

# Project Scheduling Template

## **Summary**

This document provides a scalable scheduling tool and associated schedule development, analysis, and monitoring methods that can be used by Implementing Agencies (IA) to prepare, monitor, and report project schedules.

Microsoft Project® is the recommended scheduling tool for most projects. This tool is scalable for most Checklist A, B, and C project categories as defined in the Scalable Tools Work Product, which includes routine or scalable projects of any project budget, and complex projects up to \$10M. For Checklist C projects, a simplified schedule such as a list of tasks or phases with schedule milestones may be adequate. For larger, more complex Checklist A projects, a more robust resource loaded project schedule is recommended, which is beyond the scope of this scheduling tool. In addition, resource-loaded scheduling is beyond the scope of this tool in this context.

The scheduling tool requires inputs from schedule development and analysis processes to produce a project schedule, and also supports schedule performance monitoring. Examples of these processes include work breakdown structure, Critical Path Method (CPM) scheduling, and Schedule Performance Index (SPI) monitoring. The recommendations in this document assume that project managers have experience in schedule management processes. Several schedule management methods with particular application in meeting King County's project scheduling requirements are included. The IA will need to develop this tool for standard agency work and then it can be updated by the PM for specific project work.

## **Purpose**

To provide project managers, project control officers, coordinators, and other staff who manage King County capital improvement projects (CIP) with a scalable tool and schedule development processes for preparing, monitoring, and reporting project schedules.

## **Objectives**

These are the objectives of the scheduling tool:

1. Describes the use of Microsoft Project® scheduling tool and its use related to key King County schedule elements.
2. Presents an overview of selected schedule development, analysis, and monitoring methods that have specific application to King County scheduling requirements.
3. Describe key considerations for developing a schedule for King County capital projects.
4. Identify schedule reporting requirements to consider when developing a project schedule.
5. Familiarize IA project management staff with terminology associated with project schedules and the start and end of project phases.
6. Provide a list of resources to aid in preparing project schedules.

This tool does not intend to provide requirements or specific instructions on how to prepare a project schedule; that is an IA and project-specific activity that is beyond the scope of this scheduling tool.

## **1 – General Schedule Tool Template**

Figure 1 presents a generalized schedule template in Microsoft Project®. This template is intended to serve as an example of items to consider when preparing a schedule. The template incorporates these key scheduling elements:

- ✓ WBS examples
- ✓ Activities examples
- ✓ Key project deliverables (as identified in The CPMWG Work Product April 2011).
- ✓ Project phase delineations
- ✓ Reporting milestones

## **2 – Selected Schedule Development Processes, Analysis Techniques, and Monitoring**

### **Methods**

This section provides an overview of selected schedule development, analysis, and monitoring methods that have particular application in meeting King County’s scheduling requirements. The applicability and use in meeting King County schedule requirements is also described for each method.

Schedule Development Processes – define the activities, duration, and sequence inputs to the scheduling tool. These include:

- Work breakdown structure (WBS) – The WBS is a breakdown of the scope of work necessary to accomplish the project and create the required deliverables. The WBS forms the initial hierarchy of inputs to the schedule tool. A WBS should be used as the basis of the scope of work input to the scheduling tool for King County projects. Some IA departments have comprehensive WBS templates that are used at the outset of a project to aid project managers.
- Activity duration and sequencing – Each WBS component is further subdivided into activities, which are distinct scheduled portions of the work. For example, the WBS entry “Prepare Report” is subdivided into separate activities including: Activity 1 Prepare Draft Report → Activity 2 Review Draft Report → Activity 3 Prepare Final Report, etc. Each of the activities is assigned attributes such as duration, sequence, imposed dates, etc. These activities and attributes are necessary inputs to the scheduling tool to define the activities needed to complete each WBS component for King County projects.
- Deliverables expectations – The “Key Project Deliverables by Phase Checklist” defines the deliverables necessary for each phase of a project. This checklist must be reviewed and the relevant deliverables should be included during development of the WBS for the project.
- Key milestone dates – Key milestone dates required for various status reports should be clearly identified in the WBS, such as King County Project Information Center reporting requirements, IA reporting requirements, grant report dates, etc.

Schedule Analysis Techniques - are used to develop a project schedule and establish a schedule baseline. These include:

- Critical Path Method (CPM) – This method utilizes the activity sequencing inputs to the scheduling tool as described above to determine the tasks that control the schedule and establish the minimum duration necessary to complete the project. The activity

sequencing, lead and lag times between linked tasks, and minimum activity durations are key inputs to ensure an accurate schedule is developed. A CPM schedule should be used as the basis for establishing project schedules for King County projects.

- **Three-Point Estimating** – Three-point estimating generates the most likely, the optimistic, and the pessimistic schedule durations, taking into account the uncertainty of the activities and durations, and the risk associated with achieving the schedule. Methodologies for developing three point schedules are included in the PMBOK Guide. King County baseline schedules should be based on either the most likely or pessimistic schedule for the project, depending on the uncertainty and risk of key project elements. The schedule baseline should in general not be based on an optimistic schedule. However, the project manager should consider managing the project to achieve the optimistic schedule.
- **Baselining** – The baseline schedule is established and fixed near the end of Phase 2, and it serves as the benchmark for calculating schedule performance for the project. The Microsoft Project® scheduling tool has functionality to save and track variance from baseline schedules. The most likely or pessimistic schedules developed from the three point estimating technique should be used as the baseline schedule, depending on the uncertainty or risk of the schedule elements. Each King County project should establish a baseline schedule.

Schedule Monitoring Methods - are used to measure and report schedule performance, and also to take corrective action during the project. These include:

- **Schedule Variance** – This is the measure of schedule performance expressed as the difference between the earned value and planned value of the schedule progress. The Microsoft Project® schedule tool has a percent complete function that should be used to track the amount of work completed on each activity, and compare the amount of work completed to the amount of schedule expended.
- **Baseline Performance Monitoring** – This method compares the current project schedule to the baseline schedule. King County projects typically conduct schedule monitoring by calculating variance of the start and end of each project phase, and also the substantial completion milestone date (example: King County Project Information Center reporting). The Microsoft Project® tool has functionality to compare current to baseline schedule.

### **3 - Key Considerations in Developing a Project Schedule**

This section provides a list of considerations as an aid in preparing a project schedule for King County capital projects. The key considerations are summarized in Table 1 below.

**Table 1. Key Considerations for Developing a Schedule**

When	Schedule Considerations
Planning/Project Charter	<ul style="list-style-type: none"> <li>• Identify critical schedule drivers (when project is needed, approval requirements, etc.)</li> <li>• Identify when funding will be available (grants, managed phase appropriation gates, etc.)</li> <li>• Identify key scope items that are required, decisions/actions that control the schedule, and key schedule constraints and assumptions.</li> </ul>

	<ul style="list-style-type: none"> <li>• Identify CIP schedule milestones necessary to support appropriation requests.</li> </ul>
Planning/Project Management Plan	<ul style="list-style-type: none"> <li>• Review the initial CIP schedule as a basis for preparing the planning level project schedule.</li> <li>• Review “Key Project Deliverables by Phase Checklist.”</li> <li>• Consider development of important schedule assumptions and constraints log to identify key schedule drivers.</li> <li>• Identify reporting requirements, including IA reporting, King County Project Information Center reporting requirements, etc.</li> <li>• Define requirements for start and end of project phases.</li> <li>• Include schedule elements and milestones necessary for cost reporting activities that may be required, such as earned value method (EVM) analysis, cash flow projections, and appropriation requests.</li> <li>• Develop work breakdown structure and activities to aid in schedule development.</li> <li>• Identify key schedule sequencing considerations (constraints, milestones and linkages).</li> <li>• Develop schedule management plan to identify potential schedule risks and corrective actions.</li> <li>• Develop a schedule monitoring plan.</li> </ul>
Preliminary Design	<ul style="list-style-type: none"> <li>• Develop baseline project schedule with updated key schedule assumptions and considerations.</li> <li>• Ensure adequate duration in baseline schedule for payment postings to King County financial system.</li> <li>• Evaluate critical path, schedule risk, and contingency needs in preparing the baseline schedule.</li> <li>• Consider the need for adding “rework” and “risk mitigation” tasks in the schedule to identify the potential need for schedule buffers.</li> </ul>
Final Design	<ul style="list-style-type: none"> <li>• Maintain both current and project baseline schedules and variance.</li> <li>• Define schedule constraints and key considerations in the construction contract documents necessary to inform the contractor of time-related issues that could impact the schedule.</li> </ul>
Implementation	<ul style="list-style-type: none"> <li>• Maintain both current and project baseline schedules and variance.</li> <li>• Review construction contract schedule and update project schedule accordingly.</li> <li>• Define schedule requirements for construction contract completion milestones, final payment, and closeout.</li> </ul>
Closeout	<ul style="list-style-type: none"> <li>• Define activities that are included in the Closeout Phase.</li> <li>• Include post-construction monitoring and warranty considerations if part of project.</li> </ul>

#### **4 – Schedule Reporting Requirements to Consider When Developing a Project Schedule**

This section provides a list of schedule reporting requirements to consider when preparing a project schedule for King County capital projects.

- Project Start Date: IA's and project managers should consider what constitutes the project start date. The start may be when a project starts collecting charges, when the Project Charter is approved, or when a key funding source such as a grant becomes available to collect charges.
- Project Information Center (PIC) Reporting Requirements: King County's PIC reporting requirements includes the start and end of each of the six project phases and substantial completion of construction, for both the current and baseline schedules. Project schedules need to clearly identify each of these reporting milestones, and the schedule needs to include both the current and baseline schedule in order to meet PIC reporting requirements. IA's may have additional reporting requirements that should be considered (permit applications, contract advertisements, beneficial use, etc.).
- Capital Improvement Program (CIP) Financial Reporting Requirements: King County's CIP requires yearly project cash flow projections by phase and by key cost category (County labor, consultants, construction contracts, etc.). Project schedules should consider discreet schedule elements by year that facilitates both projecting and reporting annual cash flow for these key cost categories.
- Grant Requirements: Other funding sources such as grants have similar financial projection and reporting requirements that should be considered here. IA's may have additional financial reporting requirements that should be considered in schedule development.

## **5 – Schedule Terminology and Phase Definitions**

This section provides an overview of schedule terminology as they pertain to project schedules for King County capital projects. These terminologies are generically applied to a project that involves all phases of a capital project, including construction.

- PMBOK: The document *A Guide to the Project Management Body of Knowledge*, published by the Project Management Institute. This document provides a guide to the project management body of knowledge that is generally recognized as good practice, and is generally incorporated into King County project management practices. The document is regularly updated; check the PMI website for the latest version.
- Project Charter: The IA document that approves the initial project scope, schedule, and budget and authorizes work to commence on the project.
- Project Baseline: The IA document that approves the baseline scope, schedule, and budget at the conclusion of the preliminary design phase and authorizes the project to proceed into Phase 3 – Final Design. Project baseline is used as a basis for variance reporting and performance measurement for the entire project.
- Notice to Proceed: NTP is a written directive issued by the County authorizing the Contractor to start performance of some or all of the work and establishing the date after which the Contractor may commence the work.
- Work Breakdown Structure: WBS is a hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and creates the required deliverables.
- Activity: A distinct, scheduled portion of work performed during the course of a project. An activity has a start and end date. As an example, a WBS scope element "Prepare Report" is broken down into discrete scheduled activities including "prepare draft

report”, “review draft report”, “resolve comments”, “prepare final report”, and “approve final report”, with the approved final report being the deliverable.

- Schedule Contingency: The concept of identifying time buffers within a project schedule to account for potential need for risk mitigation, rework, and other possible schedule uncertainty factors (see “Critical Chain” reference for discussion of this topic).
- Phase Definitions Related To Schedule: see Table 2 below.

**Table 2 – General Description of Phase Elements Related To Schedule Development**

Phase	Phase Start	Phase End	Considerations
Phase 1 – Planning	Upon commencing preparation of the purpose and needs statement or Project Charter	Upon approval of both the Project Charter and initial Project Management Plan.	IA charters may occur prior to initiating Phase 1 of the project.
Phase 2 - Preliminary Design	Upon commencing the initial Phase 2 activities as defined in the approved Project Management Plan	Upon approval of the Baseline	Preliminary design level of effort varies as necessary to establish project Baseline.
Phase 3 – Final Design	Upon commencing the initial Phase 3 activities as defined in the approved Baseline	Upon issuance of Notice to Proceed for the construction contract	This phase may include securing permits and other permissions to the at the project can proceed to construction
Phase 4 – Implementation	Upon issuance of Notice to Proceed for the construction contract	Upon issuance of Final Acceptance for the construction contract.	IA requirements vary for Final Acceptance (See detailed contract closeout matrix).
Substantial completion Milestone	NA	NA	Required for PIC and other reporting.
Phase 5 – Closeout	Upon issuance of Final Acceptance for the construction contract	When the project no longer receives cost charges	This phase may include releases of retainage and contract closeout, final approval of regulatory and permit obligations, and multi-year monitoring following construction
Phase 6 – Acquisition	Varies	Varies	This is the specific project phase where activities associated with acquisition or surplus and sale of real property, property rights, or the acquisition of

			improvements occur. This phase typically runs concurrent with other project phases.
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## **6 – List of Resources to Aid in Preparing Project Schedules**

These resources are suggested for IA project managers:

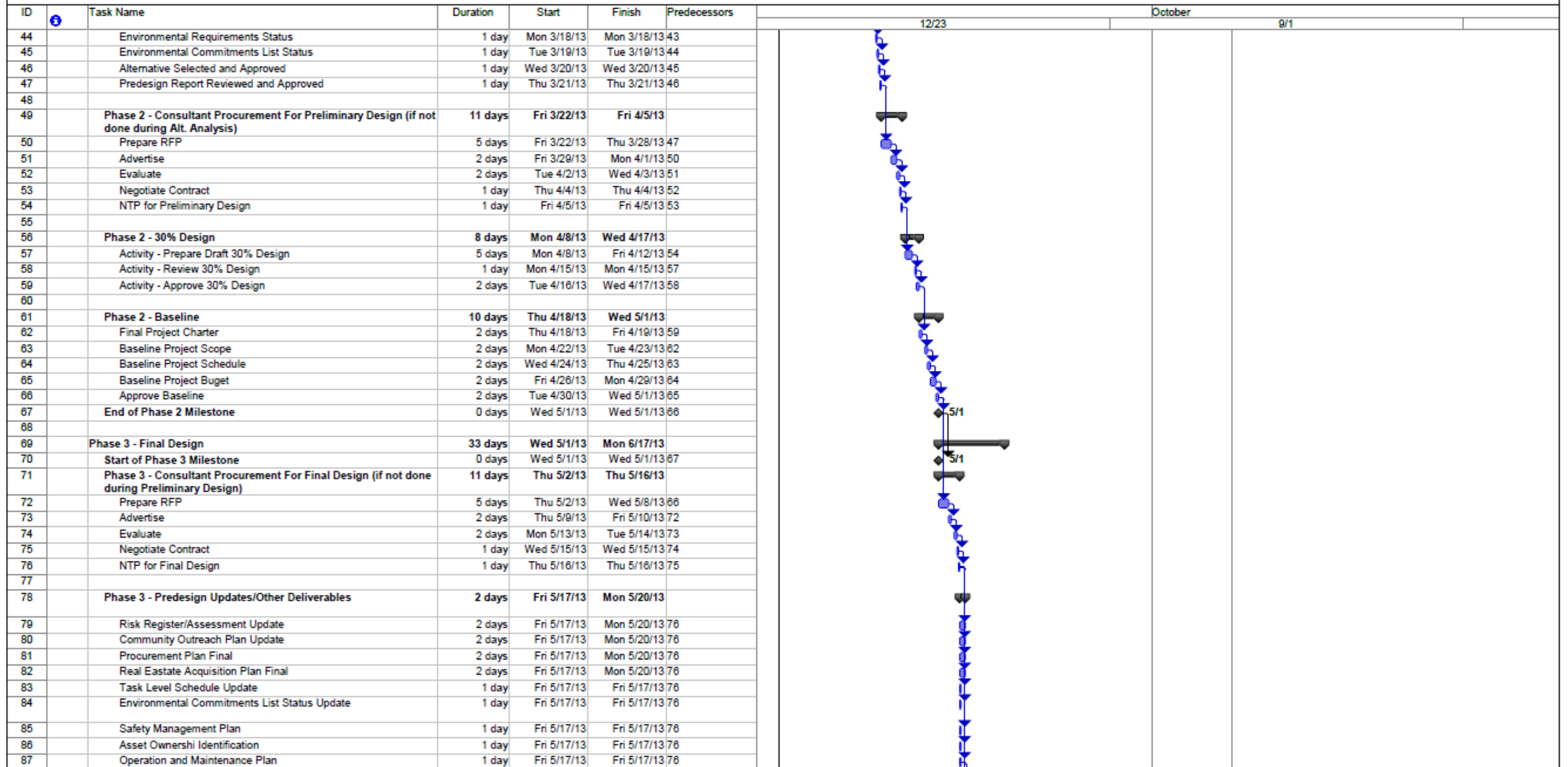
- *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*, published by Project Management Institute, latest edition
- Microsoft Project® 2010 Product Guide, Project Standard and Project Professional, available for free download from Microsoft Home Page
- *King County Capital Projects Management Work Group (CPMWG) Standards Subcommittee Work Product April 2011 (referred to as CPMWG 1 Work Product)*
- *The Project Management Institute Book of Project Management Forms*, published by Project Management Institute, latest edition.
- *The Definitive Guide to Project Management: The Fast-Track to Getting the Job Done on Time and on Budget* (Appendices A&B describe the critical chain scheduling method); by Nokes, Major, Greenwood, Allen and Goodman, Prentice Hall 2003.

Figure 1  
CPMWG Scheduling Tool - General Schedule Template  
Date Prepared: 05/17/13  
Prepared By: Mike Stanaszek, PE, PMP  
King County Metro Transit Division Design & Construction Section

ID	Task Name	Duration	Start	Finish	Predecessors	12/23	October	9/1
1	Phase 1 - Planning	30 days	Tue 1/1/13	Mon 2/11/13				
2	Start of Phase 1 Milestone	0 days	Tue 1/1/13	Tue 1/1/13				
3	Project Assigned to PM	1 day	Tue 1/1/13	Tue 1/1/13				
4	Purpose and Needs Statement	9 days	Tue 1/1/13	Fri 1/11/13				
5	Activity - Prepare Draft Purpose and Needs Statement	5 days	Tue 1/1/13	Mon 1/7/13	2			
6	Activity - Review Purpose and Needs Statement	2 days	Tue 1/8/13	Wed 1/9/13	5			
7	Activity - Approve Purpose and Needs Statement	2 days	Thu 1/10/13	Fri 1/11/13	6			
8	Project Charter	9 days	Mon 1/14/13	Thu 1/24/13				
9	Activity - Prepare Draft Project Charter	5 days	Mon 1/14/13	Fri 1/18/13	7			
10	Activity - Review Project Charter	2 days	Mon 1/21/13	Tue 1/22/13	9			
11	Activity - Approve Project Charter	2 days	Wed 1/23/13	Thu 1/24/13	10			
12	Preliminary List of Alternatives	5 days	Fri 1/25/13	Thu 1/31/13	11			
13	Draft Project Schedule	5 days	Fri 2/1/13	Thu 2/7/13	12			
14	Draft Project Budget	2 days	Fri 2/1/13	Mon 2/4/13	12			
15	ROM Draft Cost Estimate (phase level)	2 days	Tue 2/5/13	Wed 2/6/13	14			
16	Draft Phase and Contract Level Annual Cash Flow Forecast	2 days	Thu 2/7/13	Fri 2/8/13	15			
17	Draft Environmental Requirements Status	5 days	Fri 2/1/13	Thu 2/7/13	12			
18	Project Management Plan	2 days	Fri 2/8/13	Mon 2/11/13	17			
19	End of Phase 1 Milestone	0 days	Mon 2/11/13	Mon 2/11/13	18			
20								
21	Phase 2 - Preliminary Design	57 days	Mon 2/11/13	Wed 5/1/13				
22	Start of Phase 2 Milestone	0 days	Mon 2/11/13	Mon 2/11/13	19			
23	Phase 2 - Consultant Procurement For Alternatives Analysis	11 days	Tue 2/12/13	Tue 2/26/13				
24	Prepare RFP	5 days	Tue 2/12/13	Mon 2/18/13	19			
25	Advertise	2 days	Tue 2/19/13	Wed 2/20/13	24			
26	Evaluate	2 days	Thu 2/21/13	Fri 2/22/13	25			
27	Negotiate Contract	1 day	Mon 2/25/13	Mon 2/25/13	26			
28	NTP Alternatives Analysis	1 day	Tue 2/26/13	Tue 2/26/13	27			
29								
30	Phase 2 - Predesign	17 days	Wed 2/27/13	Thu 3/21/13				
31	Risk Register/Assessment	1 day	Wed 2/27/13	Wed 2/27/13	28			
32	Project Resourcing Plan	1 day	Thu 2/28/13	Thu 2/28/13	31			
33	Community Outreach Plan	1 day	Fri 3/1/13	Fri 3/1/13	32			
34	Procurement Plan	1 day	Mon 3/4/13	Mon 3/4/13	33			
35	Alternatives Analysis	1 day	Tue 3/5/13	Tue 3/5/13	34			
36	ROW Needs/Opinion of Cost	1 day	Wed 3/6/13	Wed 3/6/13	35			
37	Real Estate Acquisition Plan	1 day	Thu 3/7/13	Thu 3/7/13	36			
38	Life Cycle Cost Analysis	1 day	Fri 3/8/13	Fri 3/8/13	37			
39	Project Schedule	1 day	Mon 3/11/13	Mon 3/11/13	38			
40	Task Level Schedule	1 day	Tue 3/12/13	Tue 3/12/13	39			
41	Project Budget	1 day	Wed 3/13/13	Wed 3/13/13	40			
42	Cost Estimates (phase level)	1 day	Thu 3/14/13	Thu 3/14/13	41			
43	Phase and Contract Level Annual Cash Flow Forecast	1 day	Fri 3/15/13	Fri 3/15/13	42			

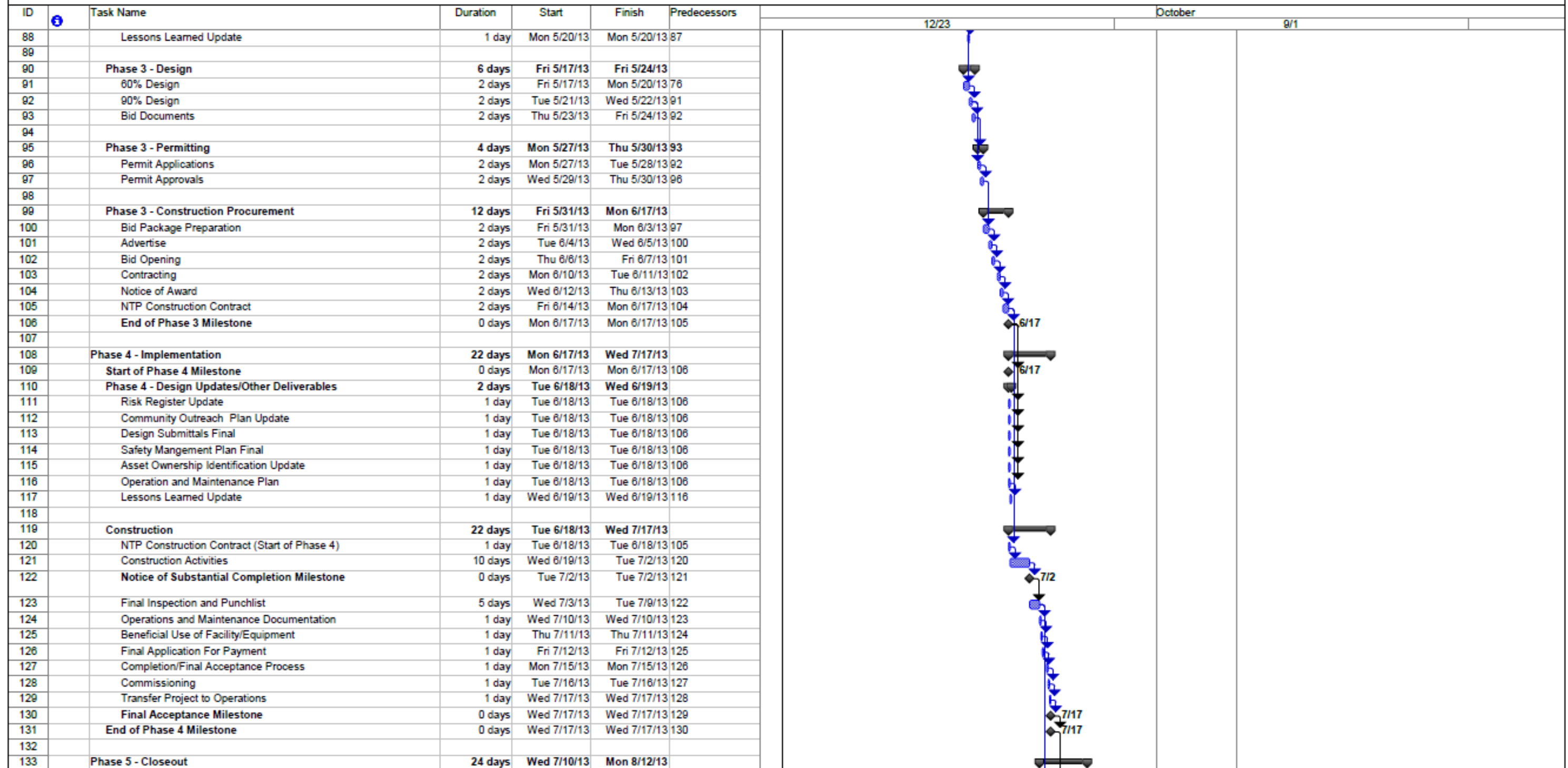


Figure 1  
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Date Prepared: 05/17/13  
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King County Metro Transit Division Design & Construction Section



Project: 10434840 RB Lift Repl 03011 Date: Wed 11/27/13	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Progress
	Split		External Tasks		Inactive Summary		Manual Summary		Deadline
	Milestone		External Milestone		Manual Task		Start-only		Finish-only
	Summary		Inactive Task		Duration-only		Finish-only		Finish-only

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Task

Split

Milestone

Summary

Project Summary

External Tasks

External Milestone

Inactive Task

Inactive Milestone

Inactive Summary

Manual Task

Duration-only

Manual Summary Rollup

Manual Summary

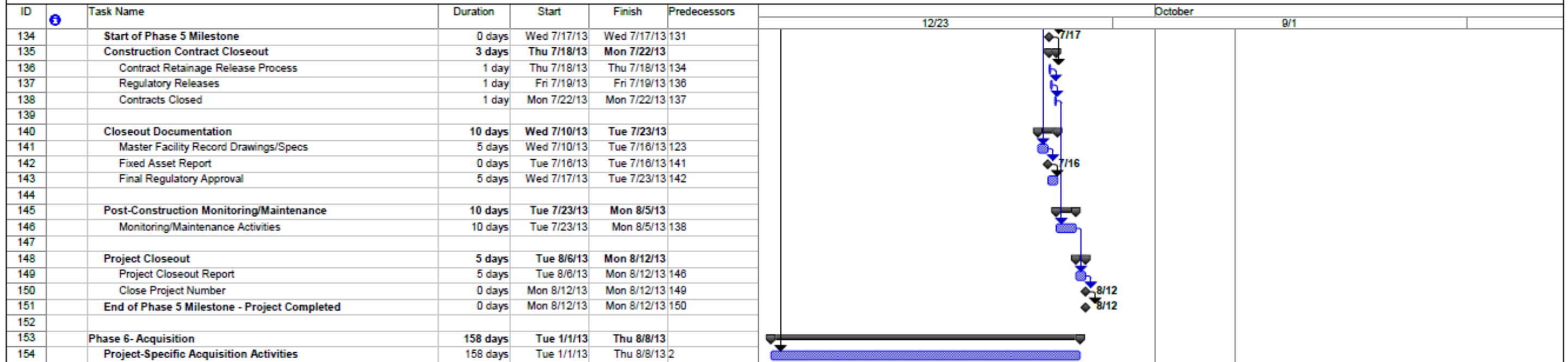
Start-only

Finish-only

Progress

Deadline

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