captures all deliverables – internal, external, interim – in terms of the work to be completed, including project management.

The **100** percent rule applies to each phase and level of the WBS:

- Each level of the WBS must include all of the work.
- Each of the levels in a project phase must include all the deliverables necessary to complete the project.
- With reference to Figure 5-3*: WBS Tree Structure organized by Project Phases*, just as the top-level encompasses the entire project, so does every level below it.
- Because of the 100 percent rule, the total project cost at the top-level will be equal to the sum of the phases, the sum of the deliverables, and the sum of the activities. This allows the WBS to be either broken down or rolled-up by each phase to any selected level.

The WBS is a building-block for further project definition. It provides the structure for developing the basis of estimate and the schedule.

5.2.4.3 How to Create a Work Breakdown Structure

A Work Breakdown Structure is developed by subdividing the work described in the scope statement into successively smaller components (deliverables) until each is in a manageable work package.

To develop a WBS:

1. **Identify deliverables.**

   The WBS is a deliverable-oriented representation of the work, and must encompass all project and product deliverables.

   The first step is to identify and analyze the project and product deliverables and related work, and then determine what activities are needed. The project management deliverables will be defined in the Project Delivery Plan and tailored for the project. These include tangible deliverables such as the Project Delivery Plan itself. The Project Delivery Plan may be further broken-down into its components such as the Project Charter, risk assessment, requirements specification, etc., or they may be included as part of the Project Delivery Plan.

   The **critical** requirement is that **all deliverables** must be **included**. The deliverables must also include the main product deliverables which may be capital assets, a result, or a service, and will be known from the Project Charter and scope statement. For the first version of the WBS, these may be defined at a high level and later broken down to greater levels of detail through the Rolling Wave Planning technique process.

2. **Create the WBS structure.**

   The WBS is to be organized in a tree structure as illustrated in Figure 5-3: *WBS Tree Structure organized by Project Phases*. Use of the tree structure permits the lower levels to be rolled up to the higher levels with the complete roll-up encompassing the entire project.

   The project title is placed at the top level, with the project phases (initiation, planning. execution, and close-out) as defined in Figure 3-2: *Project Delivery Framework: Project Phases* Figure 5-3 on the second level. The subsequent phases will depend on the project requirements, and may be subdivided into the two standard project phases on the third level (delivery, and transfer) or even further.

   Project-specific deliverables are to be included under each project phase or branch of the tree. The level of detail for deliverables must be selected to suit the project size and complexity. For large projects, there may be two or more levels for deliverables with increasing levels of detail.

   It is **critica**l that the deliverables be defined as tangible products, services, or results that will be created or produced by the project; not work activities or effort to produce them. As a result, the deliverables are always defined as a noun.

   The activities taken to create or produce the deliverables are included in the WBS level below the deliverables. They are defined as the direct activities needed to produce the deliverables, or are work packages describing a sequence of actions or steps to produce the deliverables. The activities must all roll up into the deliverables.

3. **Defining Work Packages.**

   The extent of the work breakdown for the activities depends on the granularity required for delivery and management of the project.

   As a guide, a work package is deemed small enough when it can be estimated for work effort, cost, and time.

   The breakdown should not proceed to the point where it becomes overly restrictive or causes excessive effort to manage.

4. **Identify WBS names and WBS codes.**

   An outline naming and numbering scheme is required for the WBS.

   For WBS numbering, the project level is typically considered to be Level 0 with the subordinate levels numbered sequentially.

Note: *In Microsoft Project there are two options: Outline numbers or WBS codes.*

The WBS structure can be listed in an outline view as shown in Table 5-2. This results in the complete WBS sequenced by phase.

The outline view for the WBS is the most useful and practical method of presenting the WBS. While the tree approach provides a good illustration, it is not easy to integrate with the WBS dictionary, schedule, and resource matrix.

Table 5-2. Example WBS Outline View for Deliver a Capital Project

Project	Deliver a Capital Project
1.0	**Initiation Phase**
1.1	Initiation Phase (intentional duplicate)
1.1.1	Project Charter
1.1.1.1	*Develop Project Charter*
1.1.1.2	*Endorse Project Charter*
1.1.2	Initiation Phase Closure
1.1.3	Updated Business Case
1.1.3.1	*Update Business Case*
1.1.3.2	*Acquire Phase Approval*
2.0	**Planning Phase**
2.1	Planning Phase (intentional duplicate)
2.1.1	Project Delivery Plan
2.1.2.1	*Define Scope*
2.1.2.2	*Create WBS*
2.1.2.3	*Determine Budget*
2.1.2.4	*Prepare Schedule*
2.1.2.5	*Plan Procurements*
2.1.2.6	*Plan Communications*
2.1.2.7	*Approve Project Delivery Plan*
2.1.3	Updated Business Case
2.1.3.1	*Update Business Case*
2.1.3.2	*Acquire Phase Approval*
….	….etc.
3.0	**Execution Phase**
3.1	Delivery Sub-phase
…	…etc.
4.0	**Close-out Phase**
…	…etc.

The outline numbering can be structured to best facilitate execution of the project.

If Microsoft Project is to be used, it is desirable to assign the items in each WBS level at the same hierarchy in the numbering. By doing this, similar types of information will be displayed when sorting by outline levels in the software.

For the above example this would require the insertion of item “1.1 Initiation Phase” which would be a placeholder and a repetition of the Initiation Phase item.

5.2.4.4 How to Select Delivery Sub-phases

The standard project phases may be subdivided to accommodate complex projects.

These sub-phases may be used to identify discrete review points (phase gates). A common practice is to provide cost estimates and technical review of products at the end of these various phases.

5.2.5 Develop a Work Breakdown Structure Dictionary

The Work Breakdown Structure Dictionary is an output of the created WBS process. It is a document or spreadsheet that provides more detailed descriptions of the WBS components, including work packages and control accounts. The descriptions support development of the delivery schedule and estimation of the resources required to complete the work.

5.2.5.1 How to Develop a WBS Dictionary

The WBS Dictionary should be developed based on the project complexity. An example WBS Dictionary is provided in Table 5-3.

The information must include the WBS name, deliverable number, and the WBS code so that it can be related back to the schedule and budget. Additional information as determined by the Project Manager may be included or referenced.

Table 5-3. WBS Dictionary example

WBS Dictionary	
Project Name: Deliver a Capital Project	
Deliverable: 1.1.1 Project Charter	
Work Package ID: 1.1.1.1	**Account Code:** XX-XXXXXX
Work Package Name: Develop Project Charter	
Description of Work: Develop a Project Charter based on PMM procedure Section 4.3.1.1	
Assumptions:	
Assigned to:	**Date assigned:**
Estimated cost:	**Due Date:**
Resources:	

5.3 Plan Schedule Management

Scheduling is one of the three integrated project components, as shown in Figure 5-2. Every project must have at least one schedule.

The schedule, developed by the Project Manager at the outset of the project and reported in the Project Delivery Plan (PDP), is the master schedule for the entire delivery chain and encompasses all the project components whether in detail or rolled up. The schedule must commence from the date the Project Charter is approved and continue to the end of the Project Close-out phase. There may be multiple sub-schedules within the overall master schedule for delivery of various components, with the level of detail depending on the purpose of the schedule.

The schedule, prepared with the Project Delivery Plan as well as schedules incorporated into consulting and construction contracts are the baselines for monitoring and control. Project progress is measured against these schedules, and these schedules can only be revised through a formal authorization through the change control process.

The standard schedule format is the Gantt chart. Microsoft Project is the City's de facto scheduling tool. This tool, along with others on the market, provide many useful features, such as resource-loaded schedules that can be developed with unit rates for labour and material, and can be used for load levelling, critical path management, tracking, and progress reporting.

A Critical Path Method (CPM) schedule is another type of schedule often used on complex projects. The CPM provides a method for finding the series of interdependent tasks that, if carried out in a particular sequence, will result in the shortest time the project can be completed. These tasks are then defined to be critical and delays to any of them will extend the project duration. The CPM is a useful tool under some circumstances for specific projects.

5.3.1 GANTT Chart Schedule

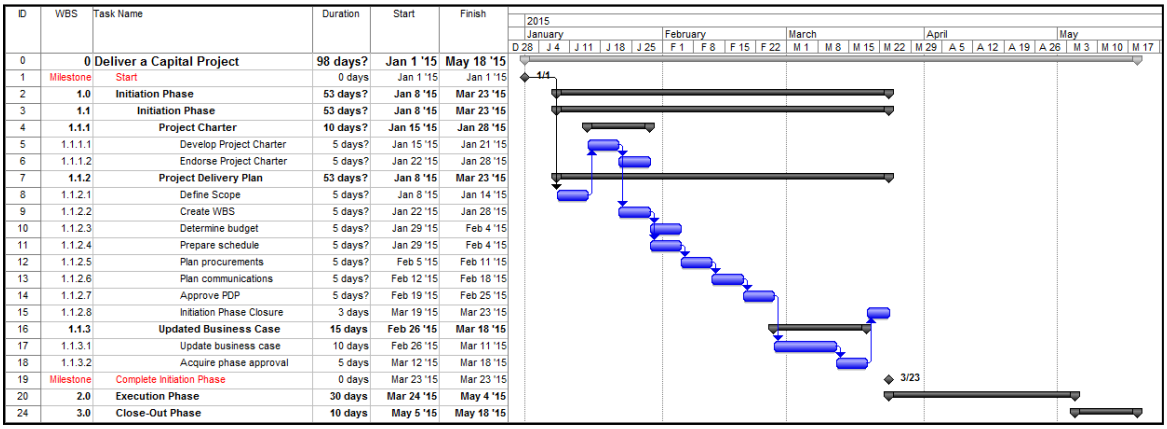
The Gantt Chart is the basic schedule used on most projects. It provides a graphic display of schedule information with bars representing work durations on a timeline for a series of activities. An example Microsoft Project Gantt Chart is provided in Figure 5-4 for the first few components of the Work Breakdown Structure (WBS) previously presented.

5.3.1.1 How to Develop a Gantt Chart Schedule

The Gantt Chart schedule is developed by:

1. **Sequencing the WBS Activities:** The logical relationships between the activities must be identified. Most projects will have relationships where one activity cannot commence until a previous one has been completed, or where one activity must follow another one.
2. **Defining Project Milestones:** A milestone is a significant point or event in the project, this may be a completion date, required in-service date, contractual date, or a combination of dates.
3. **Estimating Activity Resources and Durations:** The activity durations and material delivery times must be identified and considered in scheduling. The activity durations will depend on the resources available and level of effort, and is closely tied to the process of creating a Project Team.
4. **Developing the Schedule:** This is the process of analyzing the inputs and creating a schedule. This is often an iterative process until the best fit is achieved. Scheduling software, such as Microsoft Project, provides a valuable tool for this process.

Figure 5-4. Example Microsoft Project Gantt Chart



ID	WBS	Task Name	Duration	Start	Finish
0	0	**Deliver a Capital Project**	**98 days?**	**Jan 1 '15**	**May 18 '15**
1	Milestone	Start	0 days	Jan 1 '15	Jan 1 '15
2	1.0	**Initiation Phase**	**53 days?**	**Jan 8 '15**	**Mar 23 '15**
3	1.1	**Initiation Phase**	**53 days?**	**Jan 8 '15**	**Mar 23 '15**
4	1.1.1	**Project Charter**	**10 days?**	**Jan 15 '15**	**Jan 28 '15**
5	1.1.1.1	Develop Project Charter	5 days?	Jan 15 '15	Jan 21 '15
6	1.1.1.2	Endorse Project Charter	5 days?	Jan 22 '15	Jan 28 '15
7	1.1.2	**Project Delivery Plan**	**53 days?**	**Jan 8 '15**	**Mar 23 '15**
8	1.1.2.1	Define Scope	5 days?	Jan 8 '15	Jan 14 '15
9	1.1.2.2	Create WBS	5 days?	Jan 22 '15	Jan 28 '15
10	1.1.2.3	Determine budget	5 days?	Jan 29 '15	Feb 4 '15
11	1.1.2.4	Prepare schedule	5 days?	Jan 29 '15	Feb 4 '15
12	1.1.2.5	Plan procurements	5 days?	Feb 5 '15	Feb 11 '15
13	1.1.2.6	Plan communications	5 days?	Feb 12 '15	Feb 18 '15
14	1.1.2.7	Approve PDP	5 days?	Feb 19 '15	Feb 25 '15
15	1.1.2.8	Initiation Phase Closure	3 days	Mar 19 '15	Mar 23 '15
16	1.1.3	**Updated Business Case**	**15 days**	**Feb 26 '15**	**Mar 18 '15**
17	1.1.3.1	Update business case	10 days	Feb 26 '15	Mar 11 '15
18	1.1.3.2	Acquire phase approval	5 days	Mar 12 '15	Mar 18 '15
19	Milestone	Complete Initiation Phase	0 days	Mar 23 '15	Mar 23 '15
20	2.0	**Execution Phase**	**30 days**	**Mar 24 '15**	**May 4 '15**
24	3.0	**Close-Out Phase**	**10 days**	**May 5 '15**	**May 18 '15**

The Microsoft Project example schedule, shown above, is based on the Work Breakdown Structure (WBS) in Figure 5-3: *WBS Tree Structure organized by Project Phases* and includes the following:

- The WBS outline numbering has been included on the schedule, and provides a cross-reference for all WBS components. The third level defines the deliverables and the fourth level defines the activities.
- Microsoft Project has user defined calendars, and the Gantt chart time-scale can be adjusted as desired.
- The Gantt chart includes a summary task "*Deliver a Capital Project"* at the first line, this is the project title, and defines the total project duration. If labour hours, resources and costs are included within, the tool the will also be rolled up in the summary task. The entire duration for the summary task is calculated from individual tasks beneath it.

- The Gantt chart shows selected outline levels; the third and fourth levels for the Execution Phase are hidden, as well as the second, third and fourth for the Close-out phase.
- Work is only assigned to activities (fourth-level tasks on the chart); higher level tasks only provide summaries.
- A series of finish-to-start links have been included (the preceding task must be completed before the next task commences); links can be modified as needed. Other relationships that can be used are start-to-start, start-to-finish, and finish-to-finish, or none at all, with only fixed dates specified. The resulting schedule includes a number of work packages being carried out concurrently and a number sequentially.
- Milestones have been inserted at the start and end of the Initiation Phase, and the activities have been sized to fit within the timeframe. The milestones are of 0 duration (days) and they are represented as filled-up diamonds. Note that milestones need not be of zero duration. Though a milestone is not needed while creating a WBS, it is a good idea to have.
- Microsoft Project is a very useful tool with a number of additional features not mentioned in the preceding example, including tracking and reporting capabilities.

5.4 Plan Cost Management

Plan Cost Management defines how the project costs will be estimated, budgeted, managed and monitored and controlled throughout the project lifecycle.

5.4.1 Estimate Costs

Estimating costs is the process of developing an approximate value of the monetary value needed to complete the project component. The initial cost estimate is provided from the Business Case, developed in the pre-project phase and updated by the Project Manager based on development of the Project Delivery Plan. As the project proceeds and additional information becomes available, the Project Manager will also be responsible for developing, updating, compiling and reporting a number of intermediate cost estimate updates at different phases of the project for input to approval processes.

The cost estimate accuracy increases through the project lifecycle as the information on the product becomes more defined. At the early stages of a project, the level of accuracy is the least and the cost uncertainty is the highest. The cost estimate classification system endeavours to improve communication amongst stakeholders and reduce the misunderstanding of what they represent.

5.4.1.1 How to Classify Costs

The City has adopted the *Association for the Advancement of Cost Engineering* (AACE International) cost estimate classification system as the de facto standard. This cost estimate classification system has reasonably broad acceptance within engineering and construction communities.

Within the cost estimate classification system, the cost estimating accuracy is based on the primary characteristic of the maturity level of project definition deliverables.

The levels of project definition used correspond to the typical parts or phases of a project and their corresponding approval gates or control points.

The primary characteristic used to define the classification category is the level of project definition. A countdown approach using five estimate classes is used, labeled Class 5 through Class 1, with Class 5 being the lowest level of project definition, and Class 1 being the close to complete project definition, thus considering that estimating is a process whereby cost estimates are successively refined down to the point where a final estimate with complete project definition is achieved.

The cost estimate classification system relates a level of accuracy to the cost estimate expressed as an over or under (+/-) percentage that decreases in value as the project progresses.

At a Class 5 cost estimate, with an accuracy of +100/-50 percent means that the real value could reasonably end up being:

- as high as double
  (i.e.: 100 percent of initial + 100 percent of increase = 200 percent of initial),

  or

- as low as half of the expected value.

As an example, a cost estimate of $500,000 could be as high as $1,000,000 or as low as $250,000. Unlike contingency, the accuracy estimate is not added to the estimate however is used to demonstrate the potential range. It is also a factor for consideration in setting the contingency allowance.

Application of the Cost Estimate Classification system to the Project Delivery Framework is shown in Figure 5–5. At the pre-project phase, the cost estimates are likely to be a Class 5 cost estimate; and with the progressive refinement of project scope, the accuracy of the cost estimate increases as the project proceeds.

Figure 5-5. Cost Estimate Classification System applied to Project Delivery Framework

Cost Estimate Classification

Cost Estimate Class*	Project Definition	Project Definition/ Design % Complete	Accuracy of Cost Estimate
Class 5	Concept Screening, Rough Order of Magnitude Estimate	~1%	-50% to +100%
Class 4	Feasibility	~10%	-30% to +60%
Class 3	Preliminary Design (for Budget Authorization)	~30%	-20% to +30%
Class 2	Detailed Design in progress	~60%	-10% to +20%
Class 1	Detailed Design Documentation Complete, Pre-Tender Estimate	~99%	-5% to +10%
Scalable	Project/Program scope can be adjusted to fit the Budget	N/A	N/A

Cost Estimate Class Descriptions

Class 5	Rough estimate prepared based on very limited information. Used to make an assessment of initial viability and for long range capital planning.
Class 4	Estimates prepared based on limited information with some engineering work completed and preliminary scope determination.
Class 3**	**Estimates based on completed preliminary design documentation. This Class 3 estimate will form the basis for budget authorization and set initial control estimate against which project deliverables will be measured (i.e. on budget).**
Class 2	Estimates prepared in progressive detail from a Class 3 and are used to establish a contract value against which decisions can be made to revise the scope of the project and manage risk at a specific milestone in the design development.
Class 1	Pre-tender estimates prepared based on completed detailed design documentation (i.e. drawings, plans, specifications, etc.) as well as complete project delivery plans.
Scalable	Scalable projects/programs will be sized according to the final budget authorization.

* Determined using the AACE International Recommended Practices 17R-97, 18R-97 & 56R-08

** City Auditor has recommended that a Class 3 estimate be prepared one year in advance of construction

5.4.1.2 How to Estimate Costs

Cost estimates are required for each component of the project.

A Basis of Estimate (BoE) template is used to standardize how estimates are developed and presented.

The work breakdown structure (WBS) provides the structure for cost estimates. All costs must relate to specific deliverables in the WBS. A well-developed WBS with all deliverables identified and activities defined for their delivery, provides the basis for the project and product costs.

5.4.1.3 Project Management Costs

Project management costs are those associated with running the project. Costs are developed through bottom-up estimating for each deliverable detailed in the WBS.

The resource matrix which relates the number of hours for each individual and their billing rate to the tasks is used for this purpose. It includes a table with resources and their estimated time commitments for each task.

The project management cost estimating process takes the following steps:

1. Assign a labour rate to each individual, including a percentage for benefits (~2014-19 percent).
2. Multiply the labour rate by the number of task hours for each individual.
3. Total the values for the entire project.
4. Add any additional project expenses for materials, equipment, and incidentals.

The task costs then may be rolled up from the deliverables to higher levels of the WBS. Rolling the costs up to the top-level for every deliverable provides the total cost for the project.

A number of internal services and expenses identified in the Project Delivery Plan may not be allocated to the project budget. These may include internal support employees' time, office overhead, etc., or, in some cases, the Project Manager time may even be allocated to a non-project budget. While it is important to identify them, they must be considered separately for comparing the cost estimates with the budget.

In the future, the City may track and record all capital-project-related costs; however, this system is not yet defined.

5.4.1.4 Land Acquisition and Expropriation Costs

Land Acquisition and Expropriation costs are the costs associated with acquiring property (residential, commercial, industrial or vacant) for a particular project. This can include full takings, partial takings, easements (including right of way), corner cuts, land improvement costs and the associated administration costs.

The City's Real Estate Branch acquires land through two methods:

1. Purchase and Sale: a mutual agreement is made between the City and the landowner.
2. Expropriation: the City takes the land without the consent of the landowner.

The City prefers to acquire private property by way of purchase and sale but in some cases where a mutual agreement is not possible the City may need to acquire private property through expropriation. The City of Winnipeg Charter allows City Council to expropriate private property in accordance with the Expropriation Act, which outlines the city's requirements and responsibilities during an expropriation, as well as a property owner's rights.

Project land acquisition can be a significant risk to a project and is an important project cost. For more information, refer to FM-004 Asset Management Administrative Standard's appendix titled Land Acquisitions and Expropriations.

5.4.1.5 Consulting Service Fees

Consulting services such as those for engineering Consultants, relate to specific deliverables(s) defined in the WBS. Consultants will track and submit costs to these identified deliverables in order that costs can be managed per the change control process.

5.4.1.6 Product Cost

For the initial Project Delivery Plan, the Project Manager should start with the costs presented in the most current Business Case and update as required. As the project is now live, the Project Manager should be performing additional due diligence – taking a deeper dive into cost estimates. If the Project Manager has access to or knowledge of additional information, such as more relevant estimating tables, or experience from previous projects for cross-checking the costs, the Project Manager should include the additional information to increase the accuracy of the Project Delivery Plan.

Product costs are then developed and refined as part of the project execution. For large projects, the product cost is typically the largest cost component of the project, and development of the costs should be appropriate based on the project's complexity.

In many cases, qualified estimators or quantity surveyors are required to perform this function.

5.4.1.7 Other Incidental Costs and Fees

Other incidental costs and fees must be identified and updated. If not specifically detailed, they may be accounted for in an all-inclusive capital cost estimate or considered as part of a contingency allowance. Identifying and tracking incidental costs and fees on an individual basis becomes more important as the project becomes more defined.

Potential costs in this category include:

- Costs from other levels of government and authorities for permits, inspections, and approvals
- Third-party costs for specialist inspections, miscellaneous work, and services
- Regulatory and intervener costs for which special approvals are required
- Utility services and upgrades
- Public open houses and official openings for public programs
- Commissioning costs and customized manuals
- Operating costs during commissioning and start-up
- Use of temporary facilities and equipment
- Training costs
- Inflation
- Overhead
- Taxes

5.4.1.8 Cost Escalation

Inflation is a universal cost category that requires special attention. The estimating process must identify how inflation has been or will be addressed and managed.

The most conservative approach is to assume inflation rates are applicable, and then apply them on an annual basis to each of the component estimates. This requires that the schedules be defined and that this method be permitted in the budgeting process. Using a transparent method like this allows for proper monitoring and addressing unanticipated marketplace fluctuations.

5.4.1.9 Contingency Allowances

Contingency allowances are added to estimates to account for project uncertainty (risk) that could have a financial impact. Risks and consequently contingency allowances are generally higher at the early stages of a project, and are reduced or eliminated as more precise information becomes available.

There are several methods available for quantification of contingency amounts. Selection of the method will depend on the type of contingency under consideration, and nature of the project.

A variety of contingency allowances are used for different purposes at different points in the project, as shown in Table 5-4.

Table 5-4. Types of Contingency Allowances

Contingency Allowance	Cost Risk Type	Purpose	Owner	Value	Updating	Release
Estimating Contingency	Known-unknown	Accounts for imprecise knowledge of product details.	Project Manager	Varies with the level of cost estimate.	Updated at milestones, such as preliminary or detailed design.	The size of the contingency decreases during the project lifecycle and is eliminated or replaced by the capital cost allowance upon construction award.
Risk Reserve	Known-unknown; should be identified in the Business Case; if not, they are unknown-unknown	For response to realized risk events.	Project Manager	Determined through risk analysis, and set based on risks and risk tolerance.	Continually monitored and adjusted as risks change.	Formal process for release if risk is realized; surplus funds are retired after the risk has been eliminated.
Capital Cost Allowance	Unknown-known	Accommodates routine changes during execution	Project Manager and Project Sponsor	Usually set at a fixed percentage, such as 5 percent.	Only changed by exception.	The allowance is drawn down by issuing change orders.
Management Reserve	Unknown-unknown	For expenses outside of formal project delivery.	Project Sponsor (Senior Manage-ment Director)	Varies.	Varies.	Upon authorization of the Project Sponsor.

Table 5-4 shows that the cost risk type may be *known or unknown*, and a risk's extent and consequences may be *known or unknown*, which yields the following combinations:

Known-unknown The risk has been identified, however whether it will actually occur and, if it does, to what extent, is unknown. Knowing what the risk could be allows a rough estimate of the consequence to be made.

An example is the effect of inflation on input costs due to global economy fluctuations.

Unknown-unknown Neither the risk nor its extent and consequences are known in advance. An example is encountering archaeological ruins in an excavation.

Unknown-known	The particular risk has not been identified; however the general risk is expected to occur to a predictable extent with known consequences. An example of this is cumulative minor changes in a construction project.

Proper application, management and control of contingencies require that they have definitions and rules for how the values are determined, who owns them, how they are released, and how they are retired. The method of determining and applying contingency allowances is included in the following section.

The method of identifying and quantifying project-specific risks that affect risk reserve contingency values is described in *PMM Section 5.9 – Plan Risk Management,* and the process for tracking and managing contingency allowances are described in *PMM Section 5.4.1.10 – How to Apply Contingency Allowances.*

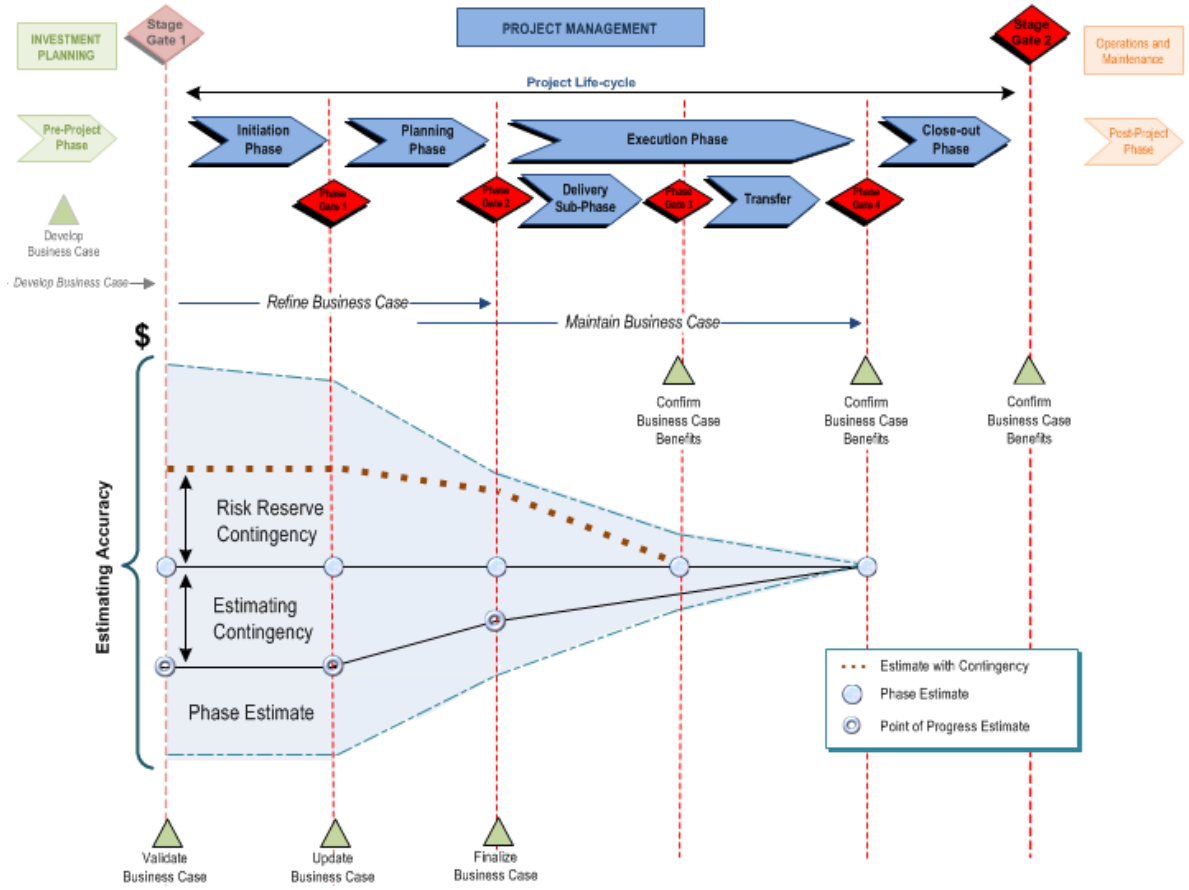
5.4.1.10 How to Apply Contingency Allowances

A fundamental issue that the Project Manager must deal with is whether the project budget is sufficient to complete the project.

Contingency allowances may be added to estimates to address various types of uncertainty and risks to improve the chances of the project being within budget, however, they must not be applied to the point where the additional commitment will encumber funds that could otherwise be put to productive use or negatively impact the project's Business Case.

The use of contingency allowances as they apply through the project lifecycle is illustrated in Figure 5-6.

Figure 5-6. Application of Contingency Allowances through Project Phases



The estimating contingency, capital cost allowance, risk reserve contingency and management reserve are applied to the project estimates at the project phases as follows.

5.4.1.10.1 Estimating Contingency

At the early phases of a project, the product cost estimate will be based on a limited amount of information, a low degree of project development and will have a high degree of uncertainly. It is generally accepted that a number of factors (known-unknowns) will cause the subsequent estimates to increase and therefore an estimating contingency is added to the phase estimate to account for the expected increases. The value of the contingency depends on the nature of the product and the level of project development. The estimating contingency is maintained through the project phases at diminishing values in general proportion to the estimating accuracy until a fixed value is received for the product.

5.4.1.10.2 Capital Cost Allowance

When a project proceeds to the delivery sub-phase, a bid for the product is received which, in effect, eliminates the estimating risk because a price is received which provides a level of cost certainty. The estimating contingency then in effect is converted to a capital cost allowance to address the unknown-known items of the delivery sub-phase. The capital cost allowance is released during the execution based on the change control process or retired at the end of the delivery sub-phase. There is no fixed rule for its quantification; however, a value of 5 percent is common based on industry practices and precedence for most major projects.

5.4.1.10.3 Risk Reserve Contingency

The risk reserve is a contingency added to the phase estimates to improve the chances that the project will remain within budget. The risk reserve contingency addresses both systemic and project specific risks and is quantified through the risk management process as described in *PMM Section 5.9 – Plan Risk Management*. The risk reserve contingency addresses the following:

- Risks that are to be accepted or are to be managed through a defined contingency allowance response will increase the required amount of the risk reserve contingency.
- Risks not to be included in the risk reserve include:
  - Extraordinary events such as extreme weather, earthquakes, riots, acts of war, new government regulations, major strikes, etc.
  - Major scope changes such as changes in product specifications, building sizes, etc. This risk should be eliminated early in the process through stakeholder requirements gathering.

5.4.1.10.4 Management Reserve

Management reserve is a provision held by the Project Sponsor for possible changes in project scope, extraordinary risks, and unforeseen external risks. Due to its nature and variability between projects, there is no industry practice or standard recommended for its quantification.

5.4.2 Determine Budget

The total funds authorized to execute the project is termed the “budget”. The budget is critical for work planning, progress and performance reporting. All Business Cases proceeding to implementation are accompanied by an approved budget, which cannot be changed without further formal approval.

For total cost accounting, all internal costs for delivery of the project are included in the budget. However, the City does not always use total cost accounting, and often projects span multiple budgets, so the Project Manager must account for which costs are allocated to the project budget, and which are funded from separate accounts.

The budget will be set based on compilation of cost estimates developed at the pre-project phase, and may be updated based on revised estimates during subsequent project phases.

Often the Business Case will have been developed from projection of historical costs or from parametric costs with a low-level of accuracy, however with a compensating contingency allowance.

Updated estimates at subsequent phases must be compared to the budget as the project proceeds. Phase gates (and/or control points for major capital projects) are the formal points for review and comparison of updated estimates with the budget.

5.4.2.1 How to Determine Budget

The initial budget is provided to the Project Manager at the outset from the Business Case, prior to the process, for developing the Project Charter. This is the first opportunity for the Project Manager to flag issues prior to acceptance and buy-in. The Project Manager must review the budget, and request any necessary clarifications to confirm or identify necessary changes to the budget. Determining a budget involves aggregating the expected cost estimates for individual deliverables and any other project cost components to establish a total cost.

The cost estimates typically include the following components of a project:

- project management costs
- Consultant or in-house engineering costs(in some cases, team members salaries)

- Construction costs
- Operational costs – additional details below
- Third-party involvement costs
- Administrative Charges – additional details below
- Contingencies
- Inflation
- Insurance costs (Course of Construction and Wrap Up Liability Insurance)
- Other costs and fees

5.4.2.1.1 Operational Costs

The Business Case considers the asset lifecycle, with operational costs forming a major component. Project delivery does not directly address operating costs; however, when the capital program changes, operating costs may change and must be updated in the Business Case's section of operating and project budgets.

5.4.2.1.2 Administrative Charges

With some specific projects, the City makes a major investment outside of normal budget categories. The City recoups these costs through administrative charges to the project.

Administrative charges include:

- *Departmental staff*
- *Corporate Administrative charges* of 1.25 percent* to a maximum capital value of $100,000 are applied to the capital budget to recover the City's internal administrative costs for expenses such as making awards, preparing contracts, and providing associated legal services.(*consult with departmental Controller for current percentage)
- *Municipal Accommodation charges* (if Municipal Accommodations is delivering the project)
- *Research (SMIR)* (Construction Only) – only applies to Public Works and construction cost items.
- *Corporate interest charge* is charged at a rate of 2 percent to the capital budget to reimburse the operating budget for interim financing. Interim financing includes the City's share of the funding and debt charges and all other costs except for salaries, Consultant fees, and legal fees. Interest is not applied to external funding, such as grants.

5.4.2.2 Estimates roll-up to the Deliverable level per the WBS

The above cost estimates roll-up to each project deliverable to facilitate consistent project reporting and the monitoring and tracking of progress, generally:

- Costs internal to the City and assigned to external parties need to be assigned to each deliverable.
- Consulting and construction contracts will have separate estimates and need to be assigned to each deliverable.
- Management reserves and risk reserve contingencies are managed as separate line items.

Project costs are continually forecasted and compared with the baseline estimates and the project budget during project execution, which may lead to the need to transfer of funds between line items or the need to obtain additional budget funds or a reduction of budget funds.

5.4.3 Basis of Estimate

Basis of Estimate (BoE) template

Download from the City's Infrastructure Planning Office website

The *Association for the Advancement of Cost Engineering International* (AACE) recommends that a Basis of Estimate (BoE) document be prepared as a deliverable to accompany the cost estimate.

The BoE clearly and concisely, indicates the purpose and scope of the estimate, pricing basis, methodology, allowances, and classification of estimate, other assumptions and any deviations from standard practices.

The BoE is the foundation for the budget request outlined in the Business Case (BC). The initial BoE is typically developed in the Investment Planning Stage of an Asset's lifecycle, and accompanies the Business Case over into Project Delivery.

Although the development of the BC and the BoE is an iterative process and will be updated multiple times as an investment matures along the project lifecycle, the BoE and BC need to be tightly integrated and aligned at specific reporting milestones.

In addition to providing the background for development of the cost estimate, it is intended to support the review and validation of the estimate.

The basic BoE includes:

- Project summary information that provides key information specific to the investment and how the estimate was assembled.
- Project Cost Detail that itemizes costs to perform all activities to deliver the investment, referencing the Work Breakdown Structure deliverable.
- Operating Cost Detail that shows the operating budget impact as a result of the capital project. This includes incremental FTE's, operation and maintenance costs and debt and financing charges.
- Class of estimate.

5.4.4 Cost Sharing Projects (to be developed)

5.5 Plan Quality Management

Quality – the degree to which the project fulfills requirements as intended in the Business Case – is one of the four project objectives. Poor quality can affect project delivery success, the product function, performance, lifecycle costs, and customer satisfaction.

The quality management process is to identify the quality requirements and standards that will be used on the project. The documenting of how the project will demonstrate compliance with those quality requirements.

5.5.1 Develop a Quality Management Plan

The Quality Management Plan (QMP) documents the quality requirements for the project and product, service and/or result, and how the project will achieve compliance.

The skills and qualifications of the resources providing services greatly affect planning for and delivering quality requirements. The Quality Management Plan must therefore also specify selection of a suitable delivery team using the following guidelines:

- Adherence to professional or trade standards may be required for certain types of work.
- Minimum qualifications and levels of experience should be considered in filling all positions.
- The procurement plan should consider the relationship between qualifications, quality, and risk in the selection criteria, and be commensurate with the project needs.

The Quality Management Plan is part of the Project Delivery Plan.

The Project Manager identifies the foundation quality requirements that will be used by the project.

For project delivery, the Project Manager will utilize the Project Management Manual as a foundational quality requirement. Other foundational requirements are included in industry-standards for a specific product, service, or result. This could include industry-standards such as the City Construction Specification, American Water Works Association (AWWA) standards, and Building Codes, etc.

The intent is to identify the core quality requirements in order that the Project Team understands what processes and procedure are to be followed on the project. The quality requirements are known at a high-level at the early stages of the project and can be refined as the project evolves. The quality requirements are also included in other documents such as Consultant and Contractor specifications (Contracts) as the project evolves.

Quality assurance and quality control activities are generated from the quality management requirements.

5.5.2 Plan Quality Assurance and Plan Quality Control

Quality Assurance (QA) – The process of reviewing (or auditing) the quality requirements and the results from quality control measurements to ensure that appropriate quality standards and operational definitions are used.

Quality assurance ensures you are doing the right things, the right way. Results from this process are used to adjust the plan, technical specification or way the work is being performed in order to ensure customer requirements and expectations are met.

Quality Control (QC) - The process of monitoring, evaluating, and recording results of executing the quality activities to assess performance and recommend necessary changes.

Quality control ensures the results of what has been done are what were expected. If not, actions must be taken to assess the reason and adjust either the process or the control parameters.

A comparison of quality assurance and quality control is described in Table 5-5.

Table 5-5. Comparison of Quality Assurance and Quality Control

	Quality Assurance (QA)	Quality Control (QC)
Definition	QA is a set of activities for ensuring quality in the processes by which products are developed.	QC is a set of activities for ensuring quality in products. The activities focus on identifying defects in the actual products produced.
Focus on	QA is process oriented and focuses on defect *prevention.* QA is a proactive quality process.	QC is product/service oriented and focuses on defect *identification.* QC is a reactive quality process.
Goal	The goal of QA is to improve development and test processes so that defects do not arise when the product is being developed. QA makes sure you are doing the right things, the right way.	The goal of QC is to identify defects after a product is developed and before it's released. QC makes sure the results of what you've done are what you expected.
How	Establish a good quality management system/plan and the assessment of its adequacy. Periodic conformance audits of the how the system/plan operates.	Finding and eliminating sources of quality problems through tools & equipment so that customer's requirements are continually met. Results are used in QA to adjust the process to eliminate consistent defects.
What	Prevention of quality problems through planned and systematic activities including documentation.	The activities or techniques used to achieve and maintain the product quality, process and service.
Responsibility	Everyone on the team involved in developing the product is responsible for quality assurance.	QC is usually the responsibility of a specific team that tests the product for defects.
Example	Verification is an example of QA. Verify that the Project Manager followed the Project Management Manual and Project Delivery Plan. Verify that a Supplier follows their mixing procedure or IT followed their scripts.	Test results are an example of QC. The number of change orders on a project. Concrete testing is an example of QC.
As a tool	QA is a managerial tool.	QC is a corrective tool.

The quality assurance and quality control processes are required for every project. The expectation is for the Project Manager to use these tools to plan, arrange, monitor, and administer the project to a standard that meets the project quality requirements.

The Quality Assurance Plan and Quality Control Plan, and their monitoring may be assigned to a QA/QC Manager or be undertaken by the Project Manager. Reviews must be undertaken by someone other than the person who performed the work.

5.5.2.1 How to Plan Quality Assurance

The Project Sponsor, Project Manager, and Project Team are to provide quality assurance throughout all project phases, regardless of the delivery method. The Project Manager promotes quality assurance by ensuring Project Team members follow a quality process.

Refer to Table 5-6 for an example Quality Management Plan illustrating quality assurance and quality control.

The Quality Management Plan will include specific processes for checking the work, outputs, and deliverables. The Project Manager coordinates the internal reviews and clearly defines reviewer expectations.

Formal quality assurance reviews may include:

- The Project Sponsor utilizing the Project Management Checklist template to ensure the Project Manager is following the processes outlined.
- Project Sponsor review and sign-off of the Project Delivery Plan (PDP) at phase gates or control points for large projects.
- Review of technical memoranda and reports, which are typically submitted as drafts and updated to final documents after the review.
- Staged reviews for large and complex projects; this may include splitting the product lifecycle into multiple phases: for example, splitting preliminary design into conceptual and functional design.
- For detailed design, sequential design reviews at the 30, 60, and 99 percent complete steps are common.

The Quality Management Plan identifies the process, who will participate in the reviews, and includes updated review schedules. The Project Manager needs to define the review period expectations so that the Project Team can properly plan and schedule its input.

The Project Manager is responsible for initiating corrective action when the quality assurance objectives are not met.

5.5.2.2 How to Plan Quality Control

Quality control applies to meeting identified project quality requirements for both project management and product delivery. The project quality requirements define the specific quality control processes and activities that need to be undertaken to ensure the product, service, or result is meeting the specification identified.

This is a monitoring and control process, and is where every deliverable is inspected, measured in some way, and tested.

The quality control process:

- checks that the results conform to quality requirements (standards)
- covers both the project and its products through the project
- detects if any defects are found, then they will need to be corrected
- needs to identify what the process is to address non-conformance

5.5.2.3 How to Develop a Product Quality Control Plan

A Product Quality Control Plan includes processes for adherence to the quality requirements for the following:

- Quality control review and inspection events
- Procedures for reviews and inspections
- Timing of quality control events and identification of reviewers and inspectors
- Checklists and forms for event tracking and documentation
- Quality metrics for comparison of results
- Process for addressing deficiencies, corrective actions and non-conformance

- Quality control sign-off forms

5.5.2.4 Example of Project Quality Management Plan

The following table is illustrates an example of how the three quality elements integrate.

Table 5-6. Integration of Quality – Requirements, Assurance, and Control

Quality Requirement	Quality Assurance	Quality Control
Follow the Project Management Manual	Project Sponsor to utilize the Project Management Checklist template to ensure the processes are followed.	Phase Gate and/or or Control Point reviews. Sign-off on key deliverables.
Develop a Training Plan	The Project Manager would review the training to ensure the processes outlined are being followed.	
Concrete meets a specific Canadian Standards Association (CSA) standard	The Contract Administrator ensures that the Consultant, Contractor and supplier are aware and follow the CSA standard (process).	Concrete tests. Concrete test results. Non-conformance identification and actions.

5.5.3 Plan Value Engineering

Value Engineering (VE) is a technique that can be used on most projects to increase value and should be considered for all large projects.

Value Engineering identifies unnecessary costs for products and services that can be reduced while still ensuring that quality, reliability, performance, and other critical factors meet or exceed customer expectations. It seeks to develop best-value solutions, not necessarily lowest capital costs.

A multi-disciplinary team identifies the improvements through structured application of VE.

The team identifies:

- the product function or service
- establishes a worth for the function
- generates alternatives through brainstorming and creative thinking
- provides the needed functions and reliability at the lowest cost

Led by a Value Engineering facilitator, the team can include those involved in design, construction, and maintenance, as well as technical experts. A number of firms with qualified practitioners can provide value engineering expertise.

5.5.3.1 How to Plan Value Engineering

For a large and complex project, value engineering is usually undertaken at the end of the functional design phase, and results are incorporated into the Functional Design Report.

The Value Engineering Team's recommendations are suggestions only; the City and the project Consultant make the decisions.

The cornerstone of effective value engineering is the generation of a large number of ideas that may be developed into feasible changes. One of the best methods for obtaining a wide spectrum of ideas is to use an interdisciplinary team of specialists. It is helpful to have at least one team member from a markedly different background since their comparatively naive viewpoint often

produces fresh, unconditioned questioning. The team is led by a person specifically trained to conduct value engineering reviews, and should include the project engineer or another employee of the project Consultant who is familiar with the project design. Whenever practical, a representative of the City should participate.

The Value Engineering Workshop is an intense working session that culminates in an oral presentation of the value engineering recommendations.

Each member of the Value Engineering Team contributes a different pattern of thinking and ideas that reflect their own experience. The ideas of each team member tend to stimulate responses and contributions from other team members, based on their backgrounds. Each team member readily responds, and the effect is that ideas represent each participant's own area of interest.

All value engineering efforts include some form of cost estimating or economic analysis; however, experience has shown that the beneficial effect is not restricted to economic savings. Significant improvements are often made in function, reliability, maintainability, reduction in complexity, and other attributes.

Early value engineering tends to produce greater results, however, there are opportunities for improvement at any stage. The ideas that are feasible for adoption change as a project moves from concept to completed design to construction and through to operations.

The conceptual design phase is one of the most productive times for value engineering review. Value engineering is undertaken at the end of the functional design phase. Changes are more readily adopted before the detailed design phase has been started. However, at the conceptual design phase, the engineering experience and competence of the Value Engineering Team is critical since appraisals must be made before the complete design is available.

Another type of value engineering review is often conducted when detailed design is 80 to 90 percent complete. At this stage it is usually too late to change basic concepts, however, there are opportunities for improvements in details.

During the Operations & Maintenance stage of an Assets lifecycle, cost-saving studies have not generally been called value engineering, however, a value engineering-like process can still be carried out. To obtain savings at this stage, additional capital expenditure is often required. The Value Engineering Team for an operational facility should have a combination of practical and theoretical skills.

Use of value engineering to reduce costs or enhance a facility's reliability, efficiency, or performance has been demonstrated in many different projects. The Value Engineering Team has a rare opportunity to review the conceptual or functional design. For a relatively low expenditure, the Value Engineering Team may identify substantial cost savings. At a minimum, a value engineering study increases overall sensitivity to project costs and boosts confidence for both the City and the project Consultant even if significant changes in the design are not made. The City is thus assured of receiving the best value for the project budget.

Several approaches are used for value engineering reviews. The most direct uses are steps labeled: Information, Creative, Evaluation, Development, Presentation, and Report, and are described below:

Information – During the Information step, the Value Engineering Team reviews the proposed design, becoming familiar with available information on function, design, construction techniques, and costs. The worth of each project element (the least-costly way to perform it) is then determined, and the cost-to-worth ratio is calculated. A high cost-to-worth ratio indicates an area where value engineering effort may be profitable. Several other techniques are also used to help the Value Engineering Team target the project elements that have high potential for cost savings or project improvement.

Creative – After identifying areas with high improvement potential, the Value Engineering Team begins a creative effort, sometimes called brainstorming, to generate ideas for alternative methods of providing the basic function. Criteria and indicated requirements are challenged, and the broadest possible range of alternatives is considered.

Evaluation – The team leader rejects ideas obviously not suitable for implementation. The entire team then ranks the remaining ideas, listing advantages and disadvantages of each and evaluating items such as technological risks, time required for implementation, and cost. The most promising alternatives are selected for further study and refinement.

Development – The best alternatives are developed into more complete proposals with more detailed cost estimates and a summary of relevant information. Cost comparisons, as estimates of savings, are made on a total lifecycle cost basis that includes both construction cost and operation and maintenance cost.

Presentation – The Value Engineering Team presents the alternatives to the City, the project Consultant, and other decision-makers. The City usually considers the Project Consultant's response before making a final decision on which alternatives to incorporate into the project.

Report – A formal report of the value engineering study is prepared listing recommended alternatives, providing complete background information on the study, and describing the basis of recommended changes. The report ordinarily summarizes the lifecycle cost savings that would be achieved through adoption of the recommended changes.

Sometimes, the most valuable value engineering suggestions do not result in cost savings, however, all are included in the report.

5.6 Plan Procurement Management

All capital projects must have previously considered the project delivery method at a higher level of analysis as part of the Business Case development. Considerations may include:

- Public Private Partnership (P3)
- Design-Build (DB)
- Construction Manager (CM)
- Design-Bid-Build (DBB)
- In-House

The project delivery method is reviewed as part of the planning phase, and a more in-depth analysis of the delivery method approach may be warranted.

The Public Service normally procures infrastructure using the Design-Bid-Build approach, which is the most common delivery model for most government projects in Canada. Therefore the City has standardized contracts in place for this model. The allocation of risk between the City and the Contractor is well defined and understood by all parties. Thus the City has established processes and experience in the administration of Design-Bid-Build contracts.

Standardized contractual documents do not normally exist for other project delivery methods and would have to be specifically developed for the project. Therefore, there is additional time and expense associated with developing new contracts for alternative delivery methods. These contracts have a different allocation of risk between the two parties, and the City employees would not have experience in drafting or administering these contracts. Thus, there may also be additional risk associated with pursuing alternative project delivery approaches.

Therefore, due to cost, schedule and contract risk, alternative project delivery approaches is only normally considered for Major Capital Projects. Alternative project delivery approaches do not normally provide significantly positive value on smaller dollar value projects, thus would not normally be pursued on projects below the major capital projects classification.

5.6.1 Review Project Delivery Methods for Major Capital Projects

As Major Capital Projects involve large dollar amounts and risk, it is important to select the correct project delivery method at an early stage in the project. Different project delivery methods involve different allocations of risk between the Contractor and the City, and have the potential to

impact the City's finances in both a positive and negative manner. The Project Manager examines the project, and determines the best project delivery method for that project with consideration of alternative delivery methods.

Determining the best method of project delivery takes considerable judgement on the part of the Project Manager. Refer to *PMM Appendix C: Alternative Project Delivery Methodology Analysis*, which is a technical memorandum which serves as a general guide to assist the Project Manager in determining the best project delivery method.

The analysis performed by the Project Manager should consider the project risk profile, past experience with similar projects delivered using the Design-Bid-Build model as well as the overall project fit with a particular project delivery method.

A professional consultant may need to be retained to assist the Project Manager in the determining the best method of project delivery for a specific project.

5.6.1.1 Process for Review of Project Delivery Methods for Major Capital Projects

For all Major Capital Projects, the process is for the department to determine the best project delivery method for the project. The assessment of the various project delivery methods is performed by the Project Manager and approved by the Project Sponsor. Department Head approval should be obtained prior to submission to Manager, Major Capital Projects Oversight in the Infrastructure Planning Office.

The Project Manager would then submit the recommendation and supporting analysis to the Manager, Major Capital Projects Oversight of the Infrastructure Planning Office.

The Manager, Major Capital Projects Oversight performs a second-party review on behalf of the Chief Asset and Project Management Officer and Chief Financial Officer.

If confirmed by the Manager, Major Capital Projects Oversight, the Project Sponsor presents the recommendation of the project delivery method to the Major Capital Projects Advisory Committee for approval.

In the event the recommendation is for the project to be procured using an alternative project delivery method, the next step is to perform an independent assessment of Value for Money.

Consideration should be given to whether Council approval of the delivery method is required, as there is some precedent in having alternative project delivery methods approved by Council.

The Project Manager must also ensure that all projects delivered using an alternative project delivery method are compliant with Provincial Legislation and Regulations (i.e.: The Public-Private Partnerships Transparency and Accountability Act).

5.6.2 Review the Design-Bid-Build Delivery Option

The most common project delivery method for infrastructure projects is the Design-Bid-Build (DBB) delivery method. This method is routinely selected for a Consultant, and is the base assumption for the processes and procedures in this Project Management Manual.

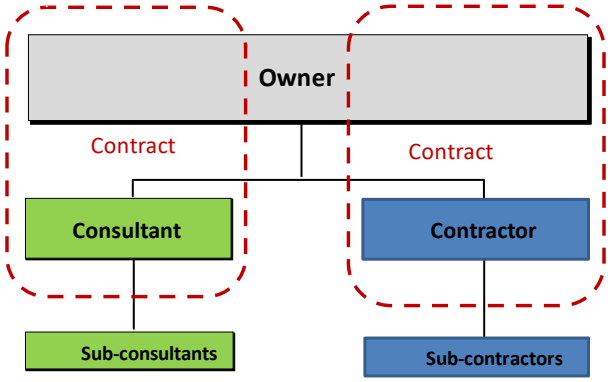
At least two procurements are required for DBB projects delivered by a Consultant:

1. First procurement is for the Consultant, who is assigned specific product delivery responsibilities. The City's Project Manager administers the Consultant's services Contract.
2. Second procurement is for the Contractor.

With this approach, the Consultant and Contractor do not form a contractual arrangement with each other; instead, the project owner has a contract with each. The City authorizes the Consultant to act on the City's behalf in inspection and oversight of construction, as illustrated in Figure 5-7.

Procurement and monitoring and control procedures consistent with the contractual arrangements are required. Roles, responsibilities and authority for the DBB delivery approach are provided in *PMM Section 5.7.3 – Roles, Responsibilities, and Authority.*

Figure 5-7. Design-Bid-Build (DBB) Contractual Relationships



The procurement plan must consider which procurements are required, the schedule for procurements, how assignments will be made, who will be involved in the process, and whether any special requirements exist. Refer to *PMM Section 6.4 Conduct Procurement* for detailed descriptions of the procurement process and links to related City websites.

5.6.2.1 Consultant Selection

All supplies are initiated through competitive offers, unless permitted as an exception, under the FI-003 Materials Management Policy (Policy Clause B3).

FM-002 Materials Management Administrative Standard further defines rules for exceptions on consulting assignments for capital and non-capital projects.

For assignments below the threshold limits single-source (direct) assignments are permitted. Single-source assignments exceeding the FM-002 Materials Management Administrative Standard values must be approved by the Executive Policy Committee. In most cases, a competitive process is required for Consultant selection.

Before soliciting proposals, the City must define its requirements by developing a Request for Proposals (RFP). The RFP approach is well-suited to consulting services since it allows Consultants to use their creativity and expertise in crafting proposals with unique features and approaches. For competitive proposals, the Consultant balances features with costs in attempting to arrive at a winning proposal. In all but exceptional circumstances, the Consultant pays proposal preparation costs.

Although required for every Consultant assignment, a Request for Proposal may vary in content and complexity depending on the size and nature of the project. Request for Proposal preparation is discussed in the executing process group in *PMM Section 6.4.1 – Prepare Request for Proposal.*

The time and effort needed to assign a Consultant may be significant because:

- The Request for Proposal is a major document that must include an accurate scope.

- The Project Team must have the opportunity for input and review before the Request for Proposal can be issued.
- Once the Request for Proposal is issued, Consultants must have adequate time to prepare proposals and respond.
- The proposals must be reviewed in detail and scored by the Evaluation Committee.
- Consultant interviews may take time for coordination and execution.
- After the Evaluation Committee has completed its rating, more time may be needed for internal recommendation reporting, review, and approval.

If there are any other special requirements they must be factored into the timeframe and cost. For example, if a two-stage proposal is used, a much longer time will be needed to assign a Consultant.

5.6.2.2 Contractor Selection

For the Design-Bid-Build method of delivery, the design, drawings, and specifications are prepared by the Consultant (or by the City for in-house projects) and packaged into a Bid Opportunity for solicitation of competitive bids.

Construction Contracts are the largest component of the Capital Budget, and it is important to consider the contracting strategy when planning the work. Availability of Contractors, size of the contract packages, sequencing of the work, and even time of year are potential considerations for packaging and issuing Bid Opportunities.

5.6.2.3 Third-Party Contracts

The need for third-parties to participate in the work must be considered as part of the procurement planning process.

Examples of potential third-party contracts are:

- Laboratory testing
- Specialist inspectors and testing agencies (concrete, roofing, welding, and air movement)
- Geotechnical Consultants
- Commissioning Contractors

The procurement plan must identify whether these services are to be contracted directly by the City, included within the consulting contract, or included within a construction contract.

Once all the procurement details are known and the procurement plan is developed, the details must be added to the work plan, with an appropriate work description, schedule, and cost estimate.

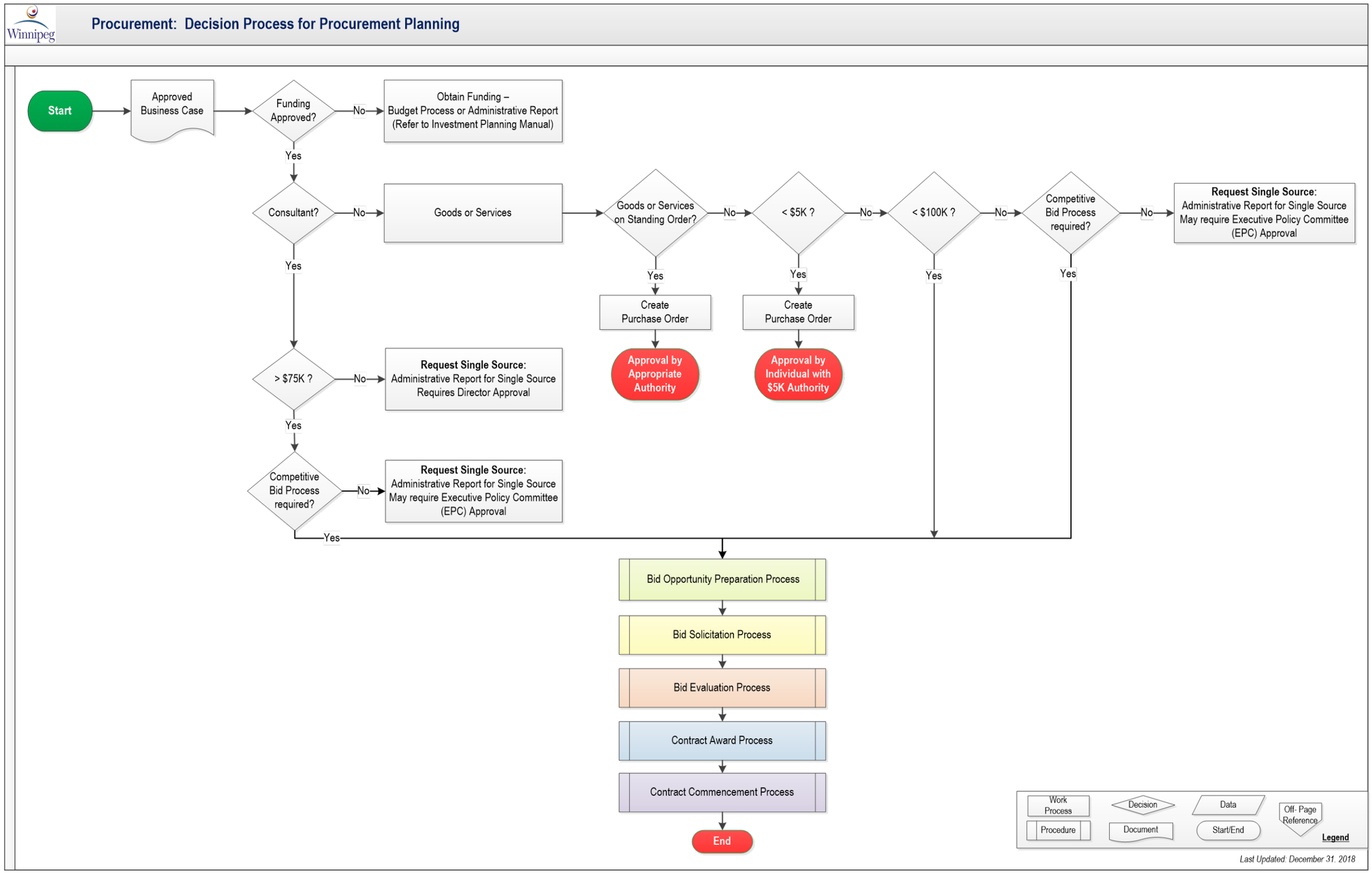
5.6.3 How to Plan Procurement

A procurement decision process map based on the FI-003 Materials Management Policy and FM-002 Materials Management Administrative Standard is shown in Figure 5-8: *Procurement: Decision Process for Procurement Planning*. The process applies to all procurements, including Consultant services and construction contracts.

The decisions are based on budget amounts, whether the procurement is for a Consultant, and whether the solicitation will be competitive or single source. If it is to be single source, the next decision is whether it requires Executive Policy Committee (EPC) approval.

Consultant assignments below the FM-002 Materials Management Administrative Standard limits do not require EPC approval; limits are different depending on whether the supply is for a capital project. In most cases, higher-value capital projects require competitive proposals for both Consultant services and construction contracts.

Figure 5-8. Procurement: Decision Process for Procurement Planning



5.7 Plan Resource Management

Resource Management planning includes the processes of estimating, acquiring, managing and utilizing resource types, such as labor, equipment and materials, and providing a schedule for the consumption of each resource respectively. It also includes the processes of identifying the organizational structure for the project and identifying and defining the roles, responsibilities, and authority for project delivery in order for successful completion of the project.

A comprehensive resource plan should list the required resources (labour, equipment, materials) quantify the required resource (labor: skills and experiences, equipment: specifications of each item, materials: type of each item required) and construct a feasible resource schedule (quantity, timeframes for consumption, assumptions and constraints identified).

5.7.1 Develop an Project Delivery Organizational Structure

By definition, projects are temporary endeavours; the team structure lasts only as long as the project. However, some organizational structure positions are used repetitively with the same individuals filling the senior roles for most projects.

A Project Sponsor, Project Manager, and Project Team are always required regardless of project size, with the team members, committees, and support staff depending on size and nature of the project.

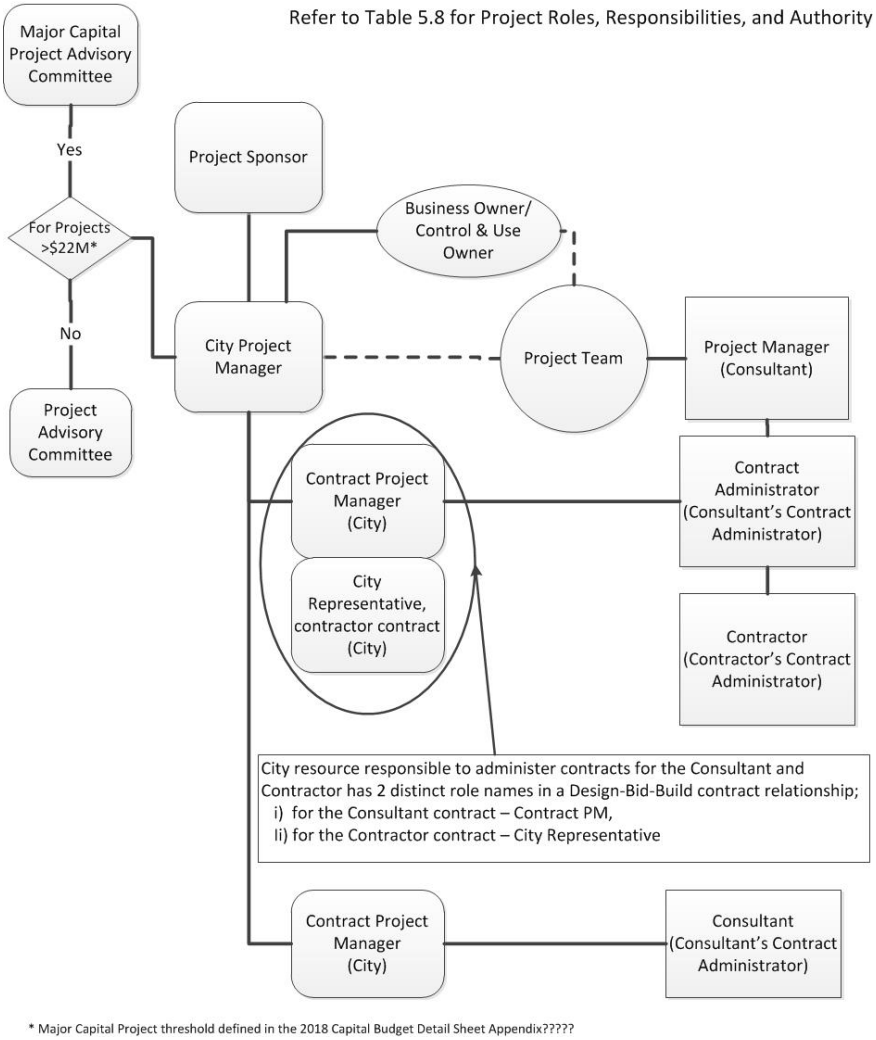
The generic organizational structure for a Consultant-delivered project is shown in Figure 5-9: *Project Delivery Organization Chart* (a Consultant is one type of vendor). The Project Sponsor, Major Capital Project Advisory Committee, Project Advisory Committee and City Project Manager are all City employees. The only expectation is that outside experts are sometimes added to the Major Capital Project Advisory Committee and/or Project Advisory Committee.

Additional project staff from the City and from the Consultant are added depending on the project requirements, and the project-specific organizational structure is defined in the Project Delivery Plan (PDP).

The organizational structure requirements for Public-Private-Partnership (P3) and Alternative Project Delivery (APD) method may be quite different than for a Design-Bid-Build (DBB) delivered project, and may be specific to the project.

In many cases for P3 and APD, the project delivery and its planning, execution, monitoring, and control are solely the vendors' responsibility, so the City does not require the traditional organizational structure. It is the Project Manager's responsibility to define and populate the project organizational structure with the key roles in the Project Delivery Plan regardless of the project delivery approach.

Figure 5-9. Project Delivery Generic Organization Chart



5.7.2 Identify Resource Requirements

Resource requirements are identified during the development of the work plan. The resources required on the project depend on factors such as:

- Skill-set for specific tasks: require a design engineer for a specific discipline
- Time constraints: need more resources to complete in a specific time
- Resource availability: when resources are available based on current workloads

These factors are assessed in the development of the project work plan and the documented in the Resource Plan of the Project Delivery Plan.

5.7.3 Roles, Responsibilities, and Authority

Many individuals and groups of people may be involved in a project. Table 5-7 provides an overview of the participant's roles and their responsibilities and authority. Details on specific responsibilities and authority for each role are provided in the process and procedures in this Project Management Manual and built into the process charts in *PMM Appendix A: Design-Bid-Build (DBB) Process Charts.*

The roles, responsibilities, authority, and any updates or revisions are a refinement of the roles, responsibilities and authorities in the most current City policies, standards and directives, which are identified in *PMM Section 2.0 – Project Management Governance.*

Table 5-7. Project Roles, Responsibilities, and Authority

Project Role	Responsibility and/or Description	Authority
The City of Winnipeg (City)	Legal entity named on all City contracts.	Authority is delegated to members of the City's administration via the City of Winnipeg Charter
Chief Administrative Officer (CAO)	The CAO is the most senior bureaucrat in the civic service, responsible for management and operation of the corporation.	Under the FI-003 Materials Management Policy, City Council has delegated senior levels of authority to the CAO, including materials management authority
Chief Asset and Project Management Officer (CAPMO)	The CAPMO is responsible to ensure that a formal project management system exists and it is utilized to effectively manage projects. The CAPMO is responsible for Major Capital Project Oversight which monitors the administration of the City's major capital projects in conjunction with departments.	The CAPMO is the ultimate decision-maker on establishing and maintaining the project management process. CAPMO has the authority to validate and intervene in Major Capital Project to ensure project success.
Chief Financial Officer (CFO)	The CFO is responsible for how the City is going to pay for the project, the project budget and funding sources, as well as the procurement approach (DBB, DB, P3).	The CFO is the ultimate decision-maker on the project budget and funding source, and the procurement approach.
Project Sponsor	The individual within in the business unit that is responsible to deliver the project who has the authority to assign resources and ensure the project is successful. The Project Sponsor must be at a level in the organization that can provide the support that the project needs to be successful. • Promotion: Acts as a project champion, supporting the project's goals and objectives; keeps updated on major project activities; and is a decision-maker for the project. • Authorization: Takes part in selection of the Project Manager, project initiation, and authorize the Project Charter. • Scoping: Generally responsible for determining the initial project scope, although the Project Manager is ultimately responsible for the official project scope within the Project Delivery Plan. • Funding: They are often responsible for ensuring funding is in place and approving changes to the project budget. • Approving: Is involved in the project planning process and reviews and approves the Project Delivery Plan and its updates. • Informing: They receive regular project status updates from the Project Manager and disseminate project	Authorizes use of resources for the project, approves major deliverables for delivery to the Business Owner, and signs off on each project phase.

Project Role	Responsibility and/or Description	Authority
	information to relevant Senior Leaders. • Supportive: Supports the Project Manager; assists with major issues, problems, and policy conflicts; and removes obstacles.	
Business Owner	The entity in the project organizational structure that accepts receipt (ownership) of the final product, service, or result (deliverables). • Is a generic role name used for both asset and non-asset based projects. • Have the responsibility or authority in the organization for the investment. The Control & Use Owner and the Business Owner can be the same individual on a project.	Sign-off of the initial requirements and the final deliverables.
Control & Use Owner	• Responsible for ownership of the asset on the City's behalf. • Responsible to define the Service Level Targets based on consultation with the customer. • Defines the Strategic Service need which includes the service the asset provides. • Manages the risk of existing assets to ensure service target are meet at the lowest lifecycle costs. • Ensure that the Investments and resulting benefits meet the needs of the customer. The Control & Use Owner and the Business Owner can be the same individual on a project.	Provide the service that the customer needs and is willing to pay for.
Major Capital Project Advisory Committee	Project-specific and is formed for any project that meets the major capital project dollar value threshold.[7] Responsible for monitoring and managing project risks. Project Sponsor is the committee chairperson.	Provides direction to the Project Manager on managing project risk and has decision-making authority.
Project Advisory Committee	The committee is advisory in nature and provides advice/not direction to the Project Manager. The members act individually and collectively as vocal and visible project champions in their representative organizations. Committee is to provide a support function to the Project Manager, drawing on experience and expertise from a variety of backgrounds to improve the overall quality of the project delivery. Committee may also facilitate better coordination of project activities between different areas of the City. The Project Sponsor is the committee chairperson.	Provides guidance to the project and advice on project deliverables, issue resolutions, policy decisions, and scope changes, however does not have decision-making authority.

[7] The Major Capital Project dollar value threshold is set every year in the *Adopted Budget Capital Project Detail Volume 3 in Appendix Major Capital Projects*. This limit is subject to change each budget cycle.

Project Role	Responsibility and/or Description	Authority
Project Manager (PM)	Develops the Project Delivery Plan. Delivers the project with support from the Project Team. Manages the Project Team's performance. Secures acceptance and approval of deliverables from the Project Sponsor. Responsible for communications, risk management, escalation of issues that cannot be resolved in the team, and making sure a quality project is delivered on budget, on schedule, and within scope.	Responsible for project delivery, and acts within the boundaries of the approved Project Delivery Plan.
Project Team	Under the direction of the Project Manager, executes the project. Consists of a variable number of members who are brought in to perform tasks according to the project work plan and defined schedule. Produce outputs or deliverables as outlined in the plan, at the level of effort defined for them. On larger projects, some Project Team members may serve as task leads, managing staff on tasks and providing technical leadership.	Performs administrative and technical functions in accordance with industry practices, as defined by the Project Delivery Plan and under the direction of the Project Manager or delegate.
Manager, Major Capital Projects Oversight	Ensures Major Capital Projects adherence to the Project Management Manual, processes, procedures, tools and templates. Conducts quality assurance on major capital projects and Major Capital Projects Quarterly Project Status Report.	Oversees and guides Major Capital Projects. Recommends changes to the Project Management Manual.
Manager, Corporate Asset Management Office	Manages the Project Management Manual and the associated processes, procedures, tools and templates.	Owner of the Project Management Manual and authorized to incorporate changes and updates based on industry best practices.
Change Manager (ChM)	Resource to the Project Manager and Project Team. Responsible for organization change management deliverables, such as stakeholder and change assessments, communications, organizational change management planning and implementation.	Authority is defined by the CAO and by Department Directors who select departmental Change Managers for training and certification.
Contract Administrator (CA)	City's representative for the administration of contracts. Role filled by the Consultant or by a City representative for in-house delivered projects.	Authority is defined in the General Conditions for the Contract.
Evaluation Committee	Evaluating proposals or bids with multiple weighted criteria requires an Evaluation Committee with appropriate expertise. Consists of a technical and financial representative and have access to Legal Services and Materials Management.	Reviews and rates proposals, provides evaluations.
Corporate Subject Matter Experts	The Project Delivery Team includes multiple parties at various steps with various roles. Corporate Subject Matter Experts participants include Materials Management, Legal Services and Insurance Branch, which each have a defined and sometimes ad-hoc role in Project Delivery.	Provides support and advice for effective project delivery related to City processes and procedures.
Customers	End-user of the service that the product or service provides. The customer can be external or internal entities.	Provides input and opinions into the City's service level targets.

Project Role	Responsibility and/or Description	Authority
Vendors	Vendors are contracted to provide additional products or services the project will require. Consultants are one type of vendor, as are Construction Contractors and those providing third-party paid services.	Provides products or services in accordance with contracts.
Stakeholders	Stakeholders are all those groups, units, individuals, or organizations, internal or external to the organization that have an interest in, are impacted by, or can impact, the outcomes of the project. This includes the Project Team, Project Sponsors, Major Capital Project Advisory Committee, Project Advisory Committee, customers, customer co-workers, public, special interest groups, and regulators.	Authority depends on the type of stakeholder.

5.7.4 Define Duties and Obligations

Successful projects are planned, designed, and built by a Project Team consisting of a Project Manager, Project Delivery Team, Consultant, and Contractor. Quality can only be achieved when each team member competently and in a timely fashion fulfills their responsibilities in cooperation with the other team members.

The duties and obligations inherent in these responsibilities and required for the success of the project are listed in Table 5-8 for a Project Team.

Table 5-8. Duties and Obligations of the Project Team

Duty/Obligation	Details/Examples
Fully disclose facts.	Provide access to all pertinent project data. Identify all known constraints. Define project objectives and expectations and communicate them accurately. Provide other agencies and public authorities with required information.
Be truthful.	Establish and maintain trust. Recognize the need for professional respect and collaboration. Keep commitments.
Maintain integrity. (perform on a highly ethical plane)	Be truthful; don't simply tell Project Team members and stakeholders what they want to hear. Fully disclose related external interests. Avoid conflicts of interest. Only accept work you are qualified for (or add appropriate expertise to the Project Team).
Demonstrate leadership.	When crises occur, carefully define the problem, not just the symptoms, and take positive authoritative action to solve it.
Enhance communications.	Facilitate and encourage communication. Inform the Consultant of how and why the City/system works. Avoid the 'we/they' mindset. Be articulate; explain clearly and succinctly the merit and the benefit of proposed schemes in a balanced and objective, yet authoritative, manner. Create a process that allows Control & Use Owners and key stakeholders to contribute.

Duty/Obligation	Details/Examples
Establish reasonable and attainable objectives.	Reach early agreement on a reasonable program of requirements and attainable performance requirements. Carefully consider relationships between cost performance, function, and aesthetics. Provide detail on objectives and refer to specific aspects of a project, such as function, operation, schedule, technical matters, quality, aesthetics, and administrative, fiscal, or management requirements.
Be responsive to the established Scope, Budget and Schedule.	Be vigilant and committed, showing forethought and anticipation in protecting the City's interests (and hence, those of the public) in the conduct of assigned projects.
Be prepared.	Maintain project files in order. Be prepared for meetings. Respond to team members and stakeholder requests in a timely fashion. Keep the Control & Use Owner informed.
Allow adequate time for performance.	Mutually develop a realistic schedule. Recognize that an unrealistic work schedule may discourage sound professional judgment.
Delegate or assign decision-making authority appropriately and support that authority.	Establish at the outset, and maintain the necessary and appropriate channels of responsibility and authority. Empower the Project Manager with appropriate authority.
Be realistic in the assumption of risks and liability.	Cleary identify conditions that are not easily understood or determined in advance.
Encourage quality.	Develop the plans and follow the plan. Focus on the process and continuous improvement. Encourage innovation and creativity in the Project Team.
Accept authority and responsibility.	Be accountable for satisfactory overall project execution and control of budget. Be responsible for all project staff, including vendors. Carefully consider and define fee arrangements without resorting to subsequent requests for additional fees on the basis of alleged misunderstandings on the scope of services to be provided. Ensure that work is accurate and precise so the City need not duplicate the design process to correct drawings and specifications.
Fund project adequately.	Recognize that design is critical to the overall project success; saving money at the expense of a competent design is a poor economic decision.
Strive for efficiency and economy.	Effectively coordinate all administrative and cost expenditures on the project.
Make timely decisions.	Provide strong leadership to make and encourage sound and timely decisions, including project reviews and approvals.
Allow freedom for innovation.	Be open to new ideas. Allow open discussion on problems and situation to promote new thinking and concepts.
Be responsive to Public	Be receptive of and responsive to Public input to serve the Public well on the City's behalf.
Comply with codes, regulations, and laws	Be familiar with and current on a broad range of legislation and regulations to best assist the City in securing the most acceptable project and in obtaining the most advantageous cost sharing.

Duty/Obligation	Details/Examples
Be familiar with City procedures.	Ensure that assigned resources are familiar with City procedures and requirements; do not expect City resources to train the Consultant's resources.

5.7.5 Create a Project Team Organization Structure

A resources plan is recommended for each project to define the specific organizational features and identify physical resources required and human resources assigned.

Human Resources are grouped into two subsets:

1. **Project Management Team** – Responsible for leadership and for carrying out the initiating, planning, executing, monitoring, controlling, and closing project management processes throughout the project phases.
2. **The Product Team** – Technical in nature, and is responsible for delivering the product, including studies, designs, and construction, or for providing other types of products, services, or results.

For in-house projects, the resources plan includes resources with the required skills and qualifications to complete the product work. This may include engineering resources, technical support, site supervisors, construction workers, and site inspectors if the project is for construction, or many other combinations of human resources and skills, depending on the product.

For Consultant projects, the Consultant assigns resources to the product work, and the City's role is focused on project management and administration of the associated contracts.

The resources plan includes the following components:

- An organization chart
- A list of roles and responsibilities for the project positions
- A resource matrix detailing the time allocations for each individual on a task-by-task basis

5.7.6 How to Develop a Project Delivery Organization Chart

Project Delivery Organization Chart template

Download from the City's Infrastructure Planning Office website

The Project Delivery Organization Chart is prepared by selecting the positions and reporting relationships for the project. The chart can draw from the project delivery generic organizational structure, however, only those relevant and needed for the project should be included.

The resources plan must assign resources to each position. The commitment of the Project Team proposed for a project, must be approved by the Project Sponsor, or in some situations, the appropriate Departmental Manager.

The roles, responsibilities, and levels of authority for each position must also be identified for the Project Delivery Organization Chart. Any variation to the standard role, responsibility, or level of authority definitions must be specifically identified in the resources plan.

5.7.7 How to Develop a Resource Matrix

The resource matrix consists of a table of labour input for each position identified for each task, as shown in Table 5-9.

The resource matrix includes the following:

- The Work Breakdown Structure and task names are identified in the left-most columns.
- All positions are included as column headings, whether they are part of the Project Team or support services.
- The matrix cells include the labour for each position, usually reported in hours.

A standalone resource matrix template has not been developed since Microsoft Project includes a resource matrix template and features to assist a Project Manager in managing resources.

Table 5-9. Example Resource Matrix

WBS	Task Name	Project Sponsor	Advisory Committee: Member 1	Member 2	Member 3	Member 4	Project Manager	Administrative Assistant	Total Hours
0	**Deliver Capital Project**								
1.0	Initiation Phase								
1.1.1	Project Charter								
1.1.1.1	Develop Project Charter	5	10	10	10	10	25	15	85
1.1.1.2	Endorse Project Charter	5	2	2	2	2	8	5	26
1.1.2	Project Delivery Plan								
1.1.2.1	Define Scope						20	5	25
1.1.2.2	Create WBS						20		20
1.1.2.3	Determine budget						20		20
1.1.2.4	Prepare schedule						10		10
1.1.2.5	Plan procurements						10		10
1.1.2.6	Plan communications						5	5	10
1.1.2.7	Approve PDP						30	25	55
1.1.2.8	Initiation Phase Closure	5					5	2	12
1.1.3	Updated Business Case								
1.1.3.1	Updated business case						40	5	45
1.1.3.2	Acquire phase approval						80		80
2	Execution Phase								
3	Close-Out Phase								

5.8 Plan Communication Management

Communications planning is the process of determining the project information needs and defining the approaches to be used. The communications plan documents the project approach, with the information in a specific format, provided at the right time, and limited to only what is needed. The Project Manager is responsible for the project communications plan.

5.8.1 Develop a Stakeholder Assessment

Stakeholder Assessment & Communication Plan template

Download from the City's Infrastructure Planning Office website

The stakeholder assessment is first developed in the initiation phase and continues to be updated and refined in the subsequent project phases. For more information, refer to *PMM Section 4.4 – Stakeholder Assessment.*

Assessment of the project stakeholders is critical to the Project Manager and the Project Team in understanding who is impacted, what their impact is, their importance and influence, and how the stakeholders will be managed.

Some of the questions to ask about the overall project and various decisions being made within the project include:

- How interested will the community be?
- What information do we need from the community?
- What issues or historical factors should be considered?
- What are the risks of engaging the community?

  What opportunity exists to adjust the scope of the project to respond to newly identified community perspectives?
- Who are the obvious and not-so obvious stakeholders?

Assessing stakeholder interests in the project requires consideration of the project objectives, as well as an exploration of unintended issues that the project might impact.

Once the stakeholder assessment is completed, a number of strategies can be developed to address stakeholder interests or needs. Refer to the Stakeholder Assessment and Communication Plan template, *Stakeholder Assessment* tab.

The communications plan identifies how each stakeholder will be communicated with in order to address their interest or needs. Table 5-11: *Example Communications Plan* in *PMM Section 5.8.2.1* provides a format for documenting communication and engagement activities designed to address issues and interests identified in the stakeholder assessment.

The assessing of stakeholders and communicating to those stakeholders evolves as the project lifecycle processes. This is an iterative process where the Project Manager continually has to manage the plan based on feedback. Communication is two way.

Table 5-10. Example Stakeholder Assessment

Stakeholder	Interest and Expectations	Importance and Influence	Assessment of Impact	Strategies for Gaining Support or Reducing Obstacles

5.8.2 Develop a Communications Plan

The information needs and the distribution methods for project communications vary widely for different types of projects, and must be developed for each project. The core of the communications plan defines who will communicate with whom (stakeholder assessment) and who will receive what information when (communications plan). An essential output from the communication planning process will be defining a balance between too much or too little communication.

5.8.2.1 How to Develop a Communications Plan

Stakeholder Assessment & Communication Plan template

Download from the City's Infrastructure Planning Office website

Table 5-11 provides an example of a communications plan. This information is captured in the Stakeholder Assessment and Communication Plan template on the *Communication Plan* tab.

The following principles guide the development of a communications plan:

- **Stakeholder** – lists persons and groups to be included in the communications plan and receive information.
- **Objective (Need/Why)** – The underlying reason for any communication should be clearly understood. Purposes include complying with reporting requirements, asking for special permission, and conveying new information.
- **Messages (What)** – Messages must be consistent with their purpose and compatible with their audience.
- **Timing/Frequency (When)** – The timeframe and frequency of communications should be identified.
- **Delivery Methods/Media Types (How)** – The delivery methods to be used should be specified. Delivery methods include in-person meetings, conference calls, video conferencing, online meetings, emails, and hard-copy reports.
- **By Who** – The person responsible for communicating each type of information should be identified. For sensitive information, the person who can authorize release must also be identified.
- **Feedback Mechanism** – The need for feedback and any requirements for the feedback such as what is expected and the timeframes should be identified.

Table 5-11. Example Communications Plan

Stakeholder	Objective (Need/Why)	Messages (What)	Timing/Frequency (When)	Delivery Method/ Media Type (How)	By Who	Feedback Mechanism
Project Sponsor						
Major Capital Projects Advisory Committee						
Project Advisory Committee						
Business Owner						
Control & Use Owner						
Mayor and Council Members						
Special Interest Groups						
Regulators						
General Public						

5.8.3 Official Openings or Ground-Breaking Ceremonies

A common part of a project communications plan relates to the ground-breaking or official opening ceremonies for completed major capital projects. These events recognize the City's efforts and public contributions for the benefit of the Public.

The CAO supports official ceremonies for designated projects involving Central Council or community facilities. The Project Manager is responsible for including these ceremonies in the communications plan.

Guidelines include:

- The time and date for the opening ceremony for a Central Council facility will be determined by the appropriate director in consultation with the Mayor's Office.
- The Mayor's Office will prepare invitation lists in consultation with the department.
- The Mayor's Office will print invitations, and the department will address and mail them.
- Where the federal government has been involved in funding a facility, federal representatives must be invited to the official opening.
- If the provincial government has been involved in funding a facility, provincial representatives must be invited to the official opening.
- The Mayor's Office, in consultation with the department, will determine program format.
- A bronze plaque dedicating the facility to the residents will form part of the ceremony when the capital cost of the facility exceeds $500,000.
- The project budget is to include all costs associated with the opening.

For official openings the Project Manager along with the assistance of the Department/Corporate Communications Officer is responsible for coordinating all arrangements and overseeing the conduct of the ceremony.

Some possible activities include:

- Preparing text for the brochure, plaque, media release, and project sign.
- Determining a suitable site for the ceremony.
- Providing for parking at the site, or for alternate transportation (transit).
- Designing the site setting, monument, and plaque.

- Constructing the site, monument, and plaque.
- Developing information brochures and invitations.
- Developing guest list
  (Consultants, Contractors, City Representatives, Politicians, members of the Public, and so forth).
- Developing ceremony program
  (format, speakers, ribbon cutting, music).
- Arranging for photography.
- Preparing alternate arrangements in case of inclement/unseasonal weather.
- Arranging for site facilities/services
  (lectern, public address system, flags, cleaning crews, traffic control).
- Making post-ceremony reception arrangements
  (location, food, refreshments, entertainment).
- Arranging for site clean-up and full opening of the facility.

5.8.4 Public Engagement

References exist throughout the *OurWinnipeg* Plan and its direction, strategies and related policy documents, which highlight the importance of and interest in working with community stakeholders to identify and address community needs and issues in the work undertaken by the City of Winnipeg. Public Engagement encompasses the range of activities that support this relationship between the City and residents.

As we heard through *SpeakUp Winnipeg* (the Public Engagement Program associated with the development of *OurWinnipeg*), Winnipeggers expect to be involved in the decisions that affect them and their city, including determining what is important to them and how their community grows and develops.

The Spectrum of Public Engagement

Table 5–12: *Spectrum of Public Participation* demonstrates the range of possible types of engagement with stakeholders and communities. It ranges from sharing feedback and perspectives to empowering the community to make decisions. The role and input of residents becomes stronger further right across the spectrum.

Table 5-12 identifies the goals associated with each level of engagement. It also identifies the level of commitment that each level represents in order for to provide a meaningful engagement process.

Table 5-12. Spectrum of Public Participation

	Inform *	Level 1: Consult	Level 2: Involve	Level 3: Collaborate	Level 4: Empower
Public Participation Goal	To inform the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solution	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of preferred solutions.	To place final decision-making in the hands of the public.
Promise to the Public	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision	We will look to you for advice and innovation in formulating solutions and incorporating your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.
Example Techniques	Fact sheets Web sites Open houses	Public comment Focus groups Surveys Public meetings	Workshops Deliberative polling	Resident advisory committees Consensus-building Participatory decision-making	Resident juries Ballots Delegated decisions

* Informing the public is required for all levels of engagement to ensure participants are aware of and knowledgeable about the project and can provide informed input. Informing the public is a critical component of any engagement process and must be included following decision making to ensure stakeholders and the public remain informed during and after the public engagement process has concluded.

A public engagement process may move through different levels of engagement as the project progresses. Every public engagement process requires balanced and objective information to assist participants in understanding the issue(s) at hand, the alternatives to choose from and the opportunities the decision presents.

Determining the appropriate level of engagement requires thoughtful consideration of the degree of decision-making influence that can be legitimately allocated to members of the public.

The statements in Table 5-13 can help identify the appropriate level of engagement.

Table 5-13. Public Engagement Framework

Level of Engagement	'Which' statement that applies to the decision being made
All levels: Inform*	I need to share information with individuals or groups about a decision that has been made or about a decision that needs to be made.
Level 1: Consult	I need to ask stakeholders and the public about their views on the options that have been developed (pre-determining options). Their feedback will be considered when the recommendations/ decision is being made.
Level 2: Involve	I need to ask stakeholders and the public to ensure concerns are understood and reflected. Feedback will be collected to define options that are not yet well defined.
Level 3: Collaborate	We need to develop and build solutions to identify the preferred solution(s) through working with the community. Generating options and solutions comes through working with stakeholders and the public.
Level 4: Empower	I need to work with a community member or group in a process in which they have the final decision-making power. The City of Winnipeg Charter requires that decisions can only be made by Council or Council committees and employees who have been delegated.

** Informing the public is required for all levels of engagement to ensure participants are aware of and knowledgeable about the project and can provide informed input. Informing the public is a critical component of any engagement process and must be included following decision making to ensure stakeholders and the public remain informed during and after the public engagement process has concluded.*

It is important to consider the statements in Table 5-13 for each phase or deliverable within the project management plan and to acknowledge that each step in the process may have more than one public participation objective. For example, communication (informing) should occur at each decision-point, at minimum, to ensure the public is kept informed.

Guiding Principles

Meaningful public engagement is dependent on the following principles, and although each plays a critical role all principles are interconnected and should be applied together to ensure meaningful public engagement and achievement of the public engagement vision.

Public engagement should strive to be reflective of the following principles:

Accountability – Provides insight on how input was considered and incorporated. If input was not incorporated, rationale is provided as to why.

Collaboration – Recognizes community-based knowledge and experience as a valuable component in decision-making and seeks dialogue with those who hold that knowledge and experience. Seek opportunities to partner with community and stakeholder groups when possible to further reach the potential for meaningful involvement.

Communication – Provide information so stakeholders and the public can engage meaningfully, and relate to key decisions. Effective communication is often an integral part of public participation, however, it is not engagement in itself.

Evaluation – Assesses performance in meeting engagement principles to strive towards advancement, improvement, and innovation.

Inclusivity – Seeks involvement from all those affected. Stakeholders may be engaged for more detailed, focused discussions, and a broader public is involved to ensure the process is open to all. Where barriers to inclusive engagement exist, barriers are reduced to the greatest degree possible.

Representation – Those affected by decisions should be included in the process. Particular attention should be paid to ensuring involvement of those who experience barriers to participation.

Timeliness – Involves the public as early as possible to provide the greatest opportunity for feedback to influence the project direction and final outcomes.

Transparency – Participants are provided with the information needed to meaningfully engage and understand the project. Participants are provided with regular updates.

Trust – Seeks to build relationships through consistent application and reflection of all other principles of engagement.

5.8.4.1 Supplementary Considerations

Consideration of the guiding principles is important at every stage of planning, implementing and evaluating public engagement activities. The following provides more specific considerations that support these guiding principles, and should also be considered throughout the process of planning, implementing and evaluating public engagement activity.

5.8.4.2 City of Winnipeg Universal Design Policy

According to the City of Winnipeg Universal Design Policy, all communications and public engagement activities of the City of Winnipeg shall take place in accordance with Universal Design Principles.

If preparing printed materials for engagement activities, or for guidance on how to make engagement activities accessible, contact the Universal Design Coordinator or refer to the City`s Universal Design website: https://winnipeg.ca/ppd/Universal_Design.stm

5.8.4.3 Plain Language

Like good communication of any kind, plain language is clear, concise, and uses simply constructed sentences. Plain language tells the audience exactly what the audience needs to know without using unnecessary words or expressions. It is not baby talk or overly simplistic, however, it lets the audience understand the message easily.

Plain language is more than just short words and short sentences — although those are often two very important guidelines for plain language. When you write in plain language, you also organize it logically to make it easy for the audience to follow. You consider how well the layout of your pages or screens works for your audience. You also ensure that the information you provide is relevant to the audience. What is plain language for one audience may not be plain language for another audience.

Communication that is clear and to the point helps improve all communication because it takes less time to read and understand. It also improves audience response to messages. Using plain language avoids creating barriers that set us apart from our audience.

5.8.4.4 Manitoba Freedom of Information and Protection of Privacy Act

When obtaining personal information from community members, it is important to remember that the Manitoba Freedom of Information and Protection of Privacy Act (MB FIPPA) imposes obligations on the City as to how information, particularly personal information is collected, used, disclosed and disposed of (destroyed). The Act controls the manner in which public bodies like the City of Winnipeg collect personal information, and protects individuals against unauthorized use or disclosure of personal information.

The Act, which can be found at gov.mb.ca/chc/fippa/understanding_fippa.html#20 identifies an extensive list of what constitutes "personal information". Any time you consider collecting information that is personal in nature, a good rule of thumb is to collect only the minimum amount of information necessary to accomplish the purpose for which it is being collected.

It is also important to note that a record of personal information can take various forms. It can be information that is written, photographed, recorded or stored in any manner, on any storage medium or by any means including by graphic, electronic, or mechanical means.

If consideration is being given to creating records of any personal information through your public engagement activities, consult with your departmental FIPPA contact before any information is collected.

5.8.4.5 Public Engagement Framework

A Public Engagement Framework, including a procedure, is under development following the approval of the Engage Winnipeg Policy.

5.8.5 Define Standard Project Performance Reports

Standard Project Performance Reports templates

Download from the City's Infrastructure Planning Office website

Once the communications plan has been established, the Project Delivery Plan must identify the reports and the reporting format for the project.

Table 5-14 identifies the specific performance reporting that will be used in the City of Winnipeg. The intent is to ensure that the stakeholder, both horizontally and vertically, in the organization become familiar with information that is needed to communicate the project performance status accurately. The intent is to move away from ad-hoc reporting where individuals develop a stand-alone reporting template.

Note: A number of the reports/tools outlined in Table 5-15 are being reviewed and are not fully developed.

Table 5-14. Standard Project Performance Reports

Report/Tool	Purpose
Project Management Checklist	Provides a record of completion of Project Management Manual required actions.
Status Report – Project Management	Summarizes data, tracks progress, and compares progress with baselines defined in the Project Delivery Plan, risk, schedule, financial forecasts, and may include earned value management.
Status Report – Consultant	
Status Report – Contract	
Open Capital Projects Dashboard projectexplorer.winnipeg.ca/projects	Summarizes data, tracks progress, and compares progress with baselines defined in the Project Delivery Plan, risk, schedule, financial forecasts, and may include Earned Value management.

Report/Tool	Purpose
Project Issue-Decision Log	Tabulates and tracks all project issues and resulting decisions on the project communications.
Project Change Tracking Log	Track changes and potential changes.
Change Control Report	Provides an integrated view of the project, Consultant, and construction changes; enabling forecasting.
Risk Register and Report	Identifies exposure to risk events for the Consultant and Construction Contractor, identifies actions taken and required, and provides information for integrated change control.
Major Capital Projects Quarterly Project Status Report	Documents all projects that meet the threshold to be considered a major capital project, and reports to Standing Policy Committee on Finance.
Consultant Performance Review	Documents Consultants' performance and provides feedback to Consultants.
Final Close-out Report	Prompts for final documentation and closure of all tasks and budgets.
Lessons Learned	Documents what went well and what did not for future reference and application to the continual improvement process.

A key concept that is being implemented into the report design is a hierarchal reporting structure. Construction reports will roll-up to Consultant reports, which will roll-up to project management reports, which will roll-up to Asset Management Office (AMO) reports, and ultimately to Major Capital Dashboard reporting.

The standard project performance reports will have guidelines for distribution to specific roles in the project organizational structure and frequency of distribution. These guidelines are embedded in the help notes.

The Project Delivery Plan is to identify any ad-hoc or non-standard reports required, distribution and the frequency of distribution.

5.8.6 Major Capital Projects Quarterly Project Status Report

Major Capital Projects Quarterly Project Status Report template

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FM-004 requires the administration to report to the Standing Policy Committee on Finance quarterly on all projects that meet the threshold to be considered a major capital project.

The threshold to be considered a major capital project is revised annually for construction inflation and is published in the Major Capital Projects Appendix in the Adopted Capital Budget Volume 3.

The Project Manager must ensure the accuracy of reports as they pertain specifically to major capital projects.

5.8.7 Plan Records Management

Projects must be managed in accordance with a comprehensive records management system managed by the owning business unit.

The primary objectives for a system of this type are to:

- Provide an efficient and intuitive document identification system.
- Store all related documents efficiently so they can be readily retrieved.
- Record the history of each document including versions, approvals, and certifications.
- Minimize the cost and time of records management.
- Facilitate provision of records to stakeholders for all aspects of the project.

For the City, the *Freedom of Information and Protection of Privacy Act* (FIPPA) and the Records Management By-law No. 86/2010 define a record as "any kind of recorded information that is created or received by, or in the custody or control of, the City regardless of its physical form or its characteristics."

5.8.7.1 Identify Record Types

Table 5-15 identifies the type of records possibly generated on a project.

Table 5-15. Record Types

Record Category	Description
Drawings	This includes all formal drawings produced as a stand-alone document or design packages. These are typically defined as "Design or Construction drawings" however the intent is any drawing produced and formally used on the Program will fall under this category.
Project Deliverables	Are specific formal document that is a product of a Project, however the life of the document continues on past the end of the Project. These can include as an example; Concept Design reports, Preliminary Design Reports, Operations & Maintenance, Contracts and Standard Operating Procedures. Other documents include land purchase and environmental impact reports.
Project Records	These are documents produced to support the management of a project. These documents have no active use once the project has been closed. These can include as an example: Progress Estimates, Change Orders, Schedules, and Meeting Minutes. Project records include administration records such as: • Financial (Project costing, invoices and other accounting records) • General correspondence • Reporting • Human Resource Management • Planning • Project-specific procedures
Uncontrolled documents	All hardcopy documentation, if not controlled by an authorised person shall be deemed uncontrolled by the person who prints the document

5.8.7.2 Record Changes in the Project Record Index

The Project Delivery Plan must consider the use of a Project Record Index (PRI) and define the rules for its use if one is to be used.

The PRI is used to track and monitor changes in the work. As soon as an issue is identified which has the potential to cause amendment to the original contract, it is entered in the PRI.

A unique number is assigned to the issue for recording in the PRI that associates all subsequent and associated change management documentation, including the reason for the potential change. All subsequent correspondence related to the change is then referenced in the PRI through the numbering system.

For more information, refer to *PMM Appendix E: Records Management*.

5.9 Plan Risk Management

Plan risk management is the process of defining how to conduct risk management activities for a project.

Risk is inherent in delivery of all projects, and risk management must be applied to all major projects. The objective of risk management is to reduce the chance that the project will not meet its goals and objectives.

The five processes in risk management are:

Process	Process Description
1. Identify risks	This process identifies risks and documents their characteristics. Each risk must relate to at least one of the project objectives (cost, scope, schedule, and quality). Risks are recorded in a Risk Analysis and Evaluation Risk template that will be further developed as part of subsequent processes and maintained and managed throughout the project.
2. Perform qualitative risk analysis	For this process, the identified risks are evaluated by assigning probability of occurrence and consequence scores to each risk and prioritizing the results. The qualitative risk analysis provides a rational basis for quantification of a risk contingency reserve.
3. Perform quantitative risk analysis	This is the process of numerically analyzing specific risks to the project objectives. This level of risk analysis can be very detailed and complex and is therefore only applied to specific risks under specific conditions.
4. Plan risk responses	Once risks have been identified and analyzed, the threats they pose to the project can be dealt with through risk responses.
5. Monitor and control risks	This is the process for implementing the risk response plans and monitoring, evaluating, and updating the process throughout the project. The Risk Analysis and Evaluation Register template is used for this purpose.

The Project Management Manual takes a progressive approach to risk management through the project phases, providing a continuum from the initiation phase to close-out phase, as outlined below.

- **Business Case Risks** – Risk analysis is considered in project pre-planning and an identified risk contingency reserve may have been established in the project budget. Risks are typically defined in the initial Business Case at a high level because specific deliverables may not have been defined and many of the details are not known. Similar projects that have been completed can often provide an initial sense of project delivery risks.
- **Project Delivery Plan** – The Risk Management Plan (RMP) is a document summarizing how the risk-related activates are structured and performed on a project. The RMP is defined and

documented in the Project Delivery Plan. As with the other plans in the Project Delivery Plan, the RMP is continually updated with each project phase. As projects progress, many of the risks are eliminated and retired as part of the risk management process.

5.9.1 Develop a Risk Management Plan

The Project Manager develops a Risk Management Plan (RMP) and manages it throughout the project. The RMP is regularly updated and reported to the Project Team, Project Sponsor, Project Advisory Committee and/or Major Capital Project Advisory Committee.

The type of risk assessment, as identified below, depends on the complexity of the project.

Risk Assessment – small, routine low-risk projects require only a Risk Analysis and Evaluation Register, which is used exclusively to identify potential risk events and responses. The risks are identified by the Project Manager or Project Delivery Team, or extracted from other sources requiring only a low level of effort. Refer to Table 5–16: *Examples of Systemic and Project-Specific Risks*.

- **Qualitative Risk Assessment** – used for projects that are not small or routine, and are not of significant concern. A short-form numerical approach and risk identification method may be used. The risks are identified by the Project Manager or Project Delivery Team, or extracted from other sources requiring only a low level of effort.
- **Comprehensive Qualitative Risk Assessment** – must be completed for projects that have medium to high risks. Detailed scoring and a risk ranking for each risk event are required. A more formal process with participation of a broad range of stakeholders is used, typically in a workshop setting.
- **Quantitative Risk Assessment** – high-risk projects, or those identified by having a Major Capital Project Advisory Committee, require quantitative risk assessments.

The Risk Management Plan must address project delivery risks as well as product risks.

- **Project Delivery Risk** – addresses threats to project delivery in terms of scope, cost, schedule, and quality. Examples include inadequate budgeting, inadequate resources, or excessive demands from stakeholders.
- **Product Risk** – addresses the product implementation and the product's function. Examples include uncertainty of soil conditions, a shortage of skilled Contractors, and use of unproven technology.

Just as risk to project delivery may cause costly overruns or start-up delays, risk to the product may cause a poorly functioning product or costly re-work that may far exceed the consequences of project delivery risk. Separating project delivery risk and product risk allows focus and discipline to be maintained for both.

Product risks are more likely to be identified by technical staff or others experienced with the product. A separate risk analysis process such as a workshop convened later in the project may be used. Product risks are updated with a different frequency than are project delivery risks.

Risk responses must be identified as part of the risk management process, either during or after the risk assessments. The Risk Management Plan also identifies the frequency of or triggers for risk reassessments.

The Project Manager is responsible for tracking all risks with summary risk reports submitted to the Major Capital Project Advisory Committee and Manager, Major Capital Projects Oversight. The Major Capital Project Advisory Committee is directly involved in reviewing risks, as indicated in FM-002 Materials Management Administrative Standard. Risk Management Plan updates are included in quarterly reporting on Major Capital Projects and are required for project phase gate and/or control point approvals.

The Risk Management Plan should also consider opportunities, which are simply risks with positive impacts. Although not described in detail in this Project Management Manual, the

processes and procedures for considering opportunities are similar to those for considering threats.

5.9.1.1 How to Prepare a Risk Management Plan

The Risk Management Plan accompanies the Project Delivery Plan and documents the results of risk planning. It defines how to conduct risk management so that the process is commensurate the risks and importance of the project, and that the information is available to project stakeholders. It will depend on the complexity of the project and, as a minimum, is to include:

- Project description
- Risk management scope and reference to WBS deliverable
- Organization, roles and responsibilities
- Risk management methodology: Evaluation approach and tools to be used
- Reporting
- Risk Analysis and Evaluation Register (template)

5.9.2 Identify Risks

Every project is exposed to multiple risks of different types. The risks may relate to either or both of the project or product, and affect any of the four project objectives: scope, cost, schedule and quality.

It is useful to categorize risks prior to attempting to quantify them or develop risk response strategies.

A recommended practice provided in AACE No. 42R-08 defines risk into two category types:

Systemic – risks that have systematically predictable relationships to overall project cost growth.

Project-specific – risks that don't have a predictable relationship to overall project cost growth.

Table 5–16 provides examples of the risk types for the two risk categories.

Table 5-16. Examples of Systemic and Project-Specific Risks

Risk Type:	Systemic Risks	Project-Specific Risks
Category of Risk:	Design Complexity • Technology • Process Complexity • Material Impurities Project Definition (how defined) • Site/Soils Requirements • Engineering and Design • Health, Safety, Security, Environmental • Planning and Schedule Development Project Management and Estimating Process • Estimate Completeness (due to scope definition) • Team Experience/Competency • Cost Information Available • Estimate Bias	• Weather • Site Subsurface Conditions • Delivery Delays • Constructability • Resource Availability • Project Team Issues • Quality Issues (i.e.: rework)

5.9.2.1 Systemic Risks

The term 'systemic' implies that the risk is a product of the project 'system', culture, business strategy, process system complexity, technology, etc.

Measures of these risks are generally known even at the earliest stages of project definition, and furthermore, the impacts of these risks tend to be highly dominant for early estimates. However, the ability to directly estimate these events is difficult. (For example, the cost of a complex design cannot be clearly quantified, however, identification that there is a risk is possible).

Finally, systemic risks tend to be owner risks – the owner is responsible for early definition, planning, technology, and decisions so these risks cannot be readily transferred.

5.9.2.2 Project Specific Risks

The impacts of these risks are not highly predictable between projects within a system or within an industry as a whole. For example, rain may have much more impact on one project than another depending on the project characteristics and circumstances.

Measures of these risks are generally not known at the earliest stages of project definition. The link between *project-specific* risks and cost impacts is more deterministic in nature; that is, they are related to individual understanding and to estimating the impact of these risks on particular items or activities (for example, the risks of excess rain on something like site preparation or concrete foundations can be estimated).

These risks are more negotiable during project contracting strategy as to who will carry them.

5.9.3 Risk Statements

Properly structured risk statements aid in developing and tracking the responses.

Fundamental concepts used in risk statements are:

- A **Cause** is the condition that exists in the project and gives rise to the threat (or opportunity); one cause may generate multiple threats (or opportunities).
- The **Risk** is the event that may or may not occur.
- The **Effect** is the unplanned impact on at least one of the project objectives.

The risk statement construct has been embedded into the Risk Analysis and Evaluation Register template.

Individual risk may be identified by the Project Manager or for larger projects a team of experts should be used. After the risk identification process, the details of the individual risks are then listed on a Risk Analysis and Evaluation Register for managing and tracking.

5.9.4 How to Create a Risk Analysis and Evaluation Register

Risk Analysis and Evaluation Register template

Download from the City's Infrastructure Planning Office website

A Risk Analysis and Evaluation Register is required for all projects, and include:

- **Risk Event Outcome** – All project objectives (scope, cost, schedule, quality) are considered in the risk assessment. The *Risk Event Outcome* columns indicate the risk statement.
- **Threat or Opportunity** – Risks can be either unfavourable to the outcome, in which case they are threats; or favourable to the outcome, in which case they are opportunities. In the *Threat or Opportunity* column, indicate which type the risk is expected to be.
- **Meta language Risk Descriptions** – The risks should be described with a three-part meta language description in the form of:
  - *As a result of [Risk CAUSE*] – identify the cause of the risk event.

- *This event may occur [Uncertain EVENT*] – identify what specific event will occur.
- *Which leads to [EFFECT on objectives]* – Identify the end result of the risk event.

This approach promotes separation of the cause and effect from the risk.

- **Risk Severity** – select the severity of the risk: critical, serious, important, or acceptable.
- **Risk Response** – identify how the risk will be addressed based on a specific category of risk. A risk response must be identified for each risk.

Table 5-17 illustrates the outline for Risk Event Identification in a Risk Analysis and Evaluation Register template.

Table 5-17. Example Risk Event Identification for Risk Analysis and Evaluation Register

Risk Event Identification				
Risk Event Outcome	**Threat or Opportunity?**	**As a result of (Risk Cause)**	**This event may occur (Uncertain Event)**	**Which leads to (Effect on objectives)**

Risk Analysis and Evaluation Registers for more detailed risk assessments include additional columns such as a formal referencing system, and likelihood and consequence scores.

5.9.5 How to Perform a Qualitative Risk Assessment

A qualitative risk analysis is carried out by estimating the likelihood (probability) of each risk to occur and the consequences (impact) if it does. The two scores are then combined, and the risk is prioritized.

An example of a risk probability scale is provided in Table 5-18, and an example of a risk consequences (or impact) scale is provided in Table 5–19.

Table 5-18. Risk Probability Scale

Score	Likelihood/Probability	Description
5	Almost Certain	Is expected to occur unless circumstances change
4	Likely	Will probably occur in most circumstances
3	Possible	Might occur under current circumstances
2	Unlikely	Could occur if circumstances change
1	Rare	May occur only in exceptional circumstances

Table 5-19. Risk Consequences (or Impact) Scale

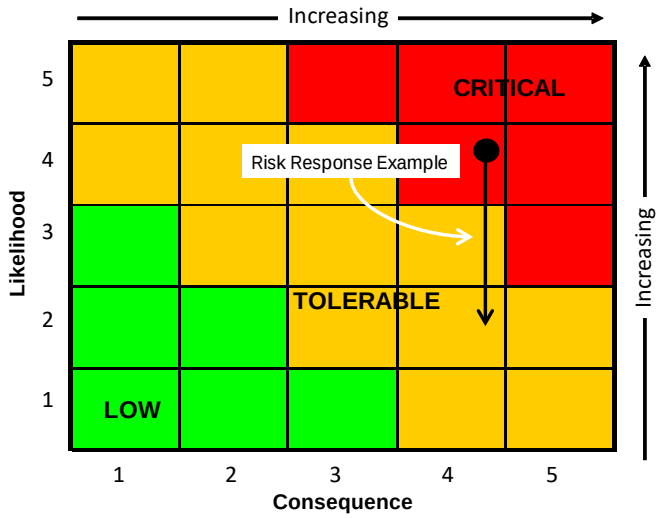
Score	Consequence/Impact	Description
5	Extreme	Heavy damages
4	Major	Significant damages
3	Moderate	Serious damage
2	Minor	Minor damage
1	Insignificant	Insignificant damage

Risks may be identified and scored by the Project Team, stakeholders, or others with related experience. The Major Capital Project Advisory Committee may also identify risk as its members can draw on experiences from other large City projects.

A typical method of capturing the information is through team brainstorming sessions. A process for conducting this analysis should be developed and agreed on by the team for each project, commensurate with the project needs.

Probability and consequence scores can be plotted in a matrix, as illustrated in Figure 5-10, and indicates the level of risk and basis for risk prioritization.

Figure 5-10. Example of a Qualitative Risk Matrix (Illustrating a Planned Risk Response)



Risks with a combination of high likelihood and high consequences will be of the most concern. A risk response will be required to manage critical risks.

In many cases, the risk response will only address either the likelihood or the consequence. Figure 5-10 shows risk response decreasing as Likelihood decreases.

Table 5–20 illustrates the integration of qualitative risk severity information in the Risk Analysis and Evaluation Register template.

Table 5-20. Risk Severity Information integrated into the Risk Analysis and Evaluation Register

Risk Event Identification					Risk Severity
Risk Event Outcome	**Threat or Opportunity?**	**As a result of (Risk Cause)**	**This event may occur (Uncertain Event)**	**Which leads to (Effect on objectives)**	

5.9.6 How to Perform a Quantitative Risk Assessment

Quantitative risk assessments are prepared after the risks have been identified, and rated through the qualitative process.

A quantitative assessment is used for cases where the risk will be accepted, or it has been determined that a contingency allowance should be applied. The individual risk contingencies are then compiled and itemized into the risk reserve contingency. Refer to *PMM Section 5.4.1.10.3 – Risk Reserve Contingency* for application of the risk reserve contingency to project estimates.

The factors that affect the quantification of the risk reserve are complex and, by necessity or for convenience, a lot of assumptions are usually made.

It is important to note:

- The risk reserve is to be added to the phase estimate with the estimating contingency included, however, do not double count any risks already considered.
- It would be incorrect and a budgeting error to set the contingency amount as the total of all of the potential risks since it is unlikely all risks would occur on any one project at the same time, and the potential for realization of opportunities would be overlooked.
- The contingency must reflect the stakeholder's risk tolerance level.

The method of risk quantification will depend on the category of risk and the project needs.

Three alternative methods are identified, as follows, for quantification of the risk reserve:

5.9.6.1 Single-Point Estimate

In single-point estimating method, the estimator assigns a fixed contingency or percentage risk reserve value to a single-point estimate.

For **systemic risks**, the value may be determined through intuition, experience, or from historical data.

For **project-specific** risks, the Expected Monetary Value (EMV) approach is used:

- EMV requires the probability of the event to be estimated as well as the monetary consequences. The amount of the contingency is then determined by the multiplication of the two values.
- The EMV estimates are improved by applying different contingency percentages to each major cost element. This recognizes that some parts of the project may have greater uncertainty than others. This method is considered more rational and reliable than the simple application of one overall percentage to the total cost because it encourages closer examination of each cost area.

The calculated amount is the risk reserve contingency to be added to the estimate, and is managed as a separate line item through the contingency management process.

This single-point estimate method is easy to apply, and is satisfactory for projects where there may be a substantial amount of experience with the type of project to justify the approach.

The drawback is that the single-figure prediction of estimated cost implies a degree of certainty that is not justified. The probability of achieving this cost is not fully evaluated and does not take into account the surrounding uncertainty.

The single-point estimate method may be used for smaller projects, and at the first phases of larger projects. It is not suitable for large and complex projects.

5.9.6.2 Three-Point Range Estimate

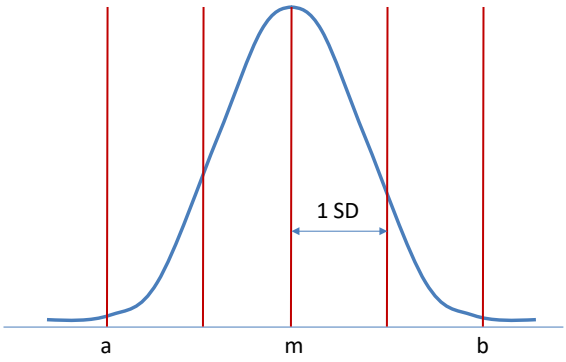
Range estimating provides a simple quantitative method of risk assessment. It is based on an assumed probabilistic distribution of the cost estimates, providing an improved prediction of the actual uncertainty and justification for the contingency values as compared to the single-point estimate method.

The three-point range estimate method can be used for any type of estimate, either at the project or component level. In its simplest form, it only requires that three estimates be prepared at the project level:

- **a** = **Best case estimate** is the value where there would only be a 5-10 percent chance of a lower value.
- **m** = **Expected value** is normally the estimated value, and the most likely case, prior to risk allowances being applied.
- **b** = **Worst case** is the value where there would only be a 5-10 percent chance of a higher value.

The method assumes that the resulting relationship is a normal distribution, which is represented by a bell curve as shown in Figure 5-11.

Figure 5-11. Probability Distribution based on the Three-Point Estimate Method.



When a single three-point estimate method is used, the expected value is equal to point “m” and the standard deviation (SD) can be calculated as:

SD = (b-a)/6

Confidence levels can then be determined from the SD:

- there is a 68 percent probability the estimate will fall within one SD higher or lower than the estimate.
- there is an 84 percent probability that the project will cost less than the estimate plus one SD.

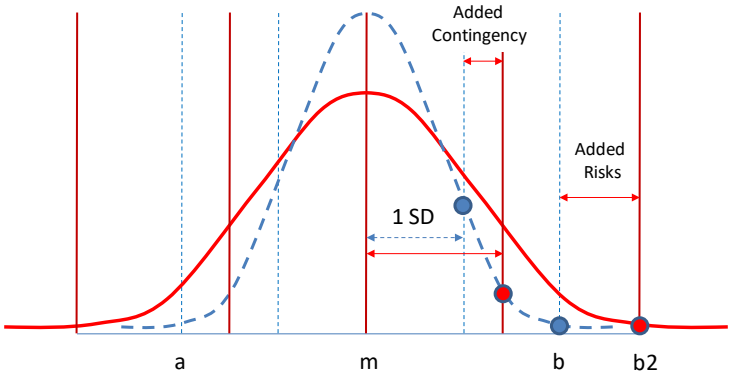
This method can be applied directly for systemic risks, with or without use of the risk register. The best and worst case estimates can be developed from prior experience, educated guesses, or more preferably, from the Risk Analysis and Evaluation Register results.

Accuracy of the estimate is improved by applying the technique to a number of component estimates for multiple deliverables, rather than at the project level. This is done by:

- Selecting deliverables with the highest risk and potential variation.
- Developing cost estimates for the selected deliverables and their SDs.
- Calculating the total project estimate by summating the component estimates.
- Calculating the total project SD by taking the square root of the summation of the squares of the SDs.

The project-specific risks from the Risk Analysis and Evaluation Register can be added to the systemic risk contingency. This is done by modifying the best and worst-case point values and recalculating the SD, as shown Figure 5-12.

Figure 5-12. Three-Point Range Estimate with Project-Specific Risks



The risk consequences from the Risk Analysis and Evaluation Register are totalled and added to the worst-case estimate (new point “b2”). A similar adjustment should also be made for the best case (opportunities) and their potential cost reductions. The resulting distribution is assumed to remain to be “normal” and the contingency allowance can be calculated as described previously with the new values.

The accuracy of the estimate is improved if multiple component estimates are used rather than at the project level, with the individual risks applied to their respective deliverables.

The three-point range estimating method doesn’t define the cumulative risk reserve value; however, it provides a rational basis for its selection based on the desired confidence limits. This would be determined from the organization’s budgeting strategies and tolerance for cost overruns. The approach and contingency value selection are to be reported in the basis of estimate.

The calculated risk reserve contingency is added to the estimate, and is to be managed as a separate line item through the contingency management process.

5.9.6.3 Monte Carlo Simulation Estimate Method

The Monte Carlo Simulation estimate method is a more sophisticated quantitative technique for analyzing risk and quantifying the contingency value. As with the three-point range estimate method, the output of Monte Carlo Simulation is a probability distribution for total cost of the project.

The Monte Carlo Simulation estimate method requires a higher level of input definition and uses a series of calculations in computing the results. It is typically carried out by experienced estimators using commercially available software, and its specific application is not included in this manual.

The Monte Carlo Simulation estimate method should be considered for large complex projects.

Table 5-21 illustrates the integration of qualitative risk information in the Risk Analysis and Evaluation Register template.

Table 5-21. Qualitative Risk Information integrated in the Risk Analysis and Evaluation Register

Risk Event Identification					Risk Severity	Cost to Manage Risks
Risk Event Outcome	Threat or Opportunity?	As a result of (Risk Cause)	This event may occur (Uncertain Event)	Which leads to (Effect on objectives)		

5.9.7 Risk Response Plan

Risk responses are developed after the risk events have been identified and prioritized. Not all risks require formal risk response plans. The level of effort to identify response strategies and follow-up risk management depends on the level of risk.

5.9.7.1 How to Develop Risk Responses

Risk response strategies can be applied to the cause, the risk, or the effect, and are described below.

Accept – Some threats are too difficult to attempt to control and must be left to chance. In this case neither the likelihood nor the consequences can be reduced and the response is to deal with the effect if it happens. Providing a risk contingency reserve is the main response to this threat. Often, Plan B contingencies should be considered and developed as well.

Avoid – This is a good strategy for when a risk has a potentially large impact on the project. A threat can be avoided by removing the cause or breaking the cause-risk link. For example, if use of unproven technology causes a risk, the risk could be avoided by using a standard approach.

Transfer – Transfer does not change the true likelihood or consequence of a threat however relieves the City of responsibility for it. You transfer the impact and management of the risk of the risk to someone else. Insurance and contract security are examples of risk transfer.

Mitigate – A risk can be mitigated by addressing either the cause or the effect, and either the likelihood of the risk or the consequences of the risk can be reduced. One limits the impact of a risk, so that it does not happen and the problem it does create is smaller and easier to fix. This could include additional work to reduce the risk.

Exploit – The risk has a positive impact on the project. The risk would have benefit to the project if it happened. In those cases we want to maximize the chance that the risk happens, not stop it from happening or transfer the benefit to someone else.

Higher order Risk Management Plans must include detailed risk response plans that also identify the risk response owner, response triggers, managing contingencies and a schedule for actions, reviews, and reporting.

Table 5-22. High Level Risk Response Plans integrated in the Risk Analysis and Evaluation Register

Risk Event Identification					Risk Severity	Risk Response	Action(s) to be undertaken	Contingency Plan	Cost to Manage Risks	Risk Owner
Risk Event Outcome	Threat or Opportunity ?	As a result of (Risk Cause)	This event may occur (Uncertain Event)	Which leads to (Effect on objectives)						

5.10 Plan Integrated Change Control Management

The majority of projects do not go exactly as initially planned from start to finish. There are events or issues that occur on a project that make change inevitable like when an unforeseen event happens or a risk is identified. These changes may occur at any phase of the project especially during project execution and monitoring and controlling phase. It is not necessary to execute all changes – only those that have been approved based on their evaluation and impact to the project.

A Change Control Plan is meant to guide a project during the process of change using the integrated change control process.

The objectives of the integrated change control process are to:

- Ensure that changes to the project have a strong business justification.
- Obtain the appropriate level for approval of changes.
- Ensure the changes to the project are understood and that Project Team members do not begin work on new or unplanned tasks prior to the approval of the change request.
- Monitor and control the cost and other implications of approved changes.
- Maintain a concise and accurate log of changes made during the duration of the project including financial costs.

The change control process for a project should include how a change request is initiated, analyzed, logged, tracked, approved and implemented. It clearly identifies roles, activities, and the sequence of activities, inputs, outputs, and how and where information is stored.

In order to control changes on a project, a Project Manager should:

- Identify all requirements at the beginning of the project.
- Comprehensively identify all risks related to the project.
- Establish and follow the change management process.
- Use the change control templates:
  - Change Work Order (CWO) for Construction/Services/Goods
  - Change in Scope of Services (CSS) for Consultant
  - Contract Change Log
  - Project Change Tracking Log
- Identify clear roles and responsibilities in regards to who can approve changes.
- Consider terminating a project if the number of changes is disproportionate.
- Ensure only approved changes are added to the baseline schedule for the project.

For more information, refer to *PMM Section 7.2 – Perform Integrated Change Control.*

5.11 Plan Health, Safety, Security, and Environmental Management

The purpose is to define and outline the Health, Safety, Security and Environmental (HSSE) standards that are to be complied with by all Contractors, Consultants, and employees working on the project.

The HSSE Plan or Plan(s) are living documents, developed before the project work begins, and based on the project's initial scope. As the project evolves, the plan is revised as the project scope changes.

Within each plan may be a checklist of information that needs to be considered (i.e.: eye wash station locations, whether asbestos or lead is present onsite, chemicals in the work site, etc.) It should consider various hazards depending on the type of work performed such as plumbing, electrical, or confined space hazards.

These elements define what must be achieved rather than how to achieve it, and describe requirements in the areas of HSSE with the following in mind:

- **Health:** Protect, promote, and improve the health and wellbeing of Project Team members, employees, Consultants and Contractors.
- **Safety:** Provide a work environment where people are able to work safely and understand their rights and obligations towards a safe workplace
- **Security:** Provide a safe and secure workplace for Project Team members, employees, Consultants, Contractors, and worksite visitors.
- **Environment:** Protect environmental and heritage values, promote the reduction and prevention of pollution, efficient use of resources and energy, and biodiversity protection and consider the environmental impact of project activities.

5.11.1 Workplace Safety and Health

The *Manitoba Workplace Safety and Health Act* (WHSA) require employers to develop workplace safety and health criteria to evaluate, select and monitor Contractors working at the workplace. Details can be found on the City's website at winnipeg.ca/matmgt/Safety/default.stm

An additional CityNet site for internal City Contract Administrators can be accessed through citynet/hrintra/workplacewellness/Safety/Safety-MainPage.stm

The City of Winnipeg process applies to Contractors who perform work for the City in the following circumstances:

- Construction Contracts with an estimated cost greater than $100,000 or considered to have high safety risk by the City; and
- Non-construction Contracts considered having high safety risk by the City.

5.11.2 Contractor Safety & Health Program Evaluations

The City's process requires bidders on affected Bid Opportunities to submit, within five business days as requested by the City, proof of an *acceptable* safety and health program. Bidders who do not provide proof will not be awarded the contract.

Acceptable means that the program meets or exceeds the elements required of a safety program as outlined in Section 7.4(5) of the Workplace Safety and Health Act.

Proof of an acceptable safety and health program is considered to be one of the following:

1. Written confirmation of a Manitoba COR™ or SECORTM program.

   Manitoba COR™ or SECORTM companies must submit a copy of their certificate along with their most recent letter of good standing to their assigned Contract Administrator.

If a Contract Administrator has not yet been assigned, this information is to be sent to the designated City contact person.

2. Written evaluation and verification by an independent workplace safety and health Consultant.

   - Bidders/Contractors can meet the requirement for independent verification without obtaining COR™ or SECORTM by providing written confirmation from an independent workplace safety and health Consultant satisfactory to the City.
   - The safety and health program review is conducted using the Contractor Safety & Health Program Evaluation Document, and is based on the requirements of Manitoba's Workplace Safety and Health Act.
   - Independent workplace safety and health Consultants satisfactory to the City include persons who:
     - have been approved to conduct COR™ or SECORTM audits; or
     - hold certification such as Canadian Registered Safety Professional (CRSP) or equivalent.

5.11.3 Safe Work Plans

Before work begins a Safe Work Plan is developed by the Contractor in consultation with the Contract Administrator.

To ensure the Safe Work Plan includes consistent safety and health information, the Contractor may be required to use the City's Safe Work Plan Document.

The Safe Work Plan demonstrates that a Contractor:

- Is aware of the hazards associated with the work; and
- Has identified appropriate control measures to manage the hazards.

The Contract Administrator reviews the Safe Work Plan with the Contractor, and requests clarification from the Contractor as required. The Contract Administrator can request assistance from their departmental safety resource as required.

The Safe Work Plan is to be provided to the Contract Administrator within the time frame mentioned in the contract. The time frame is usually at least five days before the work is scheduled to begin.

5.11.4 Security

Planning security standards would include items such as:

- workplace and/or site security
- gates
- fencing and/or physical barriers
- lighting
- vehicle access
- tools & equipment
- parking
- visitor control
- shipping, receiving material and equipment control

5.11.5 Environment

Project Environmental Impact Checklist template

Download from the City's Infrastructure Planning Office website

Planning for a project requires Project Managers to consider whether any parts of the proposed project or activities have any impacts on the environment.

The Project Environmental Impact Checklist outlines potential environmental impacts, including but not limited, to: property, historical/archaeological, endangered species, right-of-ways, land, rivers, floodplains, wetlands, noise, air, water quality, urban forest, climate action, etc. Completing the Checklist assists Project Managers in narrowing down the environmental impacts that must be accounted for when planning their specific projects.

If required, projects must first conduct an Environmental Assessment which is a planning process that must consider all environmental impacts, develop appropriate measures to manage the impacts before the project is implemented, and include consultation with stakeholders and/or the Public that could be potentially impacted.

5.12 Plan Commissioning

Planning for commissioning is included in the Project Management Manual due to its significance in the Asset Management System.

Commissioning requirements may be product-specific, and the Project Manager should communicate with the Business Owners and experts in its development. However, commissioning planning may not be applicable to all projects and, as with other processes, should only be applied as necessary.

Early consideration of commissioning is important so that assets can be transferred to operations where coordination of a number of parties is required including the Business Owner, Operator, Consultant, Contractors, trade persons, utilities employees, suppliers, permitting agencies, and potentially third-party testing and commissioning firms.

Coordination may also be needed for operating expertise, documentation, training, operating supplies, temporary services and testing, and budgets for the transition and for management of the transition services.

5.13 Plan Close-out

Close-out planning identifies which tasks, deliverables, and phases can be closed and when they can expect to be closed, and what are the resources required to ensure the tasks, deliverables, and phases can close.

The Project Manager is responsible for confirming all required work and deliverables are completed prior to the close-out, and that all documentation is in place.

The Project Delivery Plan needs to integrate the following into the project's phase or project close-out deliverable and tasks:

- A Business Case update for the Project Sponsor's consideration prior to beginning of the next phase.
- After each phase, with the completion of the appropriate cost estimate class, the Project Sponsor (and Business Owner) needs to assess whether the investment (project) should still proceed. This assessment includes multiple factors such as value for money, risk assessment and level of service – willingness to pay target (criteria). Refer to the closing process group for details.
- Confirmation that products, services, or results are being transferred to the next project phase or (upon completion of the project) to the Business Owner.
- After each phase, and at the end of the project, a lessons learned discussion, which will provide information to support the City's continual project improvement process.

- At the end of the project, through the Project Close-out Report, a benefits realization assessment is completed.

5.14 Update Project Delivery Plan

The Project Delivery Plan must be updated as one of the initial activities of each phase.

5.15 Plan Tangible Capital Asset Updates

Public accounting rules require capital assets to be identified and tracked. The City has developed Procedure #4 *Accounting Guidelines for Tangible Capital Assets* that integrate into the Project Delivery Framework.

Further information on Procedure #4 *Accounting Guidelines for Tangible Capital Assets* can be found on the City's website citynet/finance/documents_page.stm .

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