



FDM 2-20-1 Scope Management

February 15, 2023

1.1 Overview

“Scope Management includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. Managing the project scope is primarily concerned with defining and controlling what is and is not included in the project.”¹

The scope management plan includes six (6) processes:

Knowledge Area Processes Project Management Body of Knowledge (PMBOK®)	Process Group PMBOK®
Plan Scope Management – is the process of creating a scope management plan that documents how the project scope will be defined, validated, and controlled	Planning
Collect Requirements – is the process of determining, documenting, and managing stakeholder needs and requirements to meet project objectives	Planning
Define Scope – is the process of developing a detailed description of the project	Planning
Use the Wisconsin Department of Transportation (WisDOT) Work Breakdown Structure (WBS) – to subdivide project deliverables and project work into smaller, more manageable components	Planning
Validate Scope – is the process of formalizing acceptance of the completed project deliverables	Monitoring and Controlling
Control Scope – is the process of monitoring the status of the project scope and managing changes to the scope baseline	Monitoring and Controlling

1.2 WisDOT Procedures

The project scope is an essential piece of the project management plan and needs to be defined before the project schedule and budget can be developed. Overall, project success depends largely on the level of detail contained within the project scope providing clear direction to the project team on what is included in the project. Providing that necessary level of detail is the responsibility of the entire project team.

The information resulting from the scoping processes should be stored in the Scope Module of the Design Project Management Plan (PMP) application [PMP Application User’s Manual, Chapter 4](#) (internal WisDOT only). PMP uses this input to the Scope Module to produce the WisDOT WBS, displayed in the Schedule Module of PMP [PMP Application User’s Manual, Chapter 6](#) (internal WisDOT only).

WisDOT staff can access supplemental sample WBS templates on the [Project Management Unit \(PMU\) SharePoint page](#) (internal WisDOT only).

1.3 Plan Scope Management

Table 1.1 shows the anticipated use of the inputs, tools/techniques, and outputs on Conventional, High-Profile, and Federal Major Projects. It should be remembered that the anticipated uses listed in the table are dependent on the actual specifics of a project.

1.4 Scope Management Process Steps

Tables 1.1 – 1.6 show the inputs, tools/techniques, and outputs by project size for the six PMBOK® scope management processes. The guidance listed below may vary on actual project specifics.

Table 1.1 Plan Scope Management

Plan Scope Management		Conventional	High Profile	Federal Major
Inputs	Project Management Plan – Approved subsidiary plans of the project management plan are used to create the scope management plan and influence the approach taken for planning scope and managing project scope	Sometimes	Always	
	Project Overview – is used to provide context needed to plan scope management processes. It provides the high-level project description and product characteristics from the project statement of work			
Tools/ Techniques	Expert Judgment – refers to input received from knowledgeable and experienced parties in developing scope management plans	Sometimes	Always	
	Meetings – are used to develop the scope management plan. Attendees include the project manager (PM), project sponsor, selected project team members, key stakeholders, and anyone with responsibility over scope management processes	Seldom	Sometimes	Always
Resulting Outputs	Scope Management Plan – A component of the project or program management plan that describes how the scope will be defined, developed, monitored, controlled, and verified. The plan is a major input into the Develop Project Management Plan process, and the other scope management processes. The components of the scope management plan include: <ul style="list-style-type: none"> - Process for preparing a detailed project scope statement - Process that enables the creation of the Work Breakdown Structure (WBS) from the detailed project scope statement - Process the establishes how the WBS will be maintained/approved - Process that specifies how formal acceptance of the completed project deliverables will be obtained - Process to control how requests for changes to the detailed project scope statement will be processed 	Always		
	Requirements Management Plan – A component of the project management plan that describes how requirements will be analyzed, documented, and managed. The phase-to-phase relationship strongly influences how requirements are managed. The PM chooses the most effective relationship for the project and documents this approach in the requirements management plan. Many of the requirement plan components are based on that relationship	Never	Seldom	Sometimes

Table 1.2 Collect Requirements

Collect Requirements		Conventional	High Profile	Federal Major
Inputs	Scope Management Plan – provides clarity as to how project teams will determine which type of requirements need to be collected for the project	Always		
	Requirements Management Plan – provides the processes to be used throughout the Collect Requirements process to define/document stakeholder needs	Never	Seldom	Sometimes
	Stakeholder Management Plan – is used to understand stakeholder communication requirements and the level of stakeholder engagement to assess and adapt to the level of stakeholder participation in requirement activities	Always		
	Project Overview – is used to provide high-level project requirements so detailed project requirements can be developed	Sometimes	Always	
	Stakeholder Register – is used to identify stakeholders who can provide information on the requirements. It also captures major requirements and expectations stakeholders may have for the project	Seldom	Sometimes	Always
	WisDOT Inputs – The following are used to identify and report the improvement needs and existing conditions to be considered for the improvement project: <ul style="list-style-type: none"> - Current state highway plan (SHP) - Long range, multi-modal transportation plan - System for predicting highway deterioration and potential improvement needs - Program guidelines - Photologs - Field notes 	Sometimes	Always	
Tools/Techniques	Interviews – are formal/informal approach to discover information from stakeholders by talking to them directly	Never	Seldom	Sometimes
	Focus Groups – assembles prequalified stakeholders and subject matter experts to learn about their expectations/attitudes about a proposed project			
	Facilitated Workshops – are focused sessions that bring key cross-functional stakeholders together to define project requirements			
	Group Creativity Techniques – that can be used include: <ul style="list-style-type: none"> - Brainstorming - Nominal group technique - Idea/mind mapping - Affinity diagram - Multicriteria decision analysis 			
	Group Decision Making Techniques – are an assessment process of multiple alternatives with an expected outcome in the form of future actions. These techniques can be used to generate, classify, and prioritize product requirements			
	Questionnaires and Surveys – can quickly accumulated information from many respondents			
Resulting Outputs	Needs Identification – describes how individual requirements meet the need for the project. Needs may start out at a high level and become progressively more detailed as more is known	Sometimes	Always	
	Requirements Traceability Matrix – is a grid that links requirements from their origin to the deliverables that satisfy them	Never	Seldom	Sometimes

Table 1.3 Define Scope

Define Scope		Conventional	High Profile	Federal Major
Inputs	Scope Management Plan – provides clarity as to how project teams will determine which type of requirements need to be collected for the project	Always		
	Project Overview – provides the high-level requirements so that detailed project requirements can be developed	Sometimes	Always	
	Needs Identification – describes how individual requirements meet the need for the project. Needs may start at a high level and become progressively more detailed as more is known			
	WisDOT Inputs – The following are used to identify and report the improvement needs and existing conditions to be considered and further define the scope of the improvement project: <ul style="list-style-type: none"> - Current stat highway plan (SHP) - Long range, multi-modal transportation plan - System for predicting highway deterioration and potential improvement needs - Program guidelines - Photologs - Field notes 			
Tools/Techniques	Expert Judgment – is used to analyze the information needed to develop the scope statement. Such judgment and expertise are applied to any technical detail	Sometimes	Always	
	Alternatives Identification/National Environmental Policy Act (NEPA) Process – is a technique used to develop as many potential options as possible to identify different approaches to execute and perform the project work			
	Facilitated Workshops – are focused sessions that bring key cross-functional stakeholders together to define project requirements	Never	Seldom	Sometimes
Resulting Outputs	Project Scope – is the description of major deliverables, assumptions, and constraints. It describes detailed project deliverables and the work required to create those deliverables	Sometimes	Always	
	Project Document Updates – may include: <ul style="list-style-type: none"> - Stakeholder register - Needs identification - Requirements traceability matrix 			

Table 1.4 Use WisDOT’s WBS

Use WisDOT’s WBS		Conventional	High Profile	Federal Major
Inputs	Scope Management Plan – provides clarity as to how project teams will determine which type of requirements need to be collected for the project	Sometimes	Always	
	Project Scope – is the description of major deliverables, assumptions, and constraints. It describes, in detail, the project's deliverables and the work required to create those deliverables			
	Needs Identification – describes how individual requirements meet the need for the project; needs may start out at a high level and become progressively more detailed as more is known.			
Tools/ Techniques	Decomposition – is used for dividing and subdividing the project scope and project deliverables into smaller, more manageable parts; the work package is the work defined at the lowest level of the WBS for which cost and duration can be estimated and managed	Seldom	Sometimes	Always
	Expert Judgment – is used to analyze the information needed to develop the scope baseline for any technical detail	Sometimes	Always	
Resulting Outputs	Scope Baseline – Contains the scope baseline components: <ul style="list-style-type: none"> - Project scope statement includes the description of the project scope, major deliverables, assumptions, and constraints - WBS defines each deliverable and the decomposition of the deliverables into work packages - WBS dictionary has a detailed description of work and technical documentation for each WBS element 	Sometimes	Always	
	Project Document Updates – may include, but are not limited to, <i>needs identification</i> , which may need to be updated to include approved changes. If approved change requests result from the <i>Use WisDOT WBS</i> process, then the <i>needs identification</i> may need to be updated to include approved changes			

Table 1.5 Validate Scope

Validate Scope		Conventional	High Profile	Federal Major
Inputs	Project Management Plan – contains the scope baseline	Sometimes	Always	
	Needs Identification – describes how individual requirements meet the project needs, which may start at a high level and become progressively more detailed as more is known			
Tools/ Techniques	Inspection – includes activities such as measuring, examining, and validating to determine whether work and deliverables meet requirements and acceptance criteria	Always		
Resulting Outputs	Accepted Deliverables – are those that meet the acceptance criteria which are formally signed off and approved	Sometimes	Always	
	Change Requests – The deliverables that have not been formally accepted are documented, along with the reasons for non-acceptance. Those deliverables may require a change request which are processed for review and disposition through the Change Management process	Always		
	Project Document Updates – Because of the Validate Scope sub-process, updates may include any documents that define the project or report status on project completion			

Table 1.6 Control Scope

Plan Scope Management		Conventional	High Profile	Federal Major
Inputs	<p>Project Management Plan – The following information from the project management plan is used to control scope:</p> <p><u>Scope baseline</u> – Compared to the actual results to determine if a change, corrective action, or preventive action is necessary</p> <p><u>Scope management plan</u> – Sections of the plan describe how the project scope will be monitored and controlled</p> <p><u>Change management plan</u> – Defines the process for managing change on the project</p> <p>Changes to other knowledge area plans, such as schedule, budget, communication, quality, and risk</p>	Sometimes	Always	
	<p>Status Reports/Status Meetings – include information about project progress, such as which deliverables have started, their progress and which deliverables have finished</p>			
	<p>Needs Identification – describes how individual requirements meet the need for the project. Needs may start at a high level and become progressively more detailed as more is known</p>			
Tools/ Techniques	<p>Change Management Meetings – Project performance measurements are used to assess variation from the original base scope. Important aspects of project scope control include determining the cause and degree of variance relative to the base scope and deciding whether corrective or preventative action is required</p>	Sometimes	Always	
	<p>Production Meetings – are vital to track possible changes in the scope. These include regularly scheduled milestone reviews</p>			
Resulting Outputs	<p>Performance Measurements – can include planned vs. actual technical performance or other scope performance measurements. This information is documented and communicated to stakeholders</p>	Sometimes	Always	
	<p>Change Requests – Analysis of scope performance can result in a change request to the scope baseline or other components of the project management plan. Change requests can include preventative or corrective actions, defect repairs, or enhancement requests. Change requests are processed for review and disposition according to the Change Management process</p>		Always	
	<p>Project Management Plan Updates – include:</p> <p><u>Base scope updates</u> – If the approved change requests influence the project scope, then the scope statement, the Work Breakdown Structure (WBS), and the WBS dictionary are revised and re-issued to reflect the approved changes</p> <p><u>Other baseline updates</u> – If the approved change requests have an effort on the project scope, then the corresponding budget baseline and schedule baselines are revised and reissued to reflect the approved changes</p>			
	<p>Project Document Plan Updates – may include:</p> <ul style="list-style-type: none"> - Needs identification - Requirements traceability matrix 			

5.1 Overview

“Stakeholder Management includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution.”¹

“Stakeholder management also focuses on continuous communication with stakeholders to understand their needs and expectations, addressing issues as they occur, managing conflicting interests and fostering appropriate stakeholder engagement in project decisions and activities.”¹

The four (4) processes in stakeholder management are:

<i>Knowledge Area Processes</i> PMBOK®	<i>Process Group</i> PMBOK®
Identify Stakeholders – is the process of identifying the people, groups, or organizations that could impact or be impacted by a decision, activity, or outcome of the project; analyzing and documenting relevant information regarding their interests, involvement, interdependencies, influence, and potential impact on project success	Initiating
Plan Stakeholder Management – is the process of developing appropriate management strategies to effectively engage stakeholders throughout the project life cycle, based on the analysis of their needs, interests, and potential impact on project success	Planning
Manage Stakeholder Engagement – is the process of communicating and working with stakeholders to meet their needs/expectations, address issues as they occur, and foster appropriate stakeholder engagement in project activities throughout the project life	Executing
Control Stakeholder Engagement – is the process of monitoring overall project stakeholder relationships and adjusting strategies and plans for engaging stakeholders	Monitoring and Controlling

5.2 WisDOT Procedures

It is essential that project teams identify, understand, and manage their stakeholders. The following reasons illustrate why:

- Failure to identify stakeholders, along with their needs and expectations, can lead to a “failed” project
- Allows early identification of conflicts of interest
- Allows early identification of risks
- Prioritizes the relative importance of scope, schedule, and cost
- Helps secure buy-in to the project
- Identifies communication needs
- We never assume we know stakeholder needs

Stakeholders include those actively involved on a project, individuals positively or negatively impacted by the project, customers, sponsors, and the public. Examples of *external* stakeholders include advisory committees, business associations, elected officials, government agencies, tribal governments, interest groups, utility and railroad companies, and property owners. Examples of WisDOT *internal* stakeholders include the Division of Transportation System Development (DTSD) Administrator’s Office, DTSD Regions and Stateside Bureaus, Division of Transportation Investment Management (DTIM), the Secretary’s Office, the Office of General Counsel, and the Office of Public Affairs.

Stakeholders are identified as part of the Public Involvement Plan (PIP) described in detail in [FDM 6-5-10](#) Public Involvement Plan. Initial WisDOT stakeholder interaction is done during the programming process to gather public input through program and other meetings.

The project manager must judge the type of information and the level of detail in the stakeholder management strategy since some of the strategies may be too sensitive to be included in a shared document.

5.3 Stakeholder Register

Creating a stakeholder register is essential for the success of your project. Be sure to:

- Identify all potential stakeholders and relevant information (anyone impacted by the project outcome)

- Analyze potential impact or support each stakeholder could generate
- Assess how stakeholders are likely to react or respond in various situations and plan how to influence them to enhance their support and mitigate potential negative impacts
- Classify stakeholders to define a management approach strategy

The PIP template outlined in [FDM 6-5-10](#) includes a section for outlining stakeholders and target audiences. At times, including a more detailed stakeholder register may help analyze the potential impact and support of each stakeholder. WisDOT staff can access supplemental sample stakeholder management templates on the [Project Management Unit \(PMU\) SharePoint page](#) (internal WisDOT only).

5.4 Stakeholder Management Process Steps

Tables 5.1, 5.2, 5.3, and 5.4 show the inputs, tools/techniques, and outputs by project size for the four PMBOK® stakeholder management processes. The guidance listed below may vary on actual project specifics.

Table 5.1 Identify Stakeholders

Identify Stakeholders		Conventional	High Profile	Federal Major
Inputs	Project Overview – provides information about internal and external parties affected by the project	Always		
	Solicitations – If a project is the result of a procurement activity or is based on an established contract, the parties in that contract are key project stakeholders	Sometimes	Always	
Tools/Techniques	Stakeholder Analysis – is a technique of systematically gathering and analyzing quantitative and qualitative information to determine whose interests should be considered throughout the project. It identifies the interests, expectations, and influence of the stakeholder and relates them to the purpose of the project	Never	Seldom	Sometimes
	Expert Judgment – is used to ensure comprehensive identification and listing of stakeholders, judgement and expertise should be sought from groups or individuals with specialized training or subject matter expertise	Sometimes	Always	
	Meetings – Profile analysis meetings are designed to develop an understanding of major project stakeholders			
Resulting Outputs	Stakeholder Register – contains all details related to the identified stakeholders	Sometimes	Always	
	Public Involvement Plan – is a project-specific sequenced list of anticipated contacts with the public	Always		

Table 5.2 Plan Stakeholder Management

Plan Stakeholder Management		Conventional	High Profile	Federal Major
Inputs	Stakeholder Management Plan – may include: <ul style="list-style-type: none"> - Life cycle selected for the project and the process that will be applied to each phase - Description of how work will be executed to accomplish the project objectives - Description of how human resources requirements will be met and how roles and responsibilities, reporting relationships, and staffing management will be addressed - Change management plan that documents how changes will be monitored and controlled - Need and techniques for stakeholder communication 	Always		
	Stakeholder Register – provides the information needed to plan appropriate ways to engage project stakeholders	Sometimes	Always	
Tools/Techniques	Expert Judgment – Based on the project objectives, the project manager (PM) should apply expert judgement to decide upon the level of engagement required at each stage of the project from each stakeholder	Always		
	Meetings – should be held with experts and the project team to define the required engagement levels of all stakeholders. This information can be used to prepare the stakeholder management plan	Sometimes	Always	
	Analytical Techniques – The current engagement level of all stakeholders needs to be compared to the planned engagement levels required for successful project completion	Never	Seldom	Sometimes
Resulting Outputs	Stakeholder Management Plan – is part of the project management plan and identifies the management strategies required to engage stakeholders. The plan can be crafted based on project needs	Always		
	Project Document Updates – may include: <ul style="list-style-type: none"> - Project schedule - Stakeholder register 			

Table 5.3 Manage Stakeholder Engagement

Manage Stakeholder Engagement		Conventional	High Profile	Federal Major
Inputs	Stakeholder Management Plan – provides guidance on how stakeholders can best be involved in the project. The plan describes the methods and technologies used for stakeholder communications	Always		
	Public Involvement Plan – is a project-specific sequenced list of anticipated contacts with the public (see FDM 6-5-10.1)			
	Communication Management Plan – provides guidance and information on managing stakeholder expectations	Sometimes	Always	
	Change Management Tracking Log – is used to document project changes regarding time, cost, and risk communicated to stakeholders			
Tools/ Techniques	Communication Methods – are decided by the project manager (PM), including how, when, and which methods are used in the project	Always		
	Interpersonal Skills – are applied by the PM to manage stakeholders' expectations	Seldom	Sometimes	Always
	Management Skills – are applied by the PM to coordinate and harmonize the group toward accomplishing the project objectives			
Resulting Outputs	Issue Log – Managing stakeholder engagement may result in the development of an issue log that is updated as new issues are identified and current issues are resolved	Sometimes	Always	
	Change Requests – Managing stakeholder engagement may result in a change request to the project, such as corrective or preventative actions to the project or to the interaction with the impacted stakeholders	Always		
	Project Management Plan Updates – are provided as new or changed stakeholder requirements are defined			
	Project Document Updates – may include the stakeholder register			

Table 5.4 Control Stakeholder Engagement

Control Stakeholder Engagement		Conventional	High Profile	Federal Major
Inputs	Project Management Plan – is used to develop the stakeholder management plan	Always		
	Issue/Risk Tracking Log – is updated as new issues are identified and current issues resolved	Sometimes	Always	
	Status Reports – include observations and measurements identified during activities being performed to do the project work	Seldom	Sometimes	Always
	Project Documents – originating from initiation, planning, execution, or control processes may be used as inputs from controlling stakeholder engagement. These include, but are not limited to, project schedule, stakeholder register, issue log, change management, tracking log and project communications	Always		
Tools/ Techniques	Information Management Systems – provides a standard tool for the project manager (PM) to capture, store, and distribute information to stakeholders about project cost, schedule progress, and performance	Never	Seldom	Sometimes
	Expert Judgment – Input should be sought from groups or individuals with specialized training or subject matter expertise	Always		
	Meetings – Status review meetings are used to exchange and analyze information about stakeholder engagement	Sometimes	Always	
Resulting Outputs	Work Performance Information – is data collected from various controlling processes, analyzed in context, and integrated based on relationships across areas	Seldom	Sometimes	Always
	Change Requests – Analysis of project performance and interactions with stakeholders often generate change requests. These change requests are processed through the Change Management process	Always		
	Project Management Plan Updates – As changes in approach or strategy are identified, the plan may need to be updated			
	Project Document Updates – may include: <ul style="list-style-type: none"> - Stakeholder register - Issue log 			

10.1 Overview

“Communication Management includes the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information.”¹

The communication management plan includes three (3) processes:

Knowledge Area Processes PMBOK®	Process Group PMBOK®
Plan Communication Management – is the process of developing an appropriate approach and plan for project communications based on stakeholder’s information needs and requirements, and available organizational assets	Planning
Manage Communication – is the process of creating, collecting, distributing, storing, retrieving, and the ultimate disposition of project information in accordance with the communications management plan	Executing
Control Communication – is the process of monitoring and controlling communication throughout the entire project life cycle to ensure the information needs of the project stakeholders are met	Monitoring and Controlling

10.2 WisDOT Procedures

Project communication is the responsibility of everyone on the project team. The project manager, however, is responsible for developing a Public Involvement Plan as discussed in [FDM 6-5-10.1](#). The Public Involvement Plan is a project-specific sequence list of anticipated contacts with the public. Plan preparation is a crucial task completed early in the project process. A properly developed plan ensures effective involvement of the affected public in a planned, orderly manner throughout the entire project.

WisDOT goals and objectives for public involvement activities are shown in [FDM 6-1-1.2](#). These activities are designed to effectively involve citizens in the Facilities Development Process so that project decisions made are in the best overall public interest. Effective public involvement is attained through implementation of various techniques designed to accomplish one or more of the following specific objectives:

1. Inventory and define key groups affected by a project
2. Identify key community issues, priorities, and values
3. Inform citizens of meetings and events
4. Motivate citizens to participate in project development
5. Predict project impacts
6. Promote direct public interaction
7. Resolve conflicts
8. Monitor impacts related to recently completed projects
9. Evaluate and document the effectiveness of public involvement activities

WisDOT staff can access supplemental communication management templates on the [PMU SharePoint page](#) (internal WisDOT only).

10.3 Communication Management Process Steps

Tables 10.1, 10.2, and 10.3 show the inputs, tools/techniques, and outputs by project size for the three PMBOK® communication management processes. The guidance listed below may vary on actual project specifics.

Table 10.1 Plan Communication Management

Plan Communication Management		Conventional	High Profile	Federal Major
Inputs	Project Management Plan – provides information on how the project will be executed, monitored, controlled, and closed	Always		
	Stakeholder Register – provides the information needed to plan the communication with project stakeholders	Sometimes	Always	
	Public Involvement Plan – is a project-specific sequenced list of anticipated contacts with the public (see FDM 6-5-10.1)	Always		
Tools/Techniques	Communications Requirements Analysis – determines the information needs of the project stakeholders. These requirements are defined by combining the type and format of information needed with an analysis of the value of that information	Never	Seldom	Sometimes
	Communication Technology – Use appropriate technology that fits project needs			
	Communication Models – are used to facilitate communications and the exchange of information may vary from project to project and within different stages of the same project			
	Communication Methods – are broadly classified as Interactive (multidirectional exchange of information), push (sent to specific recipients who need to receive the information), and pull (used for large volumes of information or for large audiences)	Always		
	Meetings – are used for dialogue with the project team to determine the most appropriate way to communication project information	Sometimes	Always	
Resulting Outputs	Communication Management Plan – is part of the project management plan and identifies the management strategies required to communicate project information. The plan can be crafted based on project needs	Always		
	Project Document Updates – may include: <ul style="list-style-type: none"> - Project schedule - Project register 			

Table 10.2 Manage Communication

Manage Communication		Conventional	High Profile	Federal Major
Inputs	Communication Management Plan – describes how project communications are planned, structured, monitored, and controlled	Always		
	Performance Reports – are a collection of project performance and status information used to facilitate discussion and to create communications	Sometimes	Always	
Tools/Techniques	Communication Technology – Ensure the technology is appropriate for the information being communicated	Seldom	Sometimes	Always
	Communication Models – Ensure communication model choice is appropriate for the project			
	Communication Methods – Ensure distributed information is received and understood to enable response and feedback	Always		
	Information Management Systems – Project information is distributed using tools such as hard-copy documents, electronic (email, video, website, phone), and electronic management (portals, web interfaces)	Seldom	Sometimes	Always
	Performance Reporting – is the periodic collection/distribution of performance information including status reports, progress measures, and forecasts			
Resulting Outputs	Project Communications – can vary significantly and is influenced by the urgency and impact of the message, its delivery method, and confidentiality level	Always		
	Project Management Plan Updates – may be required based on the current project performance against the performance measurement baseline (PMB)			
	Project Document Updates – may include: <ul style="list-style-type: none"> - Issue log - Project schedule - Funding 			

Table 10.3 Control Communication

Control Communication		Conventional	High Profile	Federal Major
Inputs	<p>Project Management Plan – describes how the project will be executed, monitored, controlled, and closed. It provides information such as:</p> <ul style="list-style-type: none"> - Stakeholder communication requirements - Reason for distribution of information - Timeframe and frequency of information distribution - Individual/group responsible for communication of information - Individual/group receiving the information 	Sometimes	Always	
	<p>Project Communications – involves activities required for information and communications to be monitored, acted upon, and released to stakeholders. Such communications come from multiple sources and may vary in format, detail, and confidentiality. Examples include deliverables status, schedule process, and costs incurred</p>			
	<p>Issue Log – is used to document/monitor issue resolution and to facilitate communication and ensure a common understanding of issues</p>			
	<p>Build Out Budget – WisDOT budget forecast information from the Control Cost process provides information on additional funds that are expected to be required for remaining work and estimates of project completion</p>	Seldom	Sometimes	Always
	<p>Status Reports – WisDOT status reports can include details about which communications have been distributed, feedback on communications, survey results of communication effectiveness, and other observations</p>			
Tools/Techniques	<p>Information Management Systems – provides a set of tools for the project manager (PM) to capture, store, and distribute information to stakeholders about project costs, schedule, and performance</p>	Seldom	Sometimes	Always
	<p>Expert Judgment – is relied upon by project team to assess the impact of project communications, any needed action, and responsibility and timing for taking actions</p>	Sometimes	Always	
	<p>Meetings – are used for dialogue with the project team to determine the most appropriate way to communication project information</p>			
Resulting Outputs	<p>Work Performance Information – organizes and summarizes the performance data gathered that provides status and progress information, then communicated to appropriate stakeholders</p>	Seldom	Sometimes	Always
	<p>Change Requests – are processed through the WisDOT Change Management process and may result in:</p> <ol style="list-style-type: none"> 1. New or revised cost estimates, activity sequences, schedule dates, resource requirements and analysis of risk response alternatives 2. Adjustments to the project management plan 3. Recommendations of corrective actions that may bring the expected future performance of the project back in line with the project management plan 	Always		
	<p>Project Management Plan Updates – The control communications process may trigger updates to the communications management plan Project Document Updates – may include:</p> <ul style="list-style-type: none"> - Forecasts - Performance reports - Issue log 			

15.1 Overview

“Budget Management includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget.”¹

The budget management plan includes four (4) processes:

<i>Knowledge Area Processes</i> PMBOK®	<i>Process Group</i> PMBOK®
Plan Budget Management – is the process that establishes the policies, procedures, and documentation for planning, managing, expending, and controlling project costs	Planning
Estimate Costs – is the process of developing an approximation of the monetary resources needed to complete project activities	Planning
Determine Budget – is the process of aggregating the estimated costs of individual activities or work packages to establish an authorized budget baseline	Planning
Control Costs – is the process of monitoring the status of the project to update the project costs and managing changes to the budget baseline	Monitoring and Controlling

15.2 WisDOT Procedures

WisDOT budget management policy is most concerned about improvement project design and construction costs. Other project component costs, although important, are managed to a lesser extent. In WisDOT’s Financial Integrated Improvement Programming System (FIIPS), a project has one or more components, and generally each component has an estimate amount and schedule date (see [FDM 19-5](#) for details on developing an estimate).

15.3 Delivery/Non-delivery Components

Components are broadly categorized as “Delivery” and “Non-delivery.” Only three components – in-house engineering component estimate (I/E), consultant engineering component estimate (C/E), and municipal engineering component estimate (M/E) are defined as “Delivery.” All others are “Non-delivery.”

For *state* system projects, “Delivery” is the cost of in-house staff and/or consultant staff to prepare the plan and specifications (during design) or administer the construction contract (during construction).

For *local* system projects, “Delivery” may also include the cost of municipal staff. “Non-delivery” is the sum of the construction cost and the cost of typically related components – real estate acquisition, compensable railroad, utility adjustments, and traffic mitigation.

15.4 Estimating Design Projects

The estimate for local program design projects is derived from the approved program listing.

The estimate for state program (i.e., six-year program) design projects is derived during the Project Definition phase by using the design delivery worksheet which is a tool intended for estimating components of the design project using project hours (WisDOT and consultant) and direct expenses. Within this tool, the estimated delivery budget is compared to the Design Delivery Cost Index (DDCI) for comparable average delivery cost for a project by work type and let estimate cost.

15.5 Determine Budget

The budget is determined by summing the component estimates from the previous sub-process. This is done automatically by entering the component information (estimate amount/schedule date) in FIIPS.

15.6 Budget Management

The design budget is reviewed at least quarterly during the design process using the WisDOT design on budget tool to assess the actual costs spent against the budget estimate and predicted spend over the design delivery timeline for on-time and on-budget delivery performance.

In addition to quarterly reviews, the cost estimate is updated at the following times during the design process:

- Life cycle 12 – after the Project Management Plan is approved
- Life cycle 15 – when the design study report is approved

- Life cycle 20 – when the Plans, Specifications, & Estimates (PS&E) is submitted

15.7 Budget Management Process Steps

Tables 15.1— 15.4 show the inputs, tools/techniques, and outputs by project size for the four PMBOK® budget management processes. The uses listed in the table vary on actual specifics of a project.

Table 15.1 Plan Budget Management

Plan Budget Management		Conventional	High Profile	Federal Major
Inputs	<p>Project Management Plan – contains information to develop the budget management plan, containing at least:</p> <p><u>Scope baseline</u> – Scope statement and Work Breakdown Structure (WBS) details for cost estimation and management</p> <p><u>Schedule baseline</u> – Defines when the project costs will incur</p> <p><u>Other information</u> – Other cost-related scheduling, risk, and communications decisions from project management plan</p>	Always		
	<p>Project Overview – WisDOT overview provides the summary budget from which detailed project costs are developed. It also defines the project approval requirements that influence the management of project costs</p>			
Tools/Techniques	<p>Expert Judgment – is guided by historical information and provides insight about the environment and information from prior similar projects</p>	Always		
	<p>Analytical Techniques – Developing the budget management plan may involve choosing strategic funding options. Such decisions may affect project schedule and/or risk</p>	Never	Seldom	Sometimes
	<p>Meetings – are held to develop the budget management plan and may include the project manager (PM), project sponsor, team members, selected stakeholders, and others as needed</p>	Seldom	Sometimes	Always
Resulting Outputs	<p>Budget Management Plan – is part of the project management plan and describes how project costs are planned, structured, and controlled. Budget management processes and associated tools and techniques are documented in the budget management plan</p>	Always		

Table 15.2 Estimate Costs

Estimate Costs		Conventional	High Profile	Federal Major
Inputs	Budget Management Plan – defines how project costs are managed and controlled. It includes the method used and level of accuracy required to estimate activity cost	Always		
	Resource Management Plan – provides project staffing attributes, personnel rates, and related rewards/recognition, which are necessary components for developing the project cost estimates			
	Scope Baseline – is comprised of the following: <ul style="list-style-type: none"> - Project scope statement - Work Breakdown Structure (WBS) - WBS dictionary 	Sometimes	Always	
	Project Schedule – The type and quantity of resources (in-house and/or consultant staff) and the amount of time which those resources are applied to complete the work of the project are major factors in determining the delivery cost. Schedule activity resources and their respective durations are used as key inputs to this process	Always		
	Issue/Risk Tracking Log – should be reviewed to consider risk response costs. Risks (threats or opportunities) typically have an impact on activity and overall project costs	Sometimes	Always	
	Expert Judgment – Guided by historical information, it provides insight about the environment and information from prior similar projects	Sometimes	Always	
Tools/Techniques	Analogous Cost Estimating – uses values such as scope, cost, budget, and duration or measure of scale such as size, weight, and complexity from a previous, similar project as the basis for estimating the same parameter or measurement for a current project	Never	Seldom	Sometimes
	Parametric Estimating – uses a statistical relationship between relevant historical data and other variables (e.g., square footage in construction) to calculate as cost estimate for project work			
	Bottom-Up Estimating – is a method of estimating a component of work. The cost of individual work packages or activities is estimated to the greatest level of detail. The detailed cost is then summarized to higher levels for subsequent reporting and tracking purposes			
	Three-Point Estimating – is a technique used to estimate cost or duration by applying an average or weighted average of optimistic, pessimistic, and most likely estimates when there is uncertainty with the individual activity estimates			
	Reserve Analysis – Cost estimates may include contingency reserves to account for cost uncertainty. They are the budget within the budget baseline that is allocated for identified risks, which are accepted and for which contingent or mitigating responses are developed			
	Cost of Quality (COQ) – assumptions may be used to prepare the activity cost estimate			
	Project Management Estimating Software – Applications, computerized worksheets, simulation, and statistical tools are used to assist with cost estimating	Always		
	Group Decision-Making Techniques – Team-based approaches, such as brainstorming, the Delphi or nominal group techniques, are useful for engaging team members to improve estimate accuracy and commitment to the emerging estimates	Never	Seldom	Sometimes
Resulting Outputs	Component Estimates – See FDM 2-20-15.4 Estimating Design Projects	Always		
	Estimate Documentation/Justification – The amount and type of additional details supporting the cost estimate vary by application area. Regardless of the detail level, the supporting documentation should provide a clearer understanding how the cost estimate was derived			
	Project Document Updates – Documents that may be updated include: the issue/risk tracking log			

Table 15.3 Determine Budget

Determine Budget		Conventional	High Profile	Federal Major
Inputs	Budget Management Plan – describes how the project costs will be managed and controlled	Always		
	Scope Baseline – <u>Project scope statement</u> – Formal limitations by period for the expenditure of project funds can be mandated by the organization, by agreement, or by other entities such as government agencies. Such constraints are reflected here <u>Work Breakdown Structure (WBS)</u> – Provides the relationships among all project deliverables and their various components <u>WBS dictionary</u> – This and related detailed statements of work provide an identification of deliverables and description of work in each WBS component to produce each deliverable	Sometimes	Always	
	Activity Cost Estimates – Cost estimates for each activity within a work package are aggregated to obtain a cost estimate for each work package	Always		
	Estimate Documentation/Justification – Supporting detail for cost estimates contained in the basis for estimates should specify any basic assumptions dealing with the inclusion or exclusion of indirect or other costs in the project budget			
	Project Schedule – includes planned start and finish dates for project activities, milestones, work packages, and control accounts. It can be used to aggregate costs to the calendar periods in which the costs are planned to be incurred			
	Staff Availability – Resource calendars provide information on which resources are assigned to the project and when they are assigned			
	Agreements (Contracts) – Applicable contract information and costs relating to products, services, or results that have been or will be purchased are included when determining the budget	Sometimes		
Issue/Risk Tracking Log – Review to consider how to aggregate the risk response costs. Include log updates when determining the budget				
Tools/Techniques	Cost Aggregation – Cost estimates are aggregated by work packages in accordance with the WBS. The work package cost estimates are then aggregated for the higher component levels of the WBS (such as control accounts) and ultimately for the entire project. See above Table 15.2 Estimate Costs, Tools/Techniques, Project Management Estimating Software for estimate tool	Always	Seldom	Sometimes
	Reserve Analysis – can establish both the contingency reserves and the management reserves for the project	Never	Always	
	Expert Judgment – used, guided by experience in an application area, Knowledge Area, discipline, industry, or similar project, aids in determining budget	Sometimes		
	Historical Relationships – Such relationships that result in parametric estimates or analogous estimates involve the use of project characteristics to develop mathematical models to predict total project costs	Seldom		
	Funding Limit Reconciliation – The expenditure of funds should be reconciled with any funding limits on the commitment of funds for the project. A variance between the funding limits and the planned expenditures will sometimes necessitate the rescheduling of work to level out the rate of expenditures. This is accomplished by placing imposed date constraints for work into the project schedule			

Table 15.3 Determine Budget (cont.)

Determine Budget		Conventional	High Profile	Federal Major
Resulting Outputs	Budget Baseline – is the approved version of the time-phased project budget, excluding any management reserves, which can only be changed through formal change control procedures and is used as a basis for comparison as a result. It is developed as a summation of the approved budgets for the different schedule activities. At WisDOT, the budget baseline is part of the Delivery Cost Report	Seldom	Sometimes	Always
	Funding – requirements and periodic funding requirements (e.g., quarterly, annually) are derived from the budget baseline. The budget baseline includes projected expenditures plus anticipated liabilities. At WisDOT, the total funding requirements are estimates that are part of the Delivery Cost Report	Always		
	Project Document Updates – may include: <ul style="list-style-type: none"> - Issue/risk tracking log activity - Cost estimates - Project schedule 			

Table 15.4 Control Costs

Control Costs		Conventional	High Profile	Federal Major
Inputs	<p>Project Management Plan – contains the following information that is used to control costs: <u>Budget baseline</u> – This is compared with actual results to determine if a change, corrective action, or preventative action is needed <u>Budget management plan</u> – Describes how the project costs will be managed and controlled</p>	Sometimes	Always	
	<p>Funding – requirements include projected expenditures plus anticipated liabilities</p>			
	<p>Status Reports – includes information about project progress, such as which activities have started, their progress, and which deliverables are finished. Information also includes costs that have been authorized and incurred</p>	Always		
Tools/Techniques	<p>Earned Value Management (EVM) – is a methodology that combines scope, schedule, and resource measurements to assess project performance and progress</p>	Never	Seldom	Sometimes
	<p>Forecasting – As the project progresses, the project team may develop a forecast for the estimate at completion (EAC) that may differ from the budget at completion (BAC) based on the project performance. If it becomes obvious that the BAC is no longer viable, the project manager (PM) should consider the forecasted EAC. Forecasting the EAC involves making projections of conditions and events in the project’s future based on current performance information and other available knowledge. At WisDOT, PMs can use the “To Date Charge Reports” from Management Information for the Improvement Program System (MIIPS)</p>			
	<p>To-Complete Performance Index (TCPI) – is a measure of cost performance that is required to be achieved with the remaining resources to meet a specified management goal, expressed as the ratio of the cost to finish the outstanding work to the remaining budget</p>			
	<p>Performance Reviews – compare cost performance over time, schedule activities or work packages overrunning and underrunning the budget, and estimated funds needed to complete work in progress</p>	Sometimes	Always	
	<p>Project Management Software – is often used to monitor the three earned value management dimensions, display graphical trends, and forecast a range of possible final project results</p>	Always		
	<p>WisDOT Procedure – A design on budget tool is used to monitor and analyze the design project burn rate to proactively manage the project delivery to the intended on-time and on-budget goals</p>	Always	Sometimes	
	<p>Reserve Analysis – During cost control, reserve analysis is used to monitor the status of contingency and management reserves for the project to determine if these reserves are still needed or if additional reserves need to be requested</p>	Seldom	Sometimes	Always
Resulting Outputs	<p>Work Performance Information – The calculated cost variance (CV), schedule variance (SV), cost performance index (CPI), schedule performance index (SPI), and variance at completion (VAC) values for Work Breakdown Structure (WBS) components, particularly the work package and control accounts, are documented/communicated to stakeholders</p>	Sometimes	Always	
	<p>Build Out Budget – Either a calculated EAC value or a bottom-up EAC value is documented/communicated to stakeholders</p>			
	<p>Change Requests – Analysis of project performance may result in a change request to the budget baseline or other components of the project management plan. Change requests may include preventative or corrective actions, and are processed for review and deposition through the WisDOT Change Management Process</p>	Always		
	<p>Project Management Plan Updates – Elements of the plan that may be updated include budget baseline and budget management plan</p>			
	<p>Project Document Updates – Those that may be updated include cost estimates and estimate documentation</p>			

20.1 Overview

Project risk management is the systematic process of identifying, analyzing, planning for, responding to, and monitoring project risk. It involves processes, tools, and techniques to help project managers minimize the probability and consequences of adverse events.

The risk management plan offers a structured way to consider risk and includes six (6) basic processes:

Knowledge Area Processes PMBOK®	Process Group PMBOK®
Plan Risk Management – is the process of defining how to conduct risk management activities for a project	Planning
Identify Risks – is the process of determining which risks may affect the project and documenting their characteristics	Planning
Perform Qualitative Risk Analysis – is the process of prioritizing risks for further analysis or action by assessing and combining their probability of occurrence and impact	Planning
Perform Quantitative Risk Analysis – is the process of numerically analyzing the effect of identified risks on overall project objectives	Planning
Plan Risk Responses – is the process of developing options and actions to enhance opportunities and to reduce threats to project objectives	Planning
Control Risks – is the process of implementing risk response plans, tracking identified risks, monitoring residual risks, identifying new risks, and evaluating risk process effectiveness throughout the project	Monitoring and Controlling

20.2 WisDOT Procedures

The term “risk” must be understood clearly for effective project risk management. In the context of a project, we are concerned about potential impacts on project objectives such as cost and time (schedule). Risk comes in many forms and can negatively or positively impact a project. All projects have some inherent risks that cannot be avoided. How these risks are identified, documented, and managed often determine the success of a project.

Risk management is performed during Life Cycle 10 of the project delivery phase and is a continuous responsibility through construction of the project (see [FDM 3-1, Attachment 1.1](#)).

20.3 Risk Management Plan

The Risk Management Plan defines the level at which risk management will be performed for the project and the frequency of risk management meetings and risk register updates. It lists the members of the project team by various disciplines involved in the project and sets a budget for the risk management activities. The plan should be completed early in project planning since it is crucial to successfully performing the other processes.

20.4 Risk Assessment and Risk Management Planning

A Risk Assessment identifies each risk and tries to understand its importance by assessing a significance. This is done by evaluating the likelihood of the risk occurring and trying to estimate the severity of impacts to the schedule and budget if it occurred. The tables in Figure 20.1 are used to perform a “Likelihood/Impact Analysis” and serve as a guide when creating a Risk Register.

Risk Management planning focusses on the management of those risks considered likely or greater to occur and considered to have a medium-to-high impact on the project schedule and budget. For these risks, specific action items should be identified and assigned to a project team member to coordinate.

The following is a list of risk strategy options when considering specific actions. Strategies include:

- Avoidance
- Transference
- Mitigation
- Acceptance
- Recognize, but no action
- Ignore

When considering risk response actions, the following essential questions should be answered:

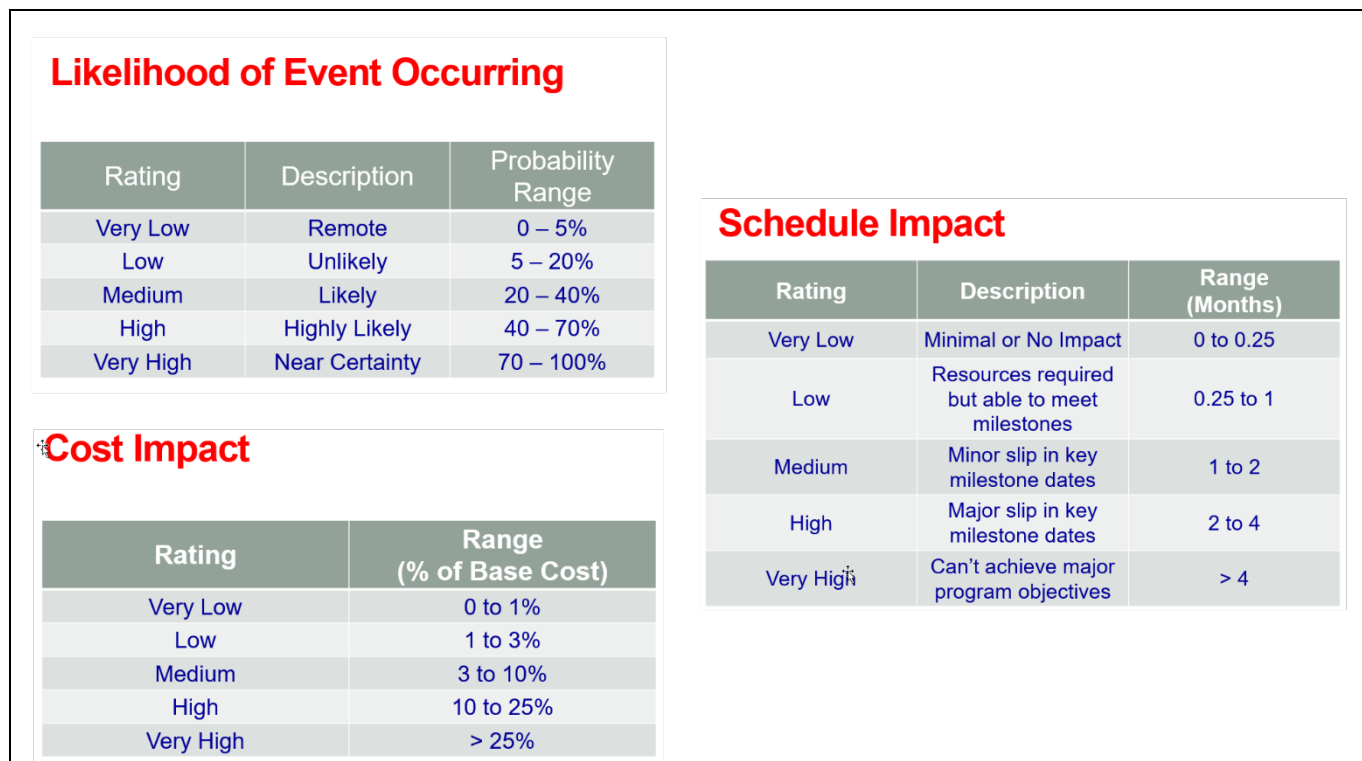
- Who will manage the risk?
- What will be done?
- When will it be done?
- What resources are likely to be required?

20.5 Create Risk Register

The Project Risk Register is a communication tool for project team and others to identify project risks, their significance to the project schedule and budget, and management strategy. A Project Risk Register template can be completed in the applicable application.

WisDOT staff can access a supplemental risk management register template to help guide the project management process on the [PMU SharePoint page](#) (internal WisDOT only). In addition, a [Risk Based Environmental Scoping Template](#) is available.

Figure 20.1 – Likelihood and Impact Tables



Source: PMBOK®

20.6 Risk Management Process Steps

Tables 20.1 – 20.6 show the anticipated use of the inputs, tools/techniques, and outputs by project size for the six (6) PMBOK® risk management processes. The uses listed in the table will vary on actual specifics of a project.

Table 20.1 Plan Risk Management

Plan Risk Management		Conventional	High Profile	Federal Major
Inputs	Project Management Plan – In planning risk management, all approved subsidiary management plans and baselines should be taken into consideration to make the risk management plan consistent with them. The risk management plan is also a component of the project management plan. The project management plan provides baseline or current state of risk-affected areas including scope, schedule, and cost	Always		
	Project Overview – can provide various inputs such as high-level risks, high-level project descriptions, and high-level requirements	Sometimes	Always	
	Stakeholder Register – contains all details related to the project's stakeholders and provides an overview of their roles			
Tools/Techniques	Analytical Techniques – are used to understand and define the overall risk management context of the project (the combination of stakeholder risk attitudes and the strategic risk exposure of a given project based on the overall project context)	Never	Seldom	Sometimes
	Expert Judgment – To ensure a comprehensive establishment of the risk management plan, judgment, and expertise should be considered from groups and individuals with specialized training or knowledge in the subject area	Always		
	Meetings – Project teams hold meetings to develop the risk management plan. Attendees may include the project manager (PM), selected team members and stakeholders and others with responsibility to manage risk-related activities	Sometimes	Always	
Resulting Outputs	Risk Management Plan – defines the level at which risk management will be performed for the project and the frequency of risk management meetings and risk register updates See above for FDM 2-20-20.3	Always		

Table 20.2 Identify Risks

Identify Risks		Conventional	High Profile	Federal Major
Inputs	Risk Management Plan – Key elements of the risk management plan that contribute to the Identify Risks process are assignment of roles and responsibilities, provision for risk management activities in the budget and schedule, and categories of risk that are sometimes expressed as a risk breakdown structure	Always		
	Budget Management Plan – provides processes and controls that can be used to help identify risks across the project	Sometimes	Always	
	Schedule Management Plan – provides insight to project time/ schedule objectives and expectations that risk may impact			
	Quality Management Plan – provides a baseline of quality measures and metrics for use in identifying risks			
	Resource Management Plan – provides guidance on how project human resources should be defined, staffed, managed, and released. It can also contain roles and responsibilities, organization charts, and the staffing management plan, which form a key input to identify risk process			
	Scope Baseline – Project assumptions are found in the scope statement. Uncertainty in project assumptions should be evaluated as potential causes of project risk. The Work Breakdown Structure (WBS) is a critical input to identifying risks as it facilitates an understanding of the potential risks at both the micro and macro levels. Risk can be identified and tracked at summary, control account, and/or work package levels			
	Activity Cost Estimates – are useful in identifying risks as they provide a quantitative assessment of the likely cost to complete scheduled activities and ideally are expressed as a range, with the width of the range indicating the degree(s) of risk. The review may result in projections indicating the estimate is either sufficient or insufficient to complete the activity	Never	Seldom	Sometimes
	Activity Duration Estimates – are useful in identifying risks related to the time allowance for the activities or project, again with the width of the range of such estimates indicating the relative degree(s) of risk	Sometimes	Always	
	Stakeholder Register – Information about the stakeholders is useful for soliciting inputs to identify risks, as this will ensure that key stakeholders are interviewed or otherwise participate during the Identify Risks process			
	Project Documents – provide the project team with information about decisions that help better identify project risks. They improve cross-team and stakeholder communications and can include: Project overview, project schedule, schedule network diagrams, issue log, and quality checklist			
Solicitation – If the project requires external procurement of resources, the solicitation becomes a key input to the Identify Risks process. The complexity and the level of detail of the solicitation should be consistent with the value of, and risks associated with, planned procurement				
Tools/Techniques	Documentation Review – may be performed, including plans, assumptions, previous project files, awarded contracts, and other information. The quality of the plans, as well as consistency between those plans and the project requirements and assumptions, may be indicators of risk in the project	Sometimes	Always	
	Information Gathering Techniques – Examples of techniques used to identify risks can include brainstorming, Delphi technique, interviewing, and root cause analysis			
	Checklist Analysis – developed based on historical information and knowledge accumulated from previous similar projects and other sources of information	Never	Seldom	Sometimes
	Assumptions Analysis – explores the validity of assumptions as they apply to the project and identifies risks from inaccuracy, instability, inconsistency, or incompleteness of assumptions			

Table 20.2 Identify Risks (cont.)

Identify Risks		Conventional	High Profile	Federal Major
Tools/Techniques	Diagramming Techniques – may include cause and effect diagrams, system or process flow charts, and influence diagrams	Never	Seldom	Sometimes
	SWOT Analysis – examines the project from strengths, weaknesses, opportunities, and threats (SWOT) perspectives to increase the breadth of identified risks			
	Expert Judgment – Risks may be identified directly by experts with relevant experience with similar projects. Such experts should be identified by the PM and invited to consider all aspects of the projects and suggest possible risks based on their previous experience and areas of expertise	Sometimes	Always	
Resulting Outputs	Risk Register – is the primary output from Identify Risks. The risk register is created in the applicable application	Always		

Table 20.3 Perform Qualitative Risk Analysis

Perform Qualitative Risk Analysis		Conventional	High Profile	Federal Major
Inputs	Risk Management Plan – Key elements of the risk management plan used in the Perform Qualitative Risk Analysis process include roles and responsibilities for conducting risk management, budgets, schedule activities for risk management, risk categories, definitions of probability and impact, the probability and impact matrix, and revised stakeholders’ risk tolerances. These inputs are usually tailored to the project during the Plan Risk Management process. If they are not available, they may be developed during the Perform Qualitative Risk Analysis process	Sometimes	Always	
	Scope Baseline – Projects of a common or recurrent type tend to have more well-understood risks. Projects using state-of-the-art or first-of-its-kind technology, and highly complex projects, tend to have more uncertainty. This can be evaluated by examining the scope baseline	Sometimes	Always	
	Issues/Risk Tracking Log – contains information that will be used to assess and prioritize risks			
Tools/Techniques	Risk Probability and Impact Analysis – investigates the likelihood that each specific risk will occur. Risk impact assessment investigates the potential effect on a project objective such as schedule, cost, quality, or performance, including negative effects for threats and positive effects for opportunities			
	Probability and Impact Matrix – Risks can be prioritized for further quantitative analysis and planning risk responses based on their risk rating. Ratings are assigned to risks based on their assessed probability and impact			
	Risk Data Quality Assessment – is a technique to evaluate the degree to which the data about risks is useful for risk management. It involves examining the degree to which the risk is understood and the accuracy, quality, reliability, and integrity of the data about the risk	Never	Seldom	Sometimes
	Risk Categorization – Risks to the project can be categorized by sources of risk, the area of the project affected, of other categories to determine the areas of the project most exposed to the effects of uncertainty. Risks can also be categorized by common root causes			
	Risk Urgency Assessment – Risks requiring near-term responses may be considered more urgent to address. Indicators of priority may include probability of detecting risk, time to affect a risk response, symptoms/warning signs, and the risk rating			
	Expert Judgment – is required to assess the probability and impact of each risk to determine its location in the matrix. Experts generally are those having experience with similar, recent projects. Gathering expert judgement is often accomplished with the use of risk facilitation workshops or interviews	Sometimes	Always	
Resulting Outputs	<p>Project Documents Updates – may include:</p> <p><u>Issue/risk tracking log updates</u> – The log is updated as new information becomes available through the qualitative risk assessment. Updates may include assessments of probability and impacts for each risk, risk ranking and scores, risk urgency information or risk categorization, and a watch list for low probability risks or risks requiring further analysis</p> <p><u>Assumptions log update</u> – Assumptions could change as new information becomes available through the qualitative risk assessment. The assumptions log needs to be revisited to accommodate this new information. Assumptions may be incorporated into the project scope statement or in a separate assumptions log</p>		Always	

Table 20.4 Perform Quantitative Risk Analysis

Perform Quantitative Risk Analysis		Conventional	High Profile	Federal Major
Inputs	Risk Management Plan – provides guidelines, methods, and tools used in quantitative risk analysis	Sometimes	Always	
	Budget Management Plan – provides guidelines on establishing and managing risk reserves			
	Schedule Management Plan – provides guidelines on establishing and managing risk reserves			
	Issues/Risk Tracking Log – is used as a reference point for performing quantitative risk analysis			
Tools/Techniques	Data gathering and Representation Techniques – <u>Interviewing</u> – Interviewing techniques draw on experience and historical data to quantify the probability and impact of risks on project objectives <u>Probability distributions</u> – Continuous probability distributions, which are used extensively in modeling and simulation, represent the uncertainty in values such as durations or schedule activities and cost of project components	Seldom	Sometimes	Always
	Quantitative Risk Analysis and Modeling Techniques – Commonly used techniques use both event-oriented and project-oriented analysis approaches, including sensitivity analysis, expect monetary value (EMV) analysis, and modeling and simulation	Never	Seldom	Sometimes
	Expert Judgment – is required to identify potential cost and schedule impacts, to evaluate probability, and to define inputs such as probability distributions into the tools. Expert judgment also comes into play in the interpretation of data	Sometimes	Always	
Resulting Outputs	Project Documents Updates – Documents are updated with information resulting from quantitative risk analysis. For example, issue/risk tracking log updates may include: <u>Probabilistic analysis of the project</u> – Estimates are made of potential project schedule and cost outcomes listing the possible completion dates and costs with their associated confidence levels <u>Probability of achieving cost and time objectives</u> – With the risks facing the project, the probability of achieving project objectives under the current plan is estimated using quantitative risk analysis results <u>Prioritized list of quantified risks</u> – This list includes those risks that pose the greatest threat or present the greatest opportunity to the project <u>Trends in quantitative risk analysis results</u> – As the analysis is repeated, a trend may become apparent that leads to conclusions affecting risk responses	Always		

Table 20.5 Plan Risk Responses

Plan Risk Responses		Conventional	High Profile	Federal Major
Inputs	Risk Management Plan – Key components include roles and responsibilities, risk analysis definitions, timing for review (and for eliminating risks from review), and risk thresholds for low, moderate, and high risks. Risk thresholds help identify those risks for which specific responses are needed	Sometimes	Always	
	Issue/Risk Tracking Log – refers to identified risks, root causes of risk, list of potential responses, risk owners, symptoms and warning signs, the relative rating or priority list of project risks, risks requiring responses in the near term, risks for additional analysis and response, trends in qualitative analysis results, and a watch list (a list of low priority risks within the log)			
Tools/Techniques	Strategies for Negative Risks or Threats – Three strategies, which typically address threats or risks that may have negative impacts on project objectives if they occur, are: avoid, transfer, and mitigate. The fourth strategy, accept, can be used for negative risks/threats and positive risks/ opportunities	Never	Seldom	Sometimes
	Strategies for Positive Risks or Opportunities – Three of the four responses are suggested to deal with risks with potentially positive impacts on project objectives. The fourth strategy, accept, can be used for negative risks or threats and positive risks or opportunities. These strategies, described below, are to exploit, share, enhance, and accept			
	Contingent Response Strategies – Some responses are designed for use only if certain events occur. For some risks, it is appropriate for the project team to make a response plan that will only be executed under certain predefined conditions, if it is believed that there will be sufficient warning to implement the plan			
	Expert Judgment – Input from knowledgeable parties pertaining to the actions to be taken on a specific and defined risk. Expertise may be provided by any group or person with specialized education, knowledge, skill, experience, or training in establishing risk responses	Sometimes	Always	
Resulting Outputs	Project Management Plan Updates – Elements of the plan that may be updated due to carrying out this process include: <ul style="list-style-type: none"> - Schedule management plan - Budget management plan - Quality management plan - Procurement management plan - Resource management plan - Scope baseline - Schedule baseline - Budget baseline 			

Table 20.5 Plan Risk Responses (cont.)

Plan Risk Responses		Conventional	High Profile	Federal Major
Resulting Outputs	<p>Project Document Updates – Several project documents are updated as needed. For example, when appropriate risk responses are chosen and agreed upon, they are included in the issue/risk tracking log. The log should be written to a level of detail that corresponds with the priority ranking and the planned response. Updates to the issue/risk tracking log can include:</p> <ul style="list-style-type: none"> - Risk owners and assigned responsibilities - Agreed-upon response strategies - Specific actions to implement the chosen response strategy - Trigger conditions, symptoms, and warning signs of a risk occurrence - Budget and schedule activities required to implement the chosen responses - Contingency plans and triggers that call for their execution - Fallback plan for use as a reaction to a risk that has occurred, and the primary response prove to be inadequate - Residual risks that are expected to remain after planned responses have been taken, as well as those that have been deliberately accepted - Secondary risks that arise as a direct outcome of implementing a risk response - Contingency reserves that are calculated based on the quantitative risk analysis of the project and the organization’s risk thresholds - Other project documents updated include: <ul style="list-style-type: none"> - Assumptions log update - Technical documentation updates - Change requests 		Always	

Table 20.6 Control Risks

Control Risks		Conventional	High Profile	Federal Major
Inputs	Project Management Plan – includes the risk management plan and provides guidance for risk monitoring and controlling	Sometimes	Always	
	Issues/Risk Tracking Log – has key inputs that include identified risks and risk owners, agreed-upon risk responses, control actions for assessing the effectiveness of response plans, risk responses, specific implementation actions, symptoms and warning signs of risk, residual and secondary risks, a watch list of low-priority risks, and the time and cost contingency reserves			
	Status Reports – Work performance data related to various performance results possibly impacted by risks may include deliverable status, schedule progress, and costs incurred			
	Performance Reports – take information from performance measurements and analyze it to provide project work performance information including variance analysis, earned value data, and forecasting data. These data points could be impactful in controlling performance related risks			
Tools/Techniques	Risk Reassessment – Control Risks often results in identification of new risks, reassessment of current risks, and the closing of outdated risks. Risk assessments should be regular	Never	Seldom	Sometimes
	Risk Audits – examine and document the effectiveness of risk responses to identified risks and their root causes, as well as the effectiveness of the risk management plan			
	Technical Performance Measurement – compares technical accomplishments during project execution to the schedule of technical achievement. It requires the definition of objective, quantifiable measures of technical performance, which can be used to compare actual results against targets			
	Reserve Analysis – Throughout execution of the project, some risks may occur with positive or negative impacts on budget or schedule contingency reserves. Reserve analysis compares the amount of the contingency reserves remaining to the amount of risk remaining at any time in the project to determine if the remaining reserve is adequate	Seldom	Sometimes	Always
	Status Meetings – Risk management should be on the agenda for at status meetings. Frequent discussions about risk make it more likely that people will identify risks and opportunities			
Resulting Outputs	Issues/Risk Tracking Log Updates (Risk Register) – can include: <u>Outcomes of risk assessments, risk audits, and periodic risk reviews</u> – Such outcomes may include identification of new risk events, updates to probability, impact, priority, response plans, ownership, and other elements of the risk register. Outcomes may include closing applicable risks <u>Actual outcomes of the project’s risks and of the risk responses</u> – This information can help project managers (PMs) plan for risk throughout their organizations and on future projects	Seldom	Sometimes	Always
	Work Performance Information – provides a mechanism to communicate and support project decision making	Sometimes	Always	
	Change Requests – are prepared and submitted to the Change Management process and can include recommended corrective/preventative actions: <u>Recommended corrective actions</u> – Activities that realign the performance of the project work with the project management plan <u>Recommended preventative actions</u> – Activities that ensure future performance of the project work is aligned with the project management plan	Always		

Table 20.6 Control Risks (cont.)

Control Risks		Conventional	High Profile	Federal Major
Resulting Outputs	Project Management Plan Updates – If the approved change requests effect the risk management processes, the corresponding component documents of the project management plan are revised and reissued to reflect the approved changes. The elements of the project management plan that may be updated are the same as those in the Plan Risk Responses process		Always	
	Project Document Updates – Documents that may be updated due to the Control Risk process include the issue/risk tracking log. Log updates may include: <u>Outcomes of risk reassessment, risk audits, and periodic risk reviews</u> – Outcomes may include identification of new risks, updates to probability, impact, priority, response plans, ownership, and other elements of the log. Outcomes can also include closing risks that are no longer applicable <u>Actual outcomes of the project's risks and of the risk responses</u> – This information can help PMs to plan for risk throughout their organizations, as well as on future projects			

25.1 Overview

“Schedule Management includes the processes required to manage the timely completion of the project.”¹

The schedule management plan includes seven (7) processes:

Knowledge Area Processes PMBOK®	Process Group PMBOK®
Plan Schedule Management – is the process of establishing the policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule	Planning
Define/Select Activities – is the process of identifying and documenting the specific actions to be performed to produce the project deliverables	Planning
Sequence Activities – is the process of identifying and documenting relationships among the project activities	Planning
Estimate Activity Resources – is the process of estimating the type and quantities of material, resources, equipment, or supplies required to perform each activity	Planning
Estimate Activity Durations – is the process of estimating the number of work periods needed to complete individual activities with estimated resources	Planning
Develop Schedule – is the process of analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule model	Planning
Control Schedule – is the process of monitoring the status of project activities to update project progress and manage changes to the schedule baseline to achieve the plan	Monitoring and Controlling

25.2 WisDOT Procedures

Much of the Schedule Management processes are generated by the PMP application. The Estimate Activity Duration process compares the durations generated by the PMP application with historical information. For additional information, review the [PMP User Manual, Chapter 6](#) (internal WisDOT only).

Under the Develop Schedule process, the SPO Planning Engineer creates the preliminary schedule showing the estimated PS&E date. This involves expanding the preliminary schedule to include significant milestones by comparing the durations with historical information and expert judgment. After this process, the PDS Project Manager (Design) expands the schedule with enough detail to monitor the project progress.

The Region has a role in monitoring the status of all projects in the Program under the Control Schedule process. For additional information, review [PMM Chapter 3](#) (internal WisDOT only). For individual projects, changes in the schedule are discussed in context of the impacts on a Program.

WisDOT staff can access a supplemental schedule template on the [PMU SharePoint page](#) (internal WisDOT only).

25.3 Schedule Management Process Steps

Tables 25.1 – 25.7 show the inputs, tools/techniques, and outputs by project size for the seven PMBOK® schedule management processes. The guidance listed below may vary on actual project specifics.

Table 25.1 Plan Schedule Management

Plan Schedule Management		Conventional	High Profile	Federal Major
Inputs	<p>Project Management Plan – contains information used to develop the schedule management plan which includes, but not limited to:</p> <p><u>Scope baseline</u> – Includes the project scope statement and the Work Breakdown Structure (WBS) detail used for defining activities, duration estimate, and schedule management</p> <p><u>Other information</u> – Other scheduling related cost, risk, and communication decisions from the project management plan are used to develop the schedule</p>	Always		
	<p>Project Overview – defines the summary milestone schedule and project approval requirements that will influence the management of the project schedule</p>			
Tools/Techniques	<p>Expert Judgment – Guided by historical information, it provides valuable insight about the environment and information from prior similar projects</p>	Sometimes	Always	
	<p>Analytical Techniques – The Plan Schedule Management process may involve choosing strategic options to estimate and schedule the project such as: scheduling methodology, scheduling tools and techniques, estimating approaches, formats, and project management software</p>	Never	Seldom	Sometimes
	<p>Meetings – Project teams may hold planning meeting to develop the schedule management plan</p>	Sometimes	Always	
Resulting Outputs	<p>Schedule Management Plan – is a component of the project management plan that establishes the criteria and the activities for developing, monitoring, and controlling the schedule. The schedule management plan may be formal or informal, highly detailed, or broadly framed, based upon the needs of the project, and includes appropriate control thresholds</p>	Always		

Table 25.2 Define/Select Activities

Define/Select Activities		Conventional	High Profile	Federal Major
Inputs	Project Management Plan – is the process of identifying and documenting specific actions to be performed to produce project deliverables. The key benefit is to break down work packages into activities that provide a basis for estimating, scheduling, executing, monitoring, and controlling the project work	Always		
	Schedule Management Plan – is a key input from the plan is the prescribed level of detail necessary to manage the work	Sometimes	Always	
	Scope Baseline – The project Work Breakdown Structure (WBS), deliverables, constraints, and assumptions documented in the scope baseline are explicitly considered while defining activities			
Tools/Techniques	Decomposition – is a technique for dividing/subdividing project scope and deliverables into smaller, more manageable parts	Seldom	Sometimes	Always
	Templates – are a standard activity list (or list from a previous project) often usable as a template for a new project. At WisDOT, templates exist for almost all potential improvement projects		Seldom	Always
	Rolling Wave Planning – is an iterative planning technique in which the work to be accomplished in the near term is planned in detail, while the work in the future is planned at a higher level	Never	Seldom	Sometimes
	Expert Judgment – Project team members or other experts who are experienced and skilled in developing detailed project scope statements, the WBS, and project schedules, can provide expertise in defining activities	Sometimes	Always	
Resulting Outputs	Activities List – is a comprehensive list including all schedule activities required on the project. At WisDOT, activity lists exist for almost all potential improvement projects	Seldom	Sometimes	Always
	Activity Attributes – Activities, distinct from milestones, have durations during which the work of that activity is performed, and may have resources and costs associated with that work. Activity attributes extend the description of the activity by identifying the multiple components associated with each activity. The components for each activity evolved over time.			
	Milestones – are significant points or events in a project compiled into a list that indicates whether the milestone is mandatory or optional. At WisDOT, milestones are automatically generated for almost all potential improvement projects	Sometimes	Always	

Table 25.3 Sequence Activities

Sequence Activities		Conventional	High Profile	Federal Major
Inputs	Schedule Management Plan – identifies the scheduling method used for the project, which guides how the activities are sequenced	Sometimes	Always	
	Activities List – contains all schedule activities required on the project to be sequenced. Dependencies and other constraints for these activities can influence the sequencing of activities	Seldom	Sometimes	Always
	Activity Attributes – describe a necessary sequence of events or defined predecessor or successor relationships			
	Milestones – may have scheduled dates for specific milestones that influence the way activities are sequenced	Sometimes	Always	
Project Scope Statement – contains the project description, which includes project characteristics that may affect sequencing. Other information from the project scope statement including project deliverables, project constraints, and project assumptions may also impact activity sequencing				
Tools/Techniques	Critical Path Methodology (CPM) – is a technique used from constructing a schedule model in which activities are represented by nodes and are graphically linked by one or more logical relationships to show the sequence in which the activities are performed	Seldom	Sometimes	Always
	Dependency Determination – Dependencies may be characterized by the following attributes: <ul style="list-style-type: none"> - mandatory or discretionary - internal or external Dependency has four attributes, but two can be applicable simultaneously in the following ways: <ol style="list-style-type: none"> 1. mandatory external dependencies 2. mandatory internal dependencies 3. discretionary external dependencies, or 4. discretionary internal dependencies 			
	Leads and Lags – A lead is the amount of time whereby a successor activity can be advanced with respect to a predecessor activity. A lag is the amount of time whereby a successor activity will be delayed with respect to a predecessor activity	Sometimes	Always	
Schedule Network Templates/Work Breakdown Structure (WBS) – are a standard activity list (or list from a previous project) often usable as a template for a new project. At WisDOT, templates exist for almost all potential improvement projects				
Resulting Outputs	Activity Sequencing (P6 software) – displays are produced using project management software	Sometimes	Always	
	Project Document Updates – may include: <ul style="list-style-type: none"> - Activity lists - Activity attributes - Milestones - Issue/risk tracking log 	Always		

Table 25.4 Estimate Activity Resources

Estimate Activity Resources		Conventional	High Profile	Federal Major
Inputs	Schedule Management Plan – identifies the level of accuracy and the units of measure for the resources to be estimated	Always		
	Activities List – identifies the level of accuracy and the units of measure for the resources to be estimated	Seldom	Sometimes	Always
	Activity Description – provides the primary data input for estimating resources required for each activity in the activity list			
	Staff Availability – Information on which resources (people, equipment, material) are potentially available during planned activity period is used for estimating staff availability and capability			
	Issue/Risk Tracking Log – Risk events may impact resource selection and availability. Log updates are included with project documents from Plan Risk Responses			
	Activity Cost Estimates – The cost of resources may impact resource selection			
Tools/Techniques	Expert Judgment – is often required to assess resource-related inputs to the process. Any group/person with specialized know-ledge in resource planning/estimating can provide such expertise	Always		
	Past Project Historical Data – is used as a basis for estimating what resources are need for the current project	Sometimes	Always	
	Alternative Analysis – includes using various levels of resource capability or skills, different size or type of machines, different tools (hand vs. automated), and make rent-or-buy decisions regarding the resource	Seldom	Sometimes	Always
	Published Estimating Data – Various organizations routinely publish updated production rates and unit costs of resources for an extensive array of labor trades, material, and equipment for different countries and geographical locations within countries			
	Bottom-Up Estimating – is a method of estimating project duration or cost by aggregating the estimates of the lower-level components of the Work Breakdown Structure (WBS). When an activity cannot be estimated with a reasonable degree of confidence, the work within the activity is decomposed into more detail			
	Project Management Software – helps plan, organize, and manage resource pools and develop resource estimates	Sometimes	Always	
Resulting Outputs	Resources to Complete Activities – Activity resource requirements identify the types and quantities of resources required for each activity in a work package. These requirements then can be aggregated to determine the estimated resources for each work package and each work period	Seldom	Sometimes	Always
	Staff Skill Sets – are a hierarchical representation of resources by category (i.e., labor, material, equipment, supplies) and type (i.e., skill level, grade level, or other information to the project)			
	Project Document Updates – may include: <ul style="list-style-type: none"> - Activity list - Activity attributes - Resource calendars 	Always		

Table 25.5 Estimate Activity Duration

Estimate Activity Duration		Conventional	High Profile	Federal Major
Inputs	Schedule Management Plan – defines the method used and the level of accuracy along with other criteria required to estimate activity durations including the project update cycle	Always		
	Activities List – identifies activities that need duration estimates	Seldom	Sometimes	Always
	Activity Descriptions – provide the primary data input for estimating durations required for each activity in the activity list			
	Resources to Complete Activities – The estimated activity resource requirements will have an impact on the duration of activity, since the level of resources assigned to the activity to meet the requirements will significantly influence the duration of most activities			
	Staff Availability – The resource calendars influence the duration of schedule activities due to the availability of specific resources, type of resources, and resources with specific attributes			
	Project Scope Statement – Assumptions and constraints from the project scope statement are considered when estimating the activity durations. Examples of assumptions: <ul style="list-style-type: none"> - Existing conditions - Availability of information, and - Length of the reporting periods Examples of constraints: <ul style="list-style-type: none"> - Available skilled resources, and - Contract terms and requirements 			
	Issues/Risk Tracking Log – The log provides the list of risks, along with the results of risk analysis and risk response planning. Updates to the log are included with project document updates			
	Staff Skill Sets – provide a hierarchical structure of the identified resources by resource category and resource type			
Tools/Techniques	Expert Judgment – Guided by historical information, it provides duration estimate information or recommended maximum activity durations from prior similar projects			
	Analogous Estimating – is a technique for estimating the duration or cost of an activity or a project using historical data from a similar activity or project	Never	Seldom	Sometimes
	Parametric Estimating – An estimating technique using an algorithm to calculate cost or duration based on historical data and project parameters			
	Three-Point Estimating – is a technique used to estimate cost or duration by applying an average or weighted average of optimistic, pessimistic, and most likely estimates when there is uncertainty with the individual activity estimates			
	Group Decision-Making Techniques – Team-based approaches (brainstorming, the Delphi or nominal group techniques) are useful for engaging team members to improve estimate accuracy and commitment to the emerging estimates			
	Reserve Analysis – Duration estimates may include contingency reserves (or buffers) into the project schedule to account for schedule uncertainty. Contingency reserves are the estimated duration within the schedule baseline, which is allocated for accepted identified risks and for which contingent or mitigation responses are developed			
Activity Duration Estimating – (the time to complete activities) are quantitative assessments of the likely number of time periods required to complete an activity	Seldom			
Resulting Outputs	Project Document Updates – may include: <ul style="list-style-type: none"> - Activity attributes - Assumptions made in developing the activity duration estimate, such as skill levels and availability and basis of estimates for durations 	Always		

Table 25.6 Develop Schedule

Develop Schedule		Conventional	High Profile	Federal Major
Inputs	Schedule Management Plan – identifies the scheduling method/ tool to create the schedule and how the schedule is calculated	Always		
	Activities List – identifies activities in the schedule model	Seldom	Sometimes	Always
	Activity Descriptions – provides the details used to build the schedule model			
	Activity Sequencing (P6 software) – contains the logical relationships of predecessors and successors used to calculate the schedule			
	Resources to Complete Activities – identifies the types and quantities of resources required for each activity used to create the schedule model			
	Staff Availability – The resource calendars contain information on the availability of resources during the project			
	Activity Duration Estimating – involves quantitative assessments of the likely number of work periods required to complete an activity used to calculate the schedule	Always		
	Scope Statement – contains assumptions and constraints that can impact the development of the project schedule	Seldom	Sometimes	Always
	Issue/Risk Tracking Log – provides the details of all identified risks and their characteristics that impact the schedule model	Sometimes	Always	
	Staff Assignments – specify which resources are assigned to each activity	Seldom	Sometimes	Always
Staff Skill Sets – provide details by which resource analysis and organizational reporting can be done				
Tools/Techniques	Schedule Network Analysis – is a technique that generates the project schedule model. It employs various analytical techniques, such as critical path method, critical chain method, what-if analysis, and resource optimization techniques to calculate early and late start and finish dates for the uncomplete portions of project activities	Never	Seldom	Sometimes
	Critical Path Method (CPM) – is a method used to estimate the minimum project duration and determine the amount of scheduling flexibility on the logical network paths within the schedule model			
	Critical Chain Method (CCM) – is a schedule method that allows the project team to place buffers on any project schedule path to account for limited resources and project uncertainties. It is developed from the CPM approach and considers the effects of resource allocations, resource optimization, resource leveling, and activity duration uncertainty on the critical path determined using the CPM. The P6 software performs this task automatically at WisDOT			
	Resource Optimization Techniques – Examples include: <u>Resource leveling</u> – A technique in which start and finish dates are adjusted based on resource constraints with the goal of balancing demand for resources with the available supply <u>Resource smoothing</u> – A technique that adjusts schedule model activities so project resources requirements do not exceed certain predefined resource limits			
	Modeling Techniques – Examples include: <u>What-If Scenario Analysis</u> – A process of evaluating scenarios to predict their effect, positively or negatively, on project objectives <u>Simulation</u> – Involves calculating multiple project durations with different sets of activity assumptions, usually using probability distributions constructed from the three-point estimates			
	Leads and Lags – done automatically by P6 software at WisDOT			
	Schedule Compression – done automatically by P6 software at WisDOT	Seldom	Sometimes	Always
Scheduling Tool – done automatically by P6 software at WisDOT				

Table 25.6 Develop Schedule (cont.)

Develop Schedule		Conventional	High Profile	Federal Major
Resulting Outputs	Schedule Baseline – is the approved version of a schedule model that can be changed only through formal change control procedures and is used as a basis for comparison to actual results. It is accepted and approved by appropriate stakeholders as the schedule baseline with baseline start dates and finish dates	Seldom	Sometimes	Always
	Schedule Data – (for the project model) is the collection of information for describing and controlling the schedule. It includes at least the schedule milestones, schedule activities, activity attributes, and documentation of all identified assumptions and constraints			
	Project Schedule – is an output of a schedule model that presents linked activities with planned dates, durations, milestones, and resources. It is often presented graphically			
	Project Calendars – identifies working days and shifts available for scheduled activities. It distinguishes time periods in days or part of days that are available to complete scheduled activities from time periods that are not available			
	Project Management Plan Updates – may include: <ul style="list-style-type: none"> - Schedule baseline - Schedule management plan 	Sometimes	Always	
	Project Document Updates – may include: <ul style="list-style-type: none"> - Resources to complete activities - Activity attributes - Calendars - Issue/risk tracking log 	Always		

Table 25.7 Control Schedule

Control Schedule		Conventional	High Profile	Federal Major
Inputs	Project Management Plan – contains the schedule management plan and the schedule baseline which describes how the schedule is managed and controlled. The schedule baseline is used as a reference to compare with actual results to determine if a change, corrective action, or preventative action is necessary	Sometimes	Always	
	Project Schedule – refers to the most recent version with notations to indicate updates, completed activities, and started activities as of the indicated data date			
	Status Reports – refers to information about project progress such as which activities have started, their progress, and which activities have finished			
	Project Calendars – A schedule model may require more than one project calendar to allow for different work periods for some activities to calculate the schedule forecasts	Seldom	Sometimes	Always
	Schedule Data – will be reviewed and updated in the Control Schedule process			
Tools/Techniques	Performance Reviews – measure, compare, and analyze schedule performance such as actual start and finish dates, percent complete, and remaining duration for work in progress	Seldom	Sometimes	Always
	Project Management Software – Scheduling software provides the ability to track planned dates versus actual start and finish dates, to report variances to and progress against the schedule baseline, and to forecast the effects of change to the project schedule model			
	Resource Optimization Techniques – involve the scheduling of activities and the resources required by those activities while taking into consideration the resource availability and project time			
	Modeling Techniques – are used to review various scenarios guided by risk monitoring to bring the schedule model into alignment with the project management plan and approved baseline			
	Leads and Lags – adjustments are applied during network analysis to find ways to bring project activities that are behind into alignment with the plan			
	Schedule Compression – this technique is used to find ways to bring project activities that are behind into alignment with the plan by fast tracking or crashing schedule for the remaining work			
	Scheduling Tool – Schedule data is updated and compiled into the schedule model to reflect actual project progress and remaining work. The scheduling tool and supporting schedule data are used in conjunction with manual methods or other project management software to perform schedule network analysis to generate and updated project schedule	Sometimes	Always	
Resulting Outputs	Work Performance Information – The Work Breakdown Structure (WBS) time performance indicators, especially the work packages and control accounts, are documented and communicated to stakeholders	Sometimes	Always	
	Schedule Forecasts – are estimates or predictions of conditions and events in the project’s future based on information and knowledge available at the time of the forecast. Forecasts are updated and re-issued based on work performance information as the project is executed	Seldom	Sometimes	Always
	Change Requests – are processed for review and disposition through the Change Management process	Always		
	Project Management Plan Updates – may include: - Schedule baseline - Schedule management plan - Budget baseline			
	Project Document Updates – may include: - Schedule data - Project schedule - Issue/risk tracking log			

30.1 Overview

“Resource Management includes the processes that organize, manage, and lead the project team. The project team is comprised of the people with assigned roles and responsibilities for completing the project.”¹

The resource management plan includes four (4) processes:

Knowledge Area Processes PMBOK®	Process Group PMBOK®
Plan Resource Management – is the process of identifying and documenting project roles, responsibilities, required skills, reporting relationships, and creating a resource management plan	Planning
Acquire Project Team – is the process of confirming human resource availability and obtaining the team necessary to complete project activities	Executing
Develop Project Team – is the process of improving competencies, team member interaction, and overall team environment to enhance project performance	Executing
Manage Project Team – is the process of tracking team member performance, providing feedback, resolving issues, and managing team changes to optimize project performance	Executing

30.2 WisDOT Procedures

At WisDOT, the initial estimates of resources needed is prepared as part of the Estimate Activity Resources process (see [FDM 2-20-25.2](#)). The Region SPO Planning Engineer uses this information to develop the initial schedule. For most improvement projects, the resources are assigned based on the staffs that were needed to complete similar projects in the past. If there are not enough in-house resources available, consultant staff are obtained as discussed in the Procurement Management Plan.

30.3 Resource Management Process Steps

Tables 30.1 – 30.4 show the inputs, tools/techniques, and outputs by project size for the four PMBOK® resource management processes. The guidance listed below may vary on actual project specifics.

Table 30.1 Plan Resource Management

Plan Resource Management		Conventional	High Profile	Federal Major
Inputs	<p>Project Management Plan – is used to develop the resource management plan. Information to develop the plan can include:</p> <ul style="list-style-type: none"> - The project life cycle and processes applied to each phase - How work will be executed to accomplish project objectives - A change management plan that documents how changes will be monitored and controlled - A configuration management plan that documents how configuration management will be performed - How integrity of the project baselines will be maintained - Needs and methods of communication among stakeholders 	Always		
	<p>Resources to Complete Activities – uses activity resource requirements to determine the resources needs for the project. The preliminary requirements regarding the required project team members and their competencies are progressively elaborated as part of the Plan Resource Management Process</p>	Sometimes	Always	
Tools/Techniques	<p>Organizational Charts and Position Descriptions – Various formats exist to document team member roles and responsibilities. Most formats fall into one of three types: hierarchical, matrix, and text oriented. Some project assignments are listed in subsidiary plans such as risk, quality, or communication management plans</p>	Sometimes	Always	
	<p>Networking – is the formal and informal interaction with others in an organization, industry, or professional environment</p>	Never	Seldom	Sometimes
	<p>Organizational Theory – provides information regarding the way people, teams, and organizational unit behave</p>			
	<p>Expert Judgment – When developing the resource management plan, expert judgment is used to:</p> <ul style="list-style-type: none"> - List the preliminary requirements of the required skills - Assess the roles required for the project based on standardized role descriptions within the organization - Determine the preliminary effort level and number of resources needed to meet project objectives - Determine reporting relationships needed based on the organizational culture - Provide guidelines on lead-time required for staffing, based on lessons learned and market conditions - Identify risks associated with staff acquisition, retention, and release plans - Identify and recommend programs for complying with applicable government and union contracts 	Sometimes	Always	
	<p>Meetings – Project management team meetings leverage a combination of other tools and techniques allowing for all team member to reach consensus on the resource management plan</p>			
Resulting Outputs	<p>Resource Management Plan – is part of the project management plan that provides guidance on how project resources should be defined, staffed, managed, and eventually released. The plan can include:</p> <ul style="list-style-type: none"> - Roles and responsibilities - Project organization charts - Staffing management plan 	Sometimes	Always	

Table 30.2 Acquire Project Team

Acquire Project Team		Conventional	High Profile	Federal Major
Inputs	<p>Resource Management Plan – provides guidance on how project human resources should be identified, staffed, managed, and eventually released. It includes:</p> <ul style="list-style-type: none"> - Roles and responsibilities defining the positions, skills, and competencies that the project demands - Project organization charts indicating the number of people needed for the project - Staffing management plan delineating the time periods each project team member will be needed and other information important to engage the project team 	Sometimes	Always	
	<p>Pre-Assignment – (When team members are selected in advance) This can occur if the project is the result of specific people being identified as part of a competitive proposal, if the project is dependent upon the expertise of persons, or if some staff assignments are defined within the project overview</p> <p>Negotiation – Staff assignments are negotiated on many projects. The project management team may need to negotiate with:</p> <ul style="list-style-type: none"> - Functional managers to ensure that the project receives appropriately competent staff in the required timeframe - Other project management teams within the performing organization to appropriately assign scarce or specialized human resources - External organizations, especially consulting firms, for appropriate, scarce, specialized, qualified certified, or other such resources 	Never	Seldom	Sometimes
Tools/Techniques	<p>Acquisition – When the performing organization is unable to provide the staff needed to complete a project, the required services may be acquired from outside resources. This can involve hiring individual consultants or subcontracting work to another organization</p>	Sometimes		Always
	<p>Virtual Teams – are groups of people with a shared goal who fulfill their roles with little or no time meeting face-to-face</p>	Never	Seldom	Sometimes
	<p>Multi-Criteria Decision Analysis – Selection criteria are often used as a part of acquiring the project team. By use of a multi-criteria decision analysis tool, criteria are developed and used to rate or score potential team members which are weighted according to the relative importance of the needs within the team</p>			
	<p>Project Staff Assignments – The project is staffed when appropriate people are assigned to the team. The documentation of these assignments can include a project team directory, memos to team members, names inserted into other parts of the project management plan such as project organization charts/schedules</p>	Seldom	Sometimes	Always
Resulting Outputs	<p>Staff Availability – Resource calendars document the time periods that each team member is available to work on the project</p>	Seldom	Sometimes	Always
	<p>Project Management Plan Updates – Elements of the project management plan that may be updated primarily include the resource management plan</p>			

Table 30.3 Develop Project Team

Develop Project Team		Conventional	High Profile	Federal Major
Inputs	Resource Management Plan – provides guidance on how project human resources should be identified, staffed, managed, controlled, and eventually released. It identifies training strategies and plans for developing the project team	Sometimes	Always	
	Project Staff Assignments – identify the people on the team	Seldom	Sometimes	Always
	Staff Availability – Recourse calendars identify times when project team members can participate in team development activities			
Tools/Techniques	Interpersonal Skills – are behavioral competencies that include proficiencies such as communication skills, emotional intelligence, conflict resolution, negotiation, influence, team building, and group facilitation	Never	Seldom	Sometimes
	Training – includes all activities designed to enhance the competencies of the project team members			
	Team Building Activities – can vary from a 5-minute agenda item in a status review meeting to an off-site, professionally facilitated experience designed to improve interpersonal relationships			
	Ground Rules – establish clear expectations regarding acceptable behavior by project team members. Early commitment to clear guidelines decreases misunderstandings and increases productivity			
	Co-location – involves placing many or all the most active project team members in the same location to enhance their ability to perform as a team. Co-location can be temporary			
	Recognition and Rewards – involves recognizing and rewarding desirable behavior			
	Personnel Assessment Tools – give the project manager (PM) and project team insight into areas of strength and weakness. These tools help PMs assess the team preferences, aspirations, how to process and organize information, how they tend to make decisions, and how they prefer to interact with people	Seldom	Sometimes	Always
Resulting Outputs	Performance Appraisals – As project team development efforts such as training, team building, and colocation are implemented, the project management team makes formal or informal assessments of the project team’s effectiveness. Effective team development strategies and activities are expected to increase the team’s performance, which increases the likelihood of meeting team objectives	Seldom	Sometimes	Always

Table 30.4 Manage Project Team

Manage Project Team		Conventional	High Profile	Federal Major
Inputs	Resource Management Plan – provides guidance on how project human resources should be defined, staffed, managed, controlled, and eventually released. It may include: <ul style="list-style-type: none"> - Roles and responsibilities - Project organization - Staffing management plan 	Sometimes	Always	
	Project Staff Assignments – provide documentation including the list of project team members	Seldom	Sometimes	Always
	Performance Appraisals – The project management team makes ongoing formal or informal assessments of the team’s performance. By continually assessing performance, action can be taken to resolve issues, modify communication, address conflict, and improve team interactions			
	Issue Log – can be used to document and monitor who is responsible for resolving specific issues by a target date			
	Work Performance Reports – provide documentation on project status compared to project forecasts. Performance areas that can help with project team management include results from schedule control, cost control, quality control, and scope validation			
Tools/Techniques	Observation and Conversation – are used to stay in touch with the work and attitudes of project team members. The team monitors progress toward project deliverables, accomplishments that are a source of pride for team members, and interpersonal issues	Seldom	Sometimes	Always
	Project Performance Appraisals – Objectives for conducting performance appraisals during a project can include clarification of roles and responsibilities, constructive feedback to team members, discovery of unknown or unresolved issues, development of individual training plans, and the establishment of specific goals for future time periods	Never	Seldom	Sometimes
	Conflict Management – Sources of conflict include scarce resources, scheduling priorities, and personal work styles. Team ground rules, group norms, and solid project management practices such as communication planning and role definition reduce conflict	Seldom	Sometimes	Always
	Interpersonal Skills – Project managers (PMs) use a combination of technical, personal, and conceptual skills to analyze situations and interact with team members. Using appropriate interpersonal skill allows PMs to capitalize on strengths of all team members			
Resulting Outputs	Change Requests – Staffing changes can affect the rest of the project management plan. When staffing issues disrupt the project team from adhering to the project management plan such as causing the schedule to be extended	Seldom	Sometimes	Always
	Project Management Plan Updates – may include the resource management plan	Always		
	Project Document Updates – may include: <ul style="list-style-type: none"> - Issue log - Roles description - Project staff assignments 			

35.1 Overview

“Quality Management includes the processes and activities that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken.”¹

The quality management plan includes three (3) processes:

<i>Knowledge Area Processes</i> PMBOK®	<i>Process Group</i> PMBOK®
Plan Quality Management – is the process of identifying quality requirements and/or standards for the project and its deliverables, and documenting how the project will demonstrate compliance with relevant quality requirements and/or standards	Planning
Perform Quality Assurance – is the process of auditing the quality requirements and the results from quality control measurements to ensure that appropriate quality standards and operational definitions are used	Executing
Control Quality – is the process of monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes	Monitoring and Controlling

35.2 WisDOT Procedures

The information resulting from the processes may be stored in the Project Notes area of the Design PMP - see [PMP Application User’s Manual, Chapter 3](#) (internal WisDOT only).

WisDOT staff can access supplemental quality management plan templates to help guide the project management process on the [PMU SharePoint page](#) (internal WisDOT only).

35.3 Quality Management Plan vs. Quality Management Program

The Quality Management Plan discussed in the tables below should not be confused with WisDOT’s construction-related Quality Management Program (QMP). The QMP provides references, procedures, and examples for inspection, sampling, testing, and documentation of various construction materials and methods (see [CMM 8-30](#)). The primary goals of the QMP are to provide consistent construction quality, ensure effective use of personnel, and maintain cooperation throughout all project work phases.

35.4 Quality Management and MAPSS

WisDOT’s focus on quality assurance coincides with the Mobility, Accountability, Preservation, Safety, and Service (MAPSS) Performance Improvement Program that identifies five (5) core goals and associated performance measures. The goals are defined here: [MAPSS website](#). Performance measures are a tool to help the department assess how well it’s doing to meet its mission. The Scorecard provides a snapshot of Wisconsin’s transportation system.

DTSD monitors several MAPSS performance measures discussed here: [MAPSS Performance Measures by Division](#) (internal WisDOT only). The following performance measures are monitored as part of the Quality Management Plan:

- Timely scheduling of contracts (Project Letting Process or PLP)
- Inactive federal fund obligations

Additional [DTSD performance measures](#) (internal WisDOT only), although not part of the MAPSS program, are monitored as part of the Quality Management Plan:

- Advanceable Program Goal
- Scope Adherence
- Project Milestone Tracking (with design) that includes these performance indicators:
 - Mega-Major-TPC Study Schedule Milestone Tracking Report
 - Project Management Plan Phase Approval
 - Production Reports
 - Design Milestone Reports

Reporting on the above performance measures and quality efforts are typically completed after project activities are finished. However, there are several activities that occur during project initiation activities that contribute to

the Control Quality sub-process identified in the PMM (internal WisDOT only):

- [PMM 03-05-25](#) – Program Monitoring, under “Region Role in Program Monitoring” on page 1
- [PMM 06-01-01](#) – Budget and Programming, under the heading “Program Monitoring” on page 12
- [PMM 06-05](#) – Program Set Asides
- [PMM 06-10-35](#) – Month End Monitoring of Projects and Programs

35.5 Perform Quality Assurance

At WisDOT, Perform Quality Assurance is a series of independent reviews to assure the Control Quality sub-process is working.

35.6 Control Quality

At WisDOT, Control Quality is a series of scheduled internal reviews. As noted above, the MAPSS Performance Improvement program is well established at WisDOT. The following performance measures are monitored in the design process:

- Engineering Estimate Accuracy
- Design Quality Index (DQI)
- Design On-Time Index (DOTI)
- Design On-Budget Index (DOBI)

Additional DTSD performance measures, although not part of the MAPSS program, are also monitored in the design process:

- Contract Addendum
- PS&E Exceptions
- Quantities
- Project Milestone Tracking (with planning) that includes:
 - Mega-Major-TPC Study Schedule Milestone Tracking Report
 - Project Management Plan Phase Approval

The reporting on the above performance measures and quality efforts are typically completed after design activities are finished, although notes on drafts of those reports as influencing factors occur would simplify the completion later. However, there are several activities that occur during design activities that contribute to the Control Quality sub-process.

- [FDM 11-4-1](#) – Concept Definition Report
- [FDM 2-20-1.1](#) – Project Scoping
 - Typically, the region holds a preliminary scoping meeting to review the existing conditions and known issues for a project, establishing the purpose and need for the project.
- Operational Planning Meeting – refer to region practices
- Final Scope Review Meeting
 - When the Final Scope Certification is drafted (or final scope is determined), the region holds a final scope review (30% plan review) meeting to update all impacted staff of the project status. This allows for the consideration of input from various functional areas as the environmental process is completed and the project proceeds to the Design Study Report preparation.
- [FDM 3-25-1](#) – Environmental Report Processing
- [FDM 11-4](#) – Reports
- DSR Review Meeting
 - When the Environmental Document is signed and Design Study Report is ready to be approved, the region holds a DSR review (60% plan review) meeting to update all impacted staff of the project status. This allows for the consideration of input from various functional areas as the project proceeds through final design to preparation of PS&E.
- Pre-PS&E Review Meeting
 - When final plans and draft PS&E documents are nearly complete, the region holds a pre-PS&E (90% plan) review meeting to update all impacted staff of the project status. This allows for the consideration of input from various functional areas as the project proceeds to preparation of the final PS&E.
- [FDM 19-10-5](#) – Project Final Review

35.7 Quality Management Process Steps

Tables 35.1 - 35.3 show the inputs, tools/techniques, and outputs by project size for the three PMBOK® quality management processes. The guidance listed in the tables may vary on actual project specifics.

Table 35.1 Plan Quality Management

Plan Quality Management		Conventional	High Profile	Federal Major
Inputs	<p>Project Management Plan – is used to develop the quality management plan and can include:</p> <ul style="list-style-type: none"> - Scope baseline - Schedule baseline - Budget baseline - Other management plans that contribute to the overall project quality and may highlight actionable areas of concern regarding the project’s quality 	Sometimes	Always	
	<p>Stakeholder Register – aids in identifying stakeholders possessing an interest in or having an impact on quality</p>			
	<p>Issue/Risk Tracking Log – contains information on threats and opportunities that may impact quality requirements</p>	Seldom	Sometimes	Always
	<p>Needs Identification – captures the requirements that the project shall meet pertaining to stakeholder expectations. The components of the needs identification can include project and quality requirements which are used by the project team to help implement quality control</p>	Sometimes	Always	
Tools/Techniques	<p>Cost-Benefit Analysis – The primary benefits of meeting quality requirements include less rework, higher productivity, lower costs, increased stakeholder satisfaction, and increased profitability. A cost-benefit analysis for each quality activity compares the cost of the quality step to the expected benefit</p>	Seldom	Sometimes	Always
	<p>Cost of Quality (COQ) – includes all costs incurred over the life of the product by investment in preventing nonconformance to requirements, appraising the product or service for conformance to requirements, and failing to meet requirements (rework)</p>	Never	Seldom	Sometimes
	<p>Seven Basic Quality Tools – are used within the context of the Plan-Do-Check-Act (PDCA) Cycle to solve quality-related problems. The seven tools are: cause-and-effect diagrams, flowcharts, check sheets, Pareto diagrams, histograms, control charts, and scatter diagrams</p>			
	<p>Benchmarking – involves comparing actual or planned project practices to those of comparable projects to identify best practices, generate ideas for improvement, and provide a basis for measuring performance</p>			
	<p>Design of Experiments (DOE) – is a statistical method for identifying which factors may influence specific variables of a product or process under development of production. DOE may be used during the Plan Quality Management process to determine the number and type of tests and their impact on quality cost</p>			
	<p>Statistical Sampling – involves choosing part of a population of interest for inspection. Sample frequency and sizes should be determined during the Plan Quality Management process</p>			
	<p>Additional Quality Planning Tools – include brainstorming, force field analysis, nominal group techniques, and quality management and control tools</p>			
<p>Meetings – are used to develop the quality management plan. Attendees may include the PM, project sponsor, selected project team members, selected stakeholders, and others responsible for Project Quality Management activities</p>	Sometimes	Always		
Resulting Outputs	<p>Quality Management Plan – is a component of the project management plan that describes how the organization’s quality policies will be implemented. It describes how the project management team plans to meet the quality requirements set for the project</p>	Seldom	Sometimes	Always
	<p>Process Improvement Plan – is a subsidiary or component of the project management plan that details steps for analyzing project management processes to identify activities to enhance their value</p>	Sometimes	Always	

Table 35.1 Plan Quality Management (cont.)

Plan Quality Management		Conventional	High Profile	Federal Major
Resulting Outputs	Quality Metrics – describes a project or product attribute and how the quality control process will measure it. A measurement is an actual value. The tolerance defines the allowable variations to the metric	Seldom	Sometimes	Always
	Quality Checklists – is a tool, usually component-specific, used to verify that a set of required steps has been performed. Based on the project’s requirements and practices, checklists may be simple or complex and can be standardized to ensure consistency			
	Project Document Updates – may include <ul style="list-style-type: none"> - Stakeholder register - Responsibility assignment matrix - Work Breakdown Structure (WBS) and WBS Dictionary 	Always		

Table 35.2 Perform Quality Assurance

Perform Quality Assurance		Conventional	High Profile	Federal Major
Inputs	Quality Management Plan – describes the quality assurance and continuous process improvement approaches for the project	Sometimes	Always	
	Process Improvement Plan – The project’s quality assurance activities should be supportive of and consistent with the performing organization’s process improvement plans			
	Quality Metrics – provide the attributes that should be measured and the allowable variations	Seldom	Sometimes	Always
	Status Reports – refers to information about project progress such as which activities have started, its progress, and which activities have finished	Always		
	Quality Control Measurements – are the results of Control Quality activities. They are used to analyze and evaluate the quality of the processes of the project against the standards of the performing organization or the requirements specified	Seldom	Sometimes	Always
	Project Documents – may influence quality assurance work and should be monitored within the context of a system for configuration management	Sometimes	Always	
Tools/Techniques	Quality Management and Control Tools – The Perform Quality Assurance process uses the tools and techniques of the Plan Quality Management and Control Quality processes. In addition, other tools that are available include: <ul style="list-style-type: none"> - Affinity diagrams - Process decision program charts (PDPC) - Interrelationship digraphs - Tree diagrams - Prioritization matrices - Activity network diagrams - Matrix diagrams 	Always		
	Quality Audits – are structured, independent processes to determine if project activities comply with organizational and project policies, processes, and procedures. Quality audit objectives may include: <ul style="list-style-type: none"> - Identify all good and best practices being implemented - Identify all nonconformity, gaps, and shortcomings - Share good practices introduced or implemented in similar projects in the organization and/or industry - Proactively offer assistance in a positive manner to improve implementation of processes to help the team raise productivity - Highlight contributions of each audit in the lessons learned repository of the organization 	Seldom	Sometimes	Always
	Process Analysis – follows the steps outlined in the process improvement plan to identify needed improvements. This analysis also examines problems and constraints experienced, and non-value-added activities identified during process operations			
Resulting Outputs	Change Requests – are created and used as input into the Change Management process to allow full consideration of the recommended improvements. Change requests are used to take corrective and preventative action, or to perform defect repair	Always		
	Project Management Plan Updates – may include: <ul style="list-style-type: none"> - Quality management plan - Scope management plan - Schedule management plan - Budget management plan 			
	Project Document Updates – may include: <ul style="list-style-type: none"> - Quality audit reports - Training plans - Process documentation 			

Table 35.3 Control Quality

Control Quality		Conventional	High Profile	Federal Major
Inputs	Project Management Plan – contains the quality management plan that is used to control quality. The quality management plan describes how quality control is performed within the project	Sometimes	Always	
	Quality Metrics – describe a project or product attribute and how it is measured	Seldom	Sometimes	Always
	Quality Checklists – are lists that help to verify that the project work and its deliverables fulfill a set of requirements			
	Status Reports – can include: <ul style="list-style-type: none"> - Planned vs. actual technical performance - Planned vs. actual schedule performance - Planned vs. actual cost performance 			
	Approved Change Requests – As part of the Change Management process, a Change Management Tracking Log update indicates that some changes are approved, and some are not. Approved change requests may include modifications such as defect repairs, revised work methods, and revised schedule. The timely implementation of approved changes needs verification	Sometimes	Always	
	Deliverables – are any unique and verifiable product, result, or capability that results in a validated project deliverable	Seldom	Sometimes	Always
Tools/Techniques	Seven Basic Quality Tools – See Table 35.1 above	Never	Seldom	Sometimes
	Statistical Sampling – Samples are selected and tested as defined in the quality management plan			
	Inspection – is the examination of a work product to determine if it conforms to documented standards. Inspection results generally include measurements and are conducted at any level	Sometimes	Always	
	Approved Change Requests Review – Reviewed all approved change requests to verify that they are implemented as approved			
Resulting Outputs	Quality Control Measurements – are the documented results of control quality activities and should be captured in the format that was specified through the Plan Quality Management Process	Seldom	Sometimes	Always
	Validated Changes – Any changed or repaired items are inspected and will be either accepted or rejected before notification of the decision is provided. Rejected items may require rework	Sometimes	Always	
	Verified Deliverables – is a process to verify the correctness of deliverables. The results of performing the Control Quality process are verified deliverables and are an input to Validate Scope for formalized acceptance	Seldom	Sometimes	Always
	Work Performance Information – is the performance data collected from various controlling processes, analyzed in context, and integrated based on relationships across areas	Sometimes	Always	
	Change Requests – If the recommended corrective or preventive actions or a defect repair requires a change to the project management plan, a change request should be initiated in accordance with the defined Change Management process	Seldom	Sometimes	Always
	Project Management Plan Updates – may include: <ul style="list-style-type: none"> - Quality management plan - Process improvement plan 			
	Project Document Updates – may include: <ul style="list-style-type: none"> - Quality standards - Awarded contracts - Quality audit reports and Change Management Track Logs supported with corrective action plans - Training plans and assessments of effectiveness - Process documentation, such as information obtained using the seven basic quality tools or the quality management and control tools 			

40.1 Overview

Procurement Management includes the processes necessary to purchase or acquire goods or services needed from outside the project team.

The procurement management plan includes four (4) processes:

Knowledge Area Processes PMBOK®	Process Group PMBOK®
Plan Procurement Management – is the process of documenting project procurement decisions, specifying the approach, and identifying potential consultants	Planning
Conduct Procurements – is the process of obtaining seller responses, selecting a seller, and awarding a contract	Executing
Control Procurements – is the process of managing procurement relationships, monitoring contract performance, and making changes and corrections as appropriate	Monitoring and Controlling
Close Procurements – is the process of completing each project procurement	Closing

40.2 WisDOT Procedures

Generally, procurement management includes the contract management and change control processes required to develop and administer contracts for consultant engineering services. In some specialized cases, procurement management may also include purchase orders which is discussed here: [Purchasing at WisDOT](#) (internal WisDOT only).

The procurement management processes involve legal contracts typically between WisDOT and an engineering consultant. A contract represents a mutually binding agreement that obligates the consultant to provide the specific services and obligates WisDOT to provide monetary or other valuable consideration. WisDOT's procurement policies and procedures are described in FDM Chapter 8 as follows:

- [FDM 8-1 Introductions](#)
- [FDM 8-5 Securing Consultant Services](#)
- [FDM 8-10 Contract Negotiations](#)
- [FDM 8-15 Contracts](#)
- [FDM 8-20 Contract Procedures](#)
- [FDM 8-25 Contract Management](#)

It is possible that consideration of the procurement management plan may result in potential changes to the Project Management Plan. If so, the change management plan should be followed.

In the Program Management Manual ([PMM 06-05-10, page 2](#) internal WisDOT only), delivery is defined as “those service center and staff costs—either in-house or consultant—attendant to developing and implementing projects or parts of projects in the highway improvement programs.” Delivery as part of the budget is discussed in [FDM 2-20-15.3](#) – Budget Management.

Note: The phrase “consultant delivery” can also be loosely applied to services supplied by municipal staffs. Those can be design engineering services and/or construction inspection services. However, the process to procure those services is discussed in [FDM 3-5-10, Attachment 10.1](#) – *A Policy on Construction of State and Federal-Aid Highway Projects by Forces and Equipment of Counties or Other Local Governmental Units.*

45.1 Overview

“Change Management is the process of reviewing all change requests; approving changes and managing changes to deliverables, organizational process assets, project documents, and the project management plan; and communicating their disposition. It reviews all requests for changes or modifications to project documents, deliverables, baselines, or the project management plan and approves or rejects the changes.”¹

45.2 WisDOT Procedures

Change management starts in the Monitoring and Controlling Process Group. The primary changes considered are those to scope, schedule, or budget baselines, although changes to communication, resources, procurement, quality, or risk management plans may also need discussion.

The information resulting from this process during design may be stored in the Project Notes Module of the Design PMP - see [PMP Application User's Manual, Chapter 3](#) (internal WisDOT only).

The templates relevant to change management are the Change Management Plan and the Change Management Request templates. WisDOT staff can access sample change management templates to help guide the project management process on the [PMU SharePoint page](#) (internal WisDOT only).

45.3 Change Management Process Steps

Table 45.1 shows the inputs, tools/techniques, and outputs by project size for the PMBOK® change management processes. The guidance listed below may vary on actual project specifics.

Table 45.1 Change Management

Change Management		Conventional	High Profile	Federal Major
Inputs	<p>Project Management Plan – may include:</p> <ul style="list-style-type: none"> - Scope management plan, which contains the procedures for scope changes - Scope baseline, which provides product definition - Change management plan, which provides the direction of managing the change control process and documents the formal change management approval process 	Sometimes	Always	
	<p>Status Reports – Work performance reports of interest to the Change Management process include resource availability, schedule and cost data, earned value management (EVM) reports, dashboards and key performance indicators (KPI) for design projects, and burnup or burndown charts</p>			
	<p>Change Requests – All Monitoring and Controlling processes and many Executing processes produce change requests as an output. These may include corrective action, preventive action, and defect repairs. Corrective and preventive actions do not formally affect project baselines – only performance against baselines. Project Managers (PMs) typically make Change Management decisions</p>			
Tools/Techniques	<p>Expert Judgment – In addition to the project management team’s expert judgement, stakeholders may be asked to provide their expertise. Expert judgment is applied to any technical and management details during this process and may be provided by various sources, for example:</p> <ul style="list-style-type: none"> - Consultants - Stakeholders - Professional and technical associations - Industry groups - Subject matter experts (SMEs) 	Sometimes	Always	
	<p>Meetings – Usually referred to as change control meetings, it is where the change management approval process indicates who is responsible for meeting and reviewing the change requests and approving, rejecting, or other disposition of those changes. The roles and responsibilities for change management decisions are clearly defined and agreed upon by appropriate stakeholders and documented in the change management plan. Change decisions are documented and communicated to the stakeholders for information and follow-up actions</p>			
	<p>Change Control Tools – Manual or automated tools may be used to facilitate configuration and change management. Tools are used to manage the change requests and the resulting decisions. Additional considerations should be made for communication to assist the members in their duties as well as distribute the decisions to the appropriate stakeholders</p>			
Resulting Outputs	<p>Approved Change Requests – Change requests are processed according to the established change management process. Approved change requests are implemented through the Direct and Manage Project Work process (part of Project Integration Management). The disposition of all change requests, whether approved or not, will be updated in the Change Management Tracking Log</p>	Sometimes	Always	
	<p>Change Log – used to document changes during the project. Changes and their impact to the project in terms of time, cost, and risk are communicated to appropriate stakeholders. Rejected requests are also captured in the log</p>			
	<p>Project Management Plan Updates – may include:</p> <ul style="list-style-type: none"> - Any subsidiary plans - Baselines that are subject to the formal change control process <p>Baseline changes should only show changes from the current time forward. Past performance may not be changed. This protects the integrity of the baselines and the historical data of past performances</p>	Always		
	<p>Project Document Updates – Documents that may be updated because of the Perform Integrated Change Control process include all documents specified as being subject to the project’s formal change control process</p>			

FDM 2-20-50 References

December 11, 2014

- 1 Project Management Institute. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – Fifth Edition. (2013). Copyright and all rights reserved. Material from this publication has been reproduced with the permission of PMI.