

Road Map Item #: 5.4

Product Name: **SCHEDULE CONTROL PLAN**

PMP Appendix: APPENDIX N

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ABSTRACT: This deliverable establishes a standard methodology for schedule development, maintenance, and reporting. The plan encompasses the guidelines of Washington State Department of Transportation (WSDOT), Oregon Department of Transportation (ODOT), the Federal Transit Administration (FTA), and other local transit agencies, conformed to the needs of the Columbia River Crossing project.

SCHEDULE CONTROL PLAN

Draft Report

May 2013



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ACRONYMS

AC	Actual Cost
B&A	Basis and Assumption
BAC	Budget at Completion
CPI	Cost Performance Index
CPM	Critical Path Method
CRC	Columbia River Crossing
C-TRAN	Clark County Public Transportation Benefit Area Authority
CV	Cost Variance
EAC	Estimate at Completion
ETC	Estimate to Complete
EV	Earned Value
EVM	Earned Value Management
FTA	Federal Transit Administration
ODOT	Oregon Department of Transportation
PM/LE	Project Manager / Lead Engineer
PMOC	Project Management Oversight Contractor
PMP	Project Management Plan
PMRS	Project Management and Reporting System
PV	Planned Value
RCMP	Risk and Contingency Management Plan
SCC	Standard Cost Category
SPI	Schedule Performance Index
SV	Schedule Variance
TriMet	Tri-County Metropolitan Transportation District of Oregon
WBS	Work Breakdown Structure
WSDOT	Washington State Department of Transportation

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1. Introduction

1.1 Purpose

Scheduling procedures have been established to provide efficient, timely, and accurate methods of schedule development, cost control, monitoring, and reporting. Scheduling provides a planning framework not only for the Columbia River Crossing (CRC) Project Delivery Team, but also for federal, state, and local transit agencies, as well as contractors, consultants, and suppliers.

The Schedule Control Plan establishes a standard methodology for schedule development, maintenance, and reporting. The plan encompasses the guidelines of Washington State Department of Transportation (WSDOT), Oregon Department of Transportation (ODOT), the Federal Transit Administration (FTA), and other local transit agencies, conformed to the needs of the Columbia River Crossing project.

1.2 Roles and Responsibilities

The identified roles are provided as a guide to assigning the tasks included in the implementation of the Schedule Control Plan processes and procedures. Each role has the flexibility to delegate responsibilities to the appropriate functional level to meet project needs and to accommodate for current and planned organization structures.

1.2.1 Project Delivery Team

The Project Delivery Team is comprised of the WSDOT/ODOT Program Directors; Project Delivery Directors, and Engineering Managers; Transit Program Delivery Managers and Engineers; Project Managers and Lead Engineers; Project Controls Manager, Lead Schedulers and Construction Schedulers; and any others that are needed to deliver and manage the project schedule. The Project Delivery Team is responsible for working with the Project Managers/Lead Engineers in developing a work breakdown structure; providing input on work package schedule logic, constraints and milestones; reviewing the draft schedule and schedule requirements; and endorsing the Master Program Schedule.

1.2.2 Project Controls Manager

The Project Controls Manager provides leadership in support of the efforts of the Lead Schedulers and Construction Schedulers and also provides leadership and direction to Document Control, Budget/Cost Analysts, Cost Estimating, Risk Management, and Change Management. The Project Controls Manager will oversee project schedule development and will recommend final approval of the Master Program Schedule and the subsequent Baseline Master Program Schedule. Monthly schedule updates and schedule reports are also approved by the Project Controls Manager.

1.2.3 Project Manager / Lead Engineer

The Project Manager / Lead Engineer (PM/LE) oversees the development of the schedule as it relates to their disciplines or work packages, meeting State Legislative scope and FTA scope, budget and milestone requirements, with adherence to the approved Work Breakdown Structure (see Section 2.3.1), the Flowchart Account Codes (see Section 2.3.2), and the Standard Cost Categories (SCC) (see Section 2.3.3), as required. The PM/LE will coordinate closely with the Lead Schedulers throughout the schedule development process, defining the appropriate structure and level of detail; providing input on schedule logic and constraints; reviewing the draft schedule; and providing schedule updates in a timely manner.

1.2.4 Lead Program Scheduler

The Lead Program Scheduler has primary responsibility for overall development of the Master Program Schedule, schedule management and analysis, risk assessment, and schedule updates. The Lead Program Scheduler will also oversee coordination between the Construction Scheduler(s) and contractors/suppliers on schedule development, monitoring, and updates. The Lead Program Scheduler and Lead Project Scheduler will work closely together to provide the Project Delivery Team with timely updates and other reporting requirements, as needed, for informed decision-making and project management. In addition, they will coordinate the cost integration effort with cost estimators.

1.2.5 Lead Project Scheduler

The Lead Project Scheduler is responsible for developing the schedule as directed by the Project Manager / Lead Engineer in compliance with project guidelines. Schedule network development includes the addition/confirmation of work activities, durations, constraints, relationships, milestones, and other required elements to satisfy the scope of the project.

1.2.6 Construction Scheduler

Construction schedulers will provide the necessary coordination with contractors/suppliers and the CRC Project Controls group in meeting contractor/supplier schedule development and reporting requirements. They will review contractor-provided schedules regularly. In addition, they will provide scheduling support to the CRC Program functional managers and to the Project Engineers overseeing construction contracts.

1.2.7 Cost/Budget Analyst

Part of the Project Controls team, the Cost Budget Analyst will manage the funding streams, project budgets and costs. The Analyst will export actual cost data from EcoSys EPC, the CRC cost management system, for import in Primavera P6, the project scheduling software. Conversely, Scheduling will export from P6 the Percent Completes and Start/Finish Dates of schedule activities for import in EcoSys EPC.

1.2.8 Cost Estimator

The Cost Estimator will receive bid quantities from engineering disciplines and will be responsible for developing the estimating model and providing a final estimate.

1.3 Definitions

- Baseline – In project management, a baseline is a known state by which something is measured or compared. Once, the Master Program Schedule is approved, it will be “baselined,” or copied, creating a starting point for all progressive schedule activities from which to measure.
- Critical Path – The critical path is the sequence of project network activities which add up to the longest overall duration of the project. This determines the shortest time possible to complete the project. Any delay of an activity on the critical path directly impacts the planned project completion date (i.e., there is no float on the critical path).
- Critical Path Method – The critical path method (CPM) is a step-by-step technique for process planning that defines critical and non-critical tasks with the goal of preventing timeframe problems and process bottlenecks. The CPM is ideally suited to projects consisting of numerous activities that interact in a complex manner.

The basic technique for using CPM is to construct a model of the project that includes the following:

- A list of all activities required to complete the project (categorized by work breakdown structure);
- The time (duration) that each activity will take to complete; and
- The dependencies (relationships) between the activities.

The CPM was developed in the 1950s by DuPont, and was first used in missile-defense construction projects. Since that time, the CPM has been adapted to other fields including hardware and software product research and development.

- Gantt Chart – A Gantt chart is a type of bar chart, developed by Henry Gantt in the 1910s, that illustrates a project schedule.

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2. Master Program Schedule Development

2.1 Procedures

The Schedule Control Plan outlines the steps for development of the project schedule from early planning, pre-engineering, and funding approval, to right-of-way acquisition, permitting, procurement, construction, and project close-out.

Primavera Project Management P6 software is used as the scheduling package for developing, monitoring, and analysis of the Master Program Schedule and any subprojects within the Master Program Schedule, using the CPM. The CPM schedule has been developed and will continue to be updated to reflect the most current scope of work, work packaging, and funding constraints.

2.2 Identify Milestones, Deliverables and Schedule Activities

The Project Delivery Team identifies milestones (required and optional) and deliverables based on the CRC work breakdown structure, and establishes detail schedule activities by work package to ensure that the schedule reflects the project scope.

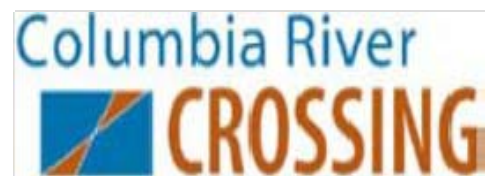
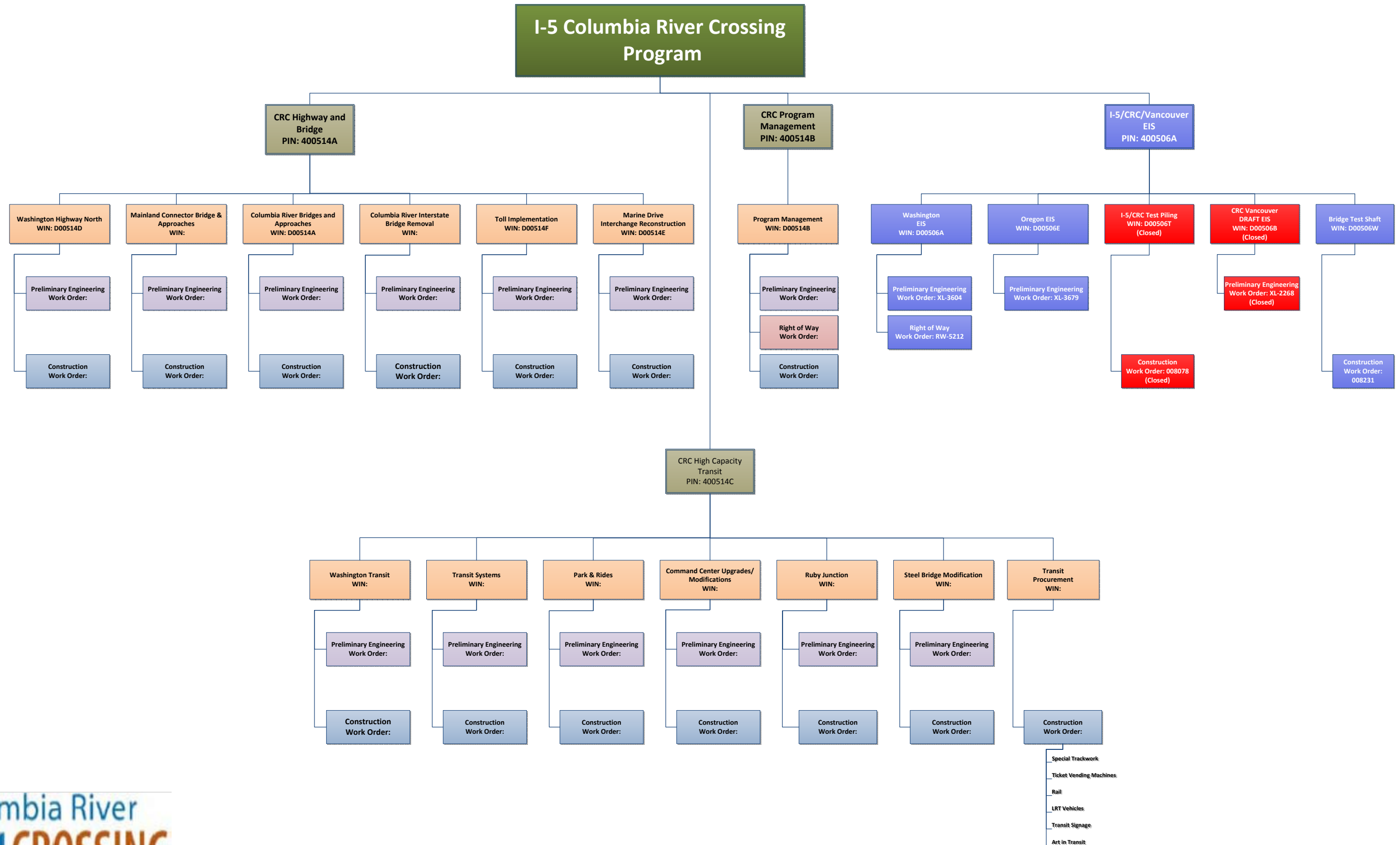
2.3 Define Work Breakdown Structure

2.3.1 CRC Work Breakdown Structure

The Work Breakdown Structure (WBS) establishes an effective framework on which to build a comprehensive project schedule. The WBS, developed and approved for this project, is defined in Figure 2-1. The WBS is used as the definitive structure of the project schedule. This, in turn, provides the ability to roll up the detail-level schedule activities to summary-level reporting as well as stakeholder and work package reporting. There is flexibility in the Work Breakdown Structure to meet project-specific needs. As work packages are fully developed, the WBS will continue to expand to fully serve the program needs.

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Work Breakdown Structure



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2.3.2 Flowchart Account Codes

The established Flowchart Account Codes used on the project are noted in Table 2-1. These accounts are used to report costs for ODOT and WSDOT. The Flowchart Account Codes provide a convenient crosswalk between estimating and schedule activities, as well as cost tracking in EcoSys EPC, the project cost management system. The term “Flowchart” is a bit misleading because it is actually a chart of accounts into which the estimate details flow. This is an important focal point of the cost/estimate juncture as the Flowchart Account Codes are used for projecting cash flow; the accounts have been institutionalized for the project. The Flowchart Account Codes are assigned to work activities in the Master Program Schedule.

Table 2-1. Flowchart Account Codes

Description	
PRE	Preliminary Engineering expenditures (12/2009 through 09/2012)
100	River Crossing PE
101	Oregon Funding
102	Washington Funding
105	Program Controls
110	Highway Agreements
130	Marine Drive LPA with Phasing Professional Engineering
140	RC Bridge Removal Professional Engineering
150	Mill Plain Professional Engineering
160	Other Environmental Permitting (Does not include RC Permits)
170	WAN ROW
180	Prepare and issue River Crossing RFQ
190	Prepare and Issue River Crossing RFP
192	CRB Permitting
200	Procurement Process and Select RC Design Builder
220	RC ROW
225	RC Sandy River Habitat
230	MC ROW
240	MD ROW
250	River Crossing Pre SB (SB) (Includes DB Design)
251	River Crossing (Post SB open milestone) (working on NB)
252	Hayden Island stage 1-3 (Pre SB open milestone)
253	Hayden Island stage 4-6 (Post SB open milestone)
254	SR14 stage 1-3 (Pre SB open milestone)
255	SR14 stage 4-5 (Post SB open milestone)
256	SR14 stage 6 (Post NB open milestone)
257	Southbound River Crossing Open
267	Northbound River Crossing Open
271	Pre-Completion Tolling
280	Mainland Connector Construction
330	Marine Drive Interchange LPA with Phasing
340	Mill Plain Construction
350	Fourth Plain Construction
370	Remove Existing River Crossing
380	FTA Approval to Enter Final Design

Description	
390	Transit PE & FTA Review
400	Transit Agreements
402	Utility Relocation for Washington Transit Work
404	Utility Relocation for Transit Work (Hayden Island)
410	CRC Final Design and PS & E Transit
415	FFGA Prep (By CRC) Application Period and FFGA Award
420	Park and Rides Professional Engineering
430	R/W Washington Transit (LRT)
440	LRT Vehicle Exercise of Option (last date to exercise is 07/2015)
450	Washington Park and Ride DB Construction
480	Oregon Transit Professional Engineering
490	Light Rail Vehicle Procurement
500	Ruby Junction Construction
505	Transit Owner Furnished Materials Procurement
506	Ticket Vending Machine Procurement
510	Oregon Transit Construction
520	Washington Transit Construction
529	Transit Systems PE
530	LRT Systems Install, testing, startup
535	Transit Before & After Study
540	LRT Revenue Service
560	Transit Other
562	Steel Bridge Improvements
564	Command Center Upgrades/Modifications
570	R/W Ruby Junction (LRT)
580	Ruby Junction Professional Engineering
590	Washington Transit Professional Engineering
600	MC Professional Engineering
610	Fourth Plain Professional Engineering
650	LPA with Phasing Complete

2.3.3 FTA Standard Cost Category

The Federal Transit Administration Standard Cost Category (SCC) accounts are assigned to FTA-funded accounts to capture transit-related estimates, cost, and schedule activities for reporting to the FTA. The SCC accounts are assigned to transit work activities in the Master Program Schedule (Table 2-2).

Table 2-2. Standard Cost Category

10	Guideway & Track Elements
10.01	Guideway: At-grade exclusive right-of-way
10.02	Guideway: At-grade semi-exclusive (allows cross-traffic)
10.03	Guideway: At-grade in mixed traffic
10.04	Guideway: Aerial structure
10.05	Guideway: Built-up fill
10.06	Guideway: Underground cut & cover
10.07	Guideway: Underground tunnel
10.08	Guideway: Retained cut or fill
10.09	Track: Direct fixation
10.10	Track: Embedded
10.11	Track: Ballasted
10.12	Track: Special (switches, turnouts)
10.13	Track: Vibration and noise dampening
20	STATIONS, STOPS, TERMINALS & INTERMODAL
20.01	At-grade station, stop, shelter, mall, terminal, platform
20.02	Aerial station, stop, shelter, mall, terminal, platform
20.03	Underground station, stop, shelter, mall, terminal, platform
20.04	Other stations, landings, terminals: Intermodal, ferry, trolley, etc.
20.05	Joint development
20.06	Automobile parking multi-story structure
20.07	Elevators, escalators
30	SUPPORT FACILITIES: YARDS, SHOPS & ADMIN BUILDINGS
30.01	Administration Building: Office, sales, storage, revenue counting
30.02	Light Maintenance Facility
30.03	Heavy Maintenance Facility
30.04	Storage or Maintenance of Way Building
30.05	Yard and Yard Track

10	Guideway & Track Elements
40	SITWORK & SPECIAL CONDITIONS
40.01	Demolition, Clearing, Earthwork
40.02	Site Utilities, Utility Relocation
40.03	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments
40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks
40.05	Site structures including retaining walls, sound walls
40.06	Pedestrian / bike access and accommodation, landscaping
40.07	Automobile, bus, van accessways including roads, parking lots
40.08	Temporary Facilities and other indirect costs during construction
50	SYSTEMS
50.01	Train control and signals
50.02	Traffic signals and crossing protection
50.03	Traction power supply: substations
50.04	Traction power distribution: catenary and third rail
50.05	Communications
50.06	Fare collection system and equipment
50.07	Central Control
60	RIGHT-OF-WAY & LAND IMPROVEMENTS
60.01	Purchase or lease of real estate
60.02	Relocation of existing households and businesses
70	VEHICLES
70.01	Light Rail
70.02	Heavy Rail
70.03	Commuter Rail
70.04	Bus
70.05	Other
70.06	Non-revenue vehicles
70.07	Spare parts
80	PROFESSIONAL SERVICES
80.01	Preliminary Engineering
80.02	Final Design
80.03	Project Management for Design and Construction
80.04	Construction Administration & Management
80.05	Insurance
80.06	Legal; Permits; Review Fees by other agencies, cities, etc.
80.07	Surveys, Testing, Investigation, Inspection
80.08	Start up
90	UNALLOCATED CONTINGENCY
90.00	Unallocated contingency

2.4 Schedule Network Development

2.4.1 Identify and Define Work Packages

Using the design basis of the CRC project, the Project Delivery Manager / Lead Engineer (PM/LE) for each discipline will identify and define the work packages. The work package will be clearly defined by a written scope of work.

2.4.2 Schedule Network (Logic, Constraints)

- Logic – Once the work packages are clearly defined, the Lead Scheduler will coordinate with the responsible Lead in developing the detail work activities associated with each work package. Each activity will have a reasonable duration, with logic assigned, creating a network. The Lead Scheduler verifies the network logic of the schedule activities based on input from the Lead, the Project Delivery Team, and outside agencies, as applicable.

Each work package is initially a subproject. The Lead Scheduler will merge each work package (or subproject) into one project in P6, which will be called the Draft Master Program Schedule.

Coordination between disciplines is critical to ensure accurate logic ties between work packages. The Lead Scheduler will refine logic ties to actual project requirements taking into account the significant components of work in each phase, with adherence to established milestones and funding agreements. Established Program-level activities will also be added to the Draft Master Program Schedule as defined by the Project Delivery Team.

- Constraints – The Lead Scheduler will incorporate any restrictions on work, including local ordinances, work calendars, holidays, weather restrictions, environmental issues, project risks, or other items or activities that require special planning or attention by the Project Delivery Team, including interfaces with other projects (non-CRC work) or agencies. Best Management Practice is to not use constraints, but build the activities and logic needed to reflect the actual schedule circumstances.
- Sub-Groupings – There is flexibility in the Work Breakdown Structure to meet project-specific needs. As work packages are fully developed, the WBS will continue to expand. Based on input from the Project Delivery Team and the Leads, the logical filtering and grouping of project activities will be determined to facilitate review and update of the schedule, as well as providing organization of reports and schedule graphics at different summary levels to accommodate the audience for which the reports/graphics are intended.

2.5 Optimize Schedule

When all subproject schedules are merged into the Draft Master Program Schedule and the schedule logic is refined, the schedule can be optimized. Schedule optimization is an iterative

process, involving close analysis to assure that milestone dates are being met. The critical path, those schedule activities that need to start and finish on time in order to meet the established end date of the project, is determined (see Section 1.3, Definitions).

2.6 Integrate Cost Estimate with Schedule Activities

The Estimator(s) will coordinate closely with the Lead Scheduler(s) during development of the estimate to provide an estimate defined by work package (or contract) and the Work Breakdown Structure, with a one-to-one relationship between estimate and schedule activity at a pre-determined WBS level. Other cost codes used by the Estimator and the Lead Scheduler to further delineate costs will be the Flowchart Account Codes (see Table 2-1) and the FTA SCC Accounts (see Table 2-2). Schedule activities will further be identified by these cost codes as well.

When the final estimate is approved, the Lead Scheduler will cost-load the Draft Master Program Schedule. The result will allow the Lead Scheduler to provide cash flow models in P6 to compare against funding for the project. Although a default cost curve can be selected, P6 has the capability of allowing the user to set the cost curve for each activity to reflect the work effort, i.e., bell curve, front loaded, back loaded, linear, etc. This would allow adjustments to be made to the cash flow model, which would aid in conformation of the work effort to available funding.

Having a cost-loaded schedule allows P6 to track actual costs against the budget as well as determining the remaining estimate to complete (ETC) and the forecast estimate of estimate at completion (EAC) based on the current percent complete of each schedule activity. These features allow for a very robust and accurate measure of the project work effort.

2.7 Issue Draft Master Program Schedule for Project Delivery Team Review

After thorough vetting of the Draft Master Program Schedule, the Project Manager / Lead Engineer for each work package will review and approve the schedule. The PM/LE is responsible for resolving schedule issues with the Lead Scheduler prior to issuing for review. The Lead Scheduler will issue the schedule for Project Delivery Team and stakeholder review. Included with the schedule are written narratives defining the schedule basis and assumptions, deliverables, milestones, and other defined project conditions.

2.8 Perform Risk Assessment

Perform risk assessment and document any issues in the Risk Contingency Management Plan (RCMP). Risk assessment is an ongoing process throughout the life of the project. Risk assessment is performed during the pre-planning stages, up to and including the award of contracts. The initial review of contractor/supplier schedules will require a risk assessment. During the monthly schedule update process, the Lead Scheduler monitors and analyzes the schedule. Any changes or variances that could potentially affect project risk will be identified at that time. After further evaluation by the Project Delivery Team, additional risk assessment(s) may occur.

2.9 Schedule Endorsement by Project Delivery Team/Stakeholders

2.9.1 Project Delivery Team

The Project Delivery Team will evaluate the final Draft Master Program Schedule. Any recommendations will be incorporated into the schedule for final approval.

2.9.2 Federal, State, and Local Agencies

All invested federal, state, and local agencies will review and approve the final Draft Master Program Schedule. Any recommendations will be incorporated into the schedule for final approval.

2.10 Issue Approved Master Program Schedule

The Master Program Schedule will be issued to the Project Delivery Team and all stakeholders upon final approval.

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3. Baseline Program Schedule

Once all project issues have been resolved and the Master Program Schedule has been approved, the Lead Scheduler will create a copy of the schedule, which is commonly referred to as a baseline schedule. The baseline schedule is a snapshot in time of the Master Program Schedule. The major differences between the Master Program Schedule and the Baseline Program Schedule are:

- The Master Program Schedule is a “living” document – the Baseline Program Schedule is “frozen.”
- The Master Program Schedule shows “actuals” – the Baseline Program Schedule is the “plan.”
- The Master Program Schedule is updated as the project is being executed – the Baseline Program Schedule is revised only as a result of an approved major schedule logic change.
- Schedule performance is measured by comparing the actual (Master Program Schedule) against the baseline (Baseline Program Schedule).
- At the beginning of project execution, the Master Program Schedule is the same as the Baseline Program Schedule. As work is done on the project, the actual progress is updated on the Master Program Schedule. At any given date, the latest version of the actual schedule is still referred to as the Master Program Schedule.

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4. Contingency Schedule

The USDOT Federal Transit Administration Project Management Oversight Contractor (PMOC) is tasked with technical review services that cover oversight reviews and analysis of project scope, schedule, cost, risk, and contingency, as well as value engineering, ADA conformance, and the Annual New Starts Review. The PMOC has requested a contingency schedule, using the Master Program Schedule critical path activities as the basis.

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5. Contractor/Supplier Schedule Requirements

During the design and contract procurement phases, the Master Program Schedule will reflect general, summary-level construction schedule activities and estimates. The CRC Project will structure the contractor construction schedule specifications based on the size and complexity of contract packages. The CRC Project anticipates that schedule specifications for larger procurement packages will use Primavera P6, providing CPM scheduling. Schedule specifications for small projects may not require CPM scheduling, but could require the contractor/supplier to regularly submit horizontal bar chart-type schedules with simple logic.

5.1 Contractor/Supplier Schedule Requirements

The contract scope and schedule requirements must be clearly understood so the contractor/supplier can develop a detailed construction/procurement schedule and cost plan in accordance with the contract specifications, using established work breakdown structure and other defined project and schedule parameters. The contractor/supplier will develop the construction/procurement schedule and will thoroughly review the schedule activities, durations, logic, constraints, staging, as well as cost and resources assigned to the schedule activities. The PM/LE, the Lead Scheduler, and the Construction Scheduler will collect and analyze the contractor/supplier initial construction/procurement schedule for accuracy and adherence to schedule and contract specification guidelines and requirements. Any agreed upon changes will be made and the schedule will be optimized. The Lead Scheduler will merge the construction/procurement schedule with the Master Program Schedule and assess and resolve any issues with the PM/LE and contractor/supplier. At a minimum, this analysis shall include the following elements:

- Analyze schedule report.
- Evaluate and confirm critical path and milestones.
- Identify and substantiate or correct schedule activities with “open ends.”
- Evaluate start/finish dates and durations.
- Identify and confirm costs and cost loading of each schedule activity.
- Evaluate and confirm resource loading, if required.
- Perform schedule recovery/optimization, as necessary.
- Perform cost and/or resource optimization, as necessary.

The PM/LE and the Project Delivery Team will confirm if the consolidated schedule meets the project’s legislatively mandated milestones and budget based on the project scope, as well as those of all federal, state, and local agencies.

5.2 Contractor/Supplier Schedule Updates

5.2.1 Contractor/Supplier Submits Schedule Update

The contractor/supplier will provide monthly schedule updates as established in the contract specifications. Schedule cut-off dates must be consistent with financial system monthly cut-off dates. At a minimum, the following information will be provided:

- Start dates, actual or expected finish dates, remaining durations, percent completes, progress updates, resource usage updates, and a narrative of status updates. The contractor/supplier may also request the addition or deletion of activities or logic changes.
- The larger contracts will also provide an electronic copy of the construction schedule.

5.2.2 Review Updates to Schedule

The assigned Construction Scheduler will review the schedule information to ensure that the submission is complete and resolves any issues before proceeding.

5.2.3 Conduct Schedule Analysis

The PM/LE and the Lead Scheduler will analyze the schedule updates, focusing on schedule impacts to the Master Program Schedule milestone dates, logic errors, and any activity changes, such as additions or deletions. At a minimum, this analysis will include the following:

- Verify that updated schedule meets established requirements.
- Identify and correct logic errors/open ends.
- Identify unauthorized changes (coordinate with Change Management process).
- Identify and correct duration and progress errors.
- Compare schedule update to project risk analysis from Risk and Contingency Management Plan and identify potential issues.

5.2.4 Schedule Issues

The PM/LE and Lead Scheduler determine if there are technical issues or issues regarding schedule impacts and whether or not the issues can be resolved or if change management is needed. The issues may be technical such as open ended logic, out of sequence activities, illogical durations, constraints without explanation, etc. They may also be work-related issues, such as delays or additional resource needs. The PM/LE and Lead Scheduler will discuss any issues with the contractor/supplier to clarify and resolve them. The contractor/supplier will make adjustments to the monthly updates as a result of issue resolution, document the changes, and resubmit the schedule update.

5.2.5 Risk Assessment / Change Management

If it is determined after discussions with the contractor/supplier that an issue is not resolved, risk assessment will be performed utilizing the Risk and Contingency Management Plan. If, as a result of the risk assessment, a change is required, it will be addressed through the formal change process – refer to Configuration and Change Management Plan.

5.3 Contractor/Supplier Schedule Monitoring

The Construction Scheduler is the liaison between the contractor/supplier and the PM/LE and Lead Scheduler. The Construction Scheduler will attend daily/weekly contractor/supplier scheduling meetings, monitor the progress of work, and provide daily/weekly updates.

5.4 Contractor/Supplier Reporting Requirements

The contractor/supplier will provide reports as specified in the contract specifications.

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6. Master Program Schedule Maintenance

6.1 Scope

This procedure provides a standard methodology for the monthly update of the Master Program Schedule, which incorporates schedule updates of contractors/service providers.

6.1.1 Monthly Schedule Updates

The Master Program Schedule updates are required, at a minimum, every month, at the assigned cut-off date. The schedule cut-off date (data date) will coincide with the financial system monthly cut-off date.

6.1.2 Project Manager / Lead Engineer Schedule Updates

The Lead Scheduler will issue a notice to each PM or Lead, advising them to update activities for which they are responsible with actual dates, physical progress, remaining duration, and any activity changes. Status includes, but is not limited to, start dates, actual or expected finish dates, revised or remaining durations, percent completes, progress updates, and a narrative of the status updates. The PM or Lead may also request the addition or deletion of schedule activities or logic changes. The schedule status is submitted to the Lead Scheduler by a predetermined date. The PM or Lead will produce a schedule update report that documents the requested changes and updates. The Lead Scheduler reviews schedule information submitted by the PM or Lead to ensure that each submission is complete and resolves any issues before proceeding.

6.1.3 Contractor/Supplier Schedule Updates

The contractor/supplier will adhere to the same monthly cut-off dates when providing the current schedule status. See Section 5-2.

6.1.4 Schedule Analysis

Once the Lead Scheduler has received updates from all responsible parties and all scheduling issues have been resolved, the Master Program Schedule is updated using the information provided. The Lead Scheduler conducts a schedule analysis with the focus on schedule impacts to the scheduled milestone dates and to the critical path, and any logic errors as a result of activity changes, such as additions and deletions. At a minimum, this analysis shall include the following:

- Verify that the updated schedule meets established requirements.
- Identify and correct logic errors/open ends.
- Identify unauthorized changes (initiate Change Management process, if needed).

- Identify and correct duration and progress errors.
- Advance schedule calendar to reflect the new cut-off (or data) date.
- Compare schedule update to the baseline schedule and note variances, such as different start/finish dates or changes in duration, and identify potential issues.
 - If there are potential issues, the Lead Scheduler will work with the PM/Lead to determine if schedule issues can be resolved. If so, adjustments are made to the schedule as a result of the issue resolution discussion and documented.

6.1.5 Earned Value Management

Earned value management (EVM) is a project management technique for measuring project performance and progress in an objective manner. Earned Value Management has the ability to combine measurements of scope, schedule, and cost to provide accurate forecasts of project performance problems, which is an important contribution for project management. The project scheduling software, Primavera P6, excels at this performance and progress-measuring methodology.

Early EVM use shows that areas of planning and control are significantly impacted by its use; and similarly, using the methodology improves both scope definition as well as the analysis of overall project performance. More recent research studies have shown that the principles of EVM are positive predictors of project success.

Monitoring project performance involves determining whether one is on, ahead of, or behind schedule and on, under, or over budget. Just comparing the actual expenditures with the budget cannot provide this assessment – which is where EVM comes in.

Introduction to EVM

Essential features of any EVM implementation include:

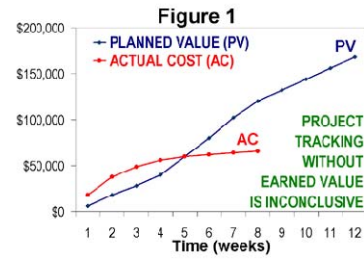
- A project schedule that identifies work to be accomplished,
- The estimate, or valuation, of planned work activities, called Planned Value (PV), and
- Pre-defined earning rules, or metrics, to quantify work accomplished, called Earned Value (EV). Simple earned value rules are explained later in this section.

EVM also includes other important measures such as indicators and forecasts of cost performance (over budget or under budget) and schedule performance (behind schedule or ahead of schedule).

Project Tracking without EVM

Because Earned Value Management is so important to the success of a project, it is important that a simple explanation be given to fully understand the benefits of using this performance measure.

It is helpful to see an example of project tracking that does not include earned value performance management. Consider a project that has been planned in detail, including a time-phased spending plan for all elements of work. Figure 1 shows the cumulative budget (cost) for this project as a function of time (blue line - PV). It also shows the cumulative actual cost of the project (red line - AC) through Week 8. To those unfamiliar with EVM, it might appear that this project was over budget through week 4 and then under budget from week 6 through week 8. However, what is missing from this chart is any understanding of how much work has been accomplished during the project. If the project were actually completed at week 8, then the project would actually be well under budget and well ahead of schedule. If, on the other hand, the project is only 10% complete at week 8, the project is significantly over budget and behind schedule. A method is needed to measure technical performance objectively and quantitatively, and that is what EVM accomplishes.



Project Tracking with EVM

Consider the same project, except this time the project plan includes pre-defined methods of quantifying the accomplishment of work. At the end of each week, the project manager identifies every detailed element of work that has been completed, and sums the PV for each of these completed elements. Earned value may be accumulated monthly, week, or as progress is made.

$$\text{Earned Value (EV)} = \text{Actual \% Complete} \times \text{Planned Value}$$

Earned Value (EV)

Figure 2 shows the EV curve (green line - EV) along with the PV curve from Figure 1. The chart indicates that technical performance (i.e., progress) started more rapidly than planned, but slowed significantly and fell behind schedule at week 7 and 8. This chart illustrates the schedule performance of EVM. It is complementary to critical path management.

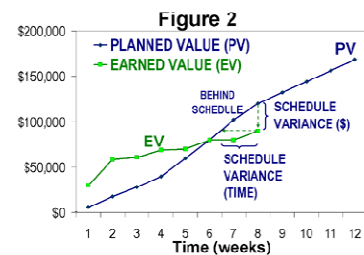


Figure 3 shows the same EV curve (green line - EV) with the actual cost data from Figure 1 (red line - AC). It can be seen that the project was actually under budget, relative to the amount of work accomplished, since the start of the project. This is a much better conclusion than might be derived from Figure 1.

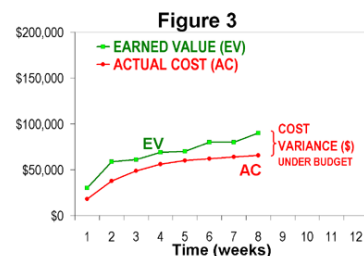
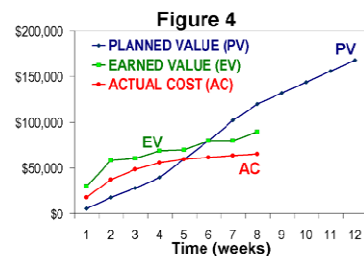


Figure 4 shows all three curves together, which is a typical EVM line chart. The best way to read these 3-line charts is to identify the EV curve first, then compare it to PV (for schedule performance) and AC (for cost performance). It can be seen from this illustration that a true understanding of cost and schedule performance relies first on measuring progress objectively. This is the fundamental principle of EVM.



Schedule Performance Measures

Using EV to measure schedule performance can be simplified – execute the project according to the plan (schedule) and measure the progress. Although it is common practice to use budgeted dollars as the scale for Planned Value (PV) and Earned Value (EV), the following EVM formulas are for schedule management and do not require accumulation of Actual Cost (AC).

- Schedule Variance (SV) – the difference between where we planned to be in the schedule and where we are in the schedule. See Figure 2.

$$SV = EV - PV \quad SV \text{ greater than } 0 \text{ is good (ahead of schedule).}$$

- Schedule Performance Index (SPI) – the rate which the project performance is meeting schedule expectations at a given point in time.

$$SPI = EV / PV \quad SPI > 1 \quad \text{Ahead of Schedule}$$

$$SPI = 1 \quad \text{On Schedule}$$

$$SPI < 1 \quad \text{Behind Schedule}$$

Cost Performance Measures

In addition to measuring schedule performance, it is equally important for cost performance to be monitored and reviewed at regular intervals. The Master Program Schedule will be updated once a month with actual costs and percent complete information, allowing EV performance measures to be successfully utilized.

- Cost Variance (CV) – the difference between what we expected to spend and what was actually spent. See Figure 3.

$$CV = EV - AC \quad CV \text{ greater than } 0 \text{ is good (under budget)}$$

- Cost Performance Index (CPI) – the rate which the project performance is meeting cost expectations during a given point in time.

$$CPI = EV / AC \quad CPI > 1 \quad \text{Under Budget}$$

$$CPI = 1 \quad \text{On Budget}$$

$$CPI < 1 \quad \text{Over Budget}$$

Final Assessment of Schedule and Cost Performance

The final step when assessing work activity (task) performance to date is to update what the total cost will be upon work activity completion. Specifically, the following needs to be determined:

- Estimate at Completion (EAC): The estimate (or projection) of the total cost of the work activity (task). Assume that the cost performance for the remainder of the task will be the same as what it has been for the work done to date.

$$EAC = \text{Budget at Completion (BAC)} / \text{Cumulative cost performance index (CPI)}$$

- Budget at Completion (BAC): The total planned value of the work at the end of the project.
- Estimate to Complete (ETC): The estimate of the cost required to complete remaining work on the work activity (task).

$$\text{ETC} = \text{Budget at Completion (BAC)} - \text{Actual costs to date (AC)}.$$

These traditional definitions of EVM typically assume that project accounting and project network schedule management are prerequisites to achieving any benefit from EVM.

6.1.6 Risk Assessment

During the monthly update process, the Lead Scheduler monitors and analyzes the schedule. Any changes or variances that could potentially affect risk would be identified at this time, which may trigger a risk assessment. Once the project is under way, however, any variances as a result of the monthly schedule updates probably have more to do with monitoring and control of work activities rather than with repeatedly running risk assessment models.

6.1.7 Change Management

Determine if change management is required as a result of schedule updates. If so, then perform the risk assessment and initiate the schedule change according to Configuration and Change Management Plan, as appropriate.

6.1.8 Approved Monthly Schedule Update

- The Lead Scheduler produces a draft of the monthly schedule update for review by the Project Controls Manager. Any changes are incorporated and documented as a result of the review.
- The Project Controls Manager will approve the monthly update of the Master Program Schedule, and the updated schedule is issued. See Section 9.2.2, Schedule Reports.

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7. Schedule Monitoring

7.1 Master Program Schedule

Throughout the duration of the project, the program schedule is constantly being monitored for any changes – weather delays or differing site conditions, permitting or right-of-way issues, extended lead times on procurement items, delay in funding, etc. – that may have an impact on the completion date of the project. The Lead Scheduler, along with the designated Lead, takes a proactive role in recognizing changes and reports any concerns to the Project Delivery Team on a regular basis. Conversely, the Project Delivery Team will report any significant changes to the Lead Scheduler in an expeditious manner so a schedule-impact determination can be made quickly.

7.2 Contractor/Supplier Schedule Monitoring

See Section 5.3.

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8. Schedule Revisions

8.1 Master Program Schedule – Change Management

Refer to Configuration and Change Management Plan.

8.2 Contractor/Supplier Schedule – Management and Revisions

See Section 5.2.5.

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9. Schedule Reporting Requirements

The Lead Scheduler has the primary responsibility for coordinating and preparing monthly Master Program Schedule status information with input from each Project Manager / Lead Engineer responsible for design and construction activities. The Lead Scheduler and assigned Budget/Cost Analyst prepare and distribute monthly schedule reports that show project status, schedule conflicts (if any), changes, and delays. This information is included in the CRC monthly and quarterly reports. As the need arises, the Lead Scheduler will produce special schedule analyses to address specific project needs.

This section provides guidance and examples of schedule-related subject matter to be addressed in monthly progress reports.

9.1 Master Summary Schedule Report

The Lead Scheduler is responsible for the development and maintenance of the Master Program Schedule. The Master Summary Schedule Report is the first and highest reporting level, a level of effort schedule overview of the program and includes key milestones. The Master Summary Schedule Report is for use by the Executive Management Team, the CRC Director, Deputy Director, and executive-level management of external agencies (WSDOT, ODOT, FTA, local transit agencies), and at public meetings.

9.2 Master Program Schedule Reports

9.2.1 Monthly Progress Report

Once the Master Program Schedule has been updated several schedule reports will be issued. One requirement is the preparation and submission of a written monthly progress report (a sample report is included as Figure 9–1). The following items should be addressed in each monthly progress report.

Overall Project Agreement Status

- Scope
 - Confirmation that project scope has not changed, or
 - Identification of actual or potential scope changes along with the estimated impact to the project scope, schedule, and budget.
 - Reasons for changes and options for mitigating the impacts of changes.
- Schedule
 - Confirmation that project schedule has not changed, or

- Identification of actual or potential schedule changes along with the estimated impact to the project scope, schedule, and budget.
- Reasons for changes and options for mitigating the impacts of changes.
- Budget

The following items are the minimum budget reporting requirements. The budget reporting is fully defined in the CRC Project Management Plan, Appendix B, Cost Control Plan.

- Comparison of actual costs to planned budget by Control Account along with an explanation of any cost variances.
- Inclusion of an up-to-date Estimate at Completion (EAC) and variance analysis if EAC differs from the approved project budget.
- Identification of actual or potential budget changes along with the estimated impact to the project scope, schedule, and budget.
- Reasons for changes and options for mitigating the impacts of changes.

Accomplishments for Month

- Key accomplishments or deliverables achieved during the month in relationship to the current agreement (original and approved modifications).
- Progress made toward satisfying other agreement requirements.

Upcoming Activities for Next Month

- Key activities planned or deliverables anticipated to be completed during the upcoming month.
- Potential issues that may affect the project's ability to meet the current agreement scope, schedule, and budget.

Schedule

- Identify each milestone / deliverable with the original completion date and current completion date.
- Confirm that current Master Program Schedule has not changed; identify actual or potential schedule changes along with the estimated impact to the scope, schedule, or budget. Include reasons for changes and options for mitigating the impact of changes.

Budget

At a minimum, the following information will be provided from EcoSys EPC, the project cost reporting system:

Control Account	Original Budget	Approved Changes	Current Budget	Actuals to Date	Estimate to Complete (ETC)	Estimate at Completion (EAC)	Variance
CA 1							
CA 2							
CA 3							
Total							
<i>Comparison of planned budget and actual costs by control account along with an explanation of any budget variances. Provide an up to date Estimate at Completion (EAC) and variance analysis if EAC differs from current budget. Identify actual or potential budget changes along with the estimated impact to the current approved scope, schedule, or budget. Include reasons for changes and options for mitigating the impacts of changes.</i>							

For guidelines, refer to the CRC Project Management Plan, Appendix B, Cost Control Plan.

Potential Changes

- Identify potential changes to the project agreement scope, schedule, or budget. Significant issues should also be brought to the attention of the Program Director(s) as soon as identified.
- Status of project agreement Change Management (approved and potential).

Risk Update

- Identify new project agreement risks and update previously identified risks from the Risk and Contingency Management Plan, including suggested risk mitigation/management strategies.
- Evaluation of ongoing risk strategies (successes/failures, if project risks have occurred, is the strategy working?).

Issues, Concerns, or Pending Decisions/Actions






- Identify new issues and/or concerns that may potentially impact the project agreement scope, schedule, and budget that have not been previously addressed.
- Evaluate the impact to the project agreement and identify strategies taken/planned to mitigate the impacts.
- Continuously update previously identified issues until resolved.

9.2.2 Schedule Reports

In addition to the monthly written progress report, the following CRC schedule reports are issued once the monthly Master Program Schedule update has been approved:

Stop Light Report – CRC Project Milestones

The Stop Light Report identifies the Federal Approval and Permits (Dashboard) Milestones as well as the CRC Project Milestones. See Figure 9–2. The start/finish date for the current reporting period is compared to the previous reporting period. Any change in the days is identified by the following stoplight colors:

-  Green – Change less than 5 days. Does not impact the Critical Path due to built in Contingency. Finish dates still met.
-  Yellow – Change between 5 to 20 Days: Does not impact the Critical Path due to built in Contingency. Finish dates still met.
-  Purple – Change greater than 20 Days: Does not impact the Critical Path due to built in Contingency. Finish dates still met.
-  Red – Change greater than 20 Days: Impacts the Critical Path. Finish date is pushed out.
-  Green with Red Text – Change greater than 20 Days, but revisions reflect updated logic/timing of the activities start.

Full Project Schedule Predecessors and Successors

The Predecessors and Successors Report identifies each schedule activity and the relationship or dependency of each activity with other activities preceding and following the work. See Figure 9–3.

- Schedule activity ID
- Schedule activity description
- Schedule activity start and finish dates
- Schedule activity predecessor/successor – dependencies with other schedule activities

Full Project Schedule Gantt Chart

Regarded as a common charting technique, the Full Project Schedule Gantt Chart is a type of bar chart that illustrates the project schedule, with start and finish dates of each schedule activity. The bar chart can also be rolled up to summary level activities. Some Gantt charts also show the logic (or dependency) between activities. The bars reflect current schedule status using percent-complete shadings and a vertical data date (“TODAY”) line. See Figure 9–4.

Figure 9.1

Sample Monthly Progress Report

Project:

WIN: **PIN:** **Work Order:**

Scope of Work:

Accomplishments for Month	<ol style="list-style-type: none"> 1. Describe key accomplishments or deliverables completed for the reporting period in relationship to the current scope (original and approved modifications). 2. 3.
----------------------------------	--

Upcoming Activities for Next Month	<ol style="list-style-type: none"> 1. Describe key activities planned or deliverables anticipated to be completed during the upcoming month. 2. 3.
---	---

Schedule	Milestone/Deliverable	Original Completion	Current Completion
	<i>Deliverable 1</i>	<i>Date</i>	<i>Date</i>
	<i>Deliverable 2</i>	<i>Date</i>	<i>Date</i>
	<i>Deliverable 3</i>	<i>Date</i>	<i>Date</i>
	<i>Deliverable 4</i>	<i>Date</i>	<i>Date</i>
	<ol style="list-style-type: none"> 1. Confirm that current Master Program Schedule has not changed; identify actual or potential schedule changes along with the estimated impact to the scope, schedule, or budget. Include reasons for changes and options for mitigating the impact of changes. 		

Budget (to be included in EcoSys EPC Monthly Report)							
Control Account	Original Budget	Approved Changes	Current Budget	Actuals to Date	Estimate to Complete (ETC)	Estimate at Completion (EAC)	Variance
CA 1							
CA 2							
CA 3							
Total							

Figure 9.1

	<p><i>Comparison of planned budget and actual costs by control account along with an explanation of any budget variances. Provide an up to date Estimate at Completion (EAC) and variance analysis if EAC differs from current budget. Identify actual or potential budget changes along with the estimated impact to the current approved scope, schedule, or budget. Include reasons for changes and options for mitigating the impacts of changes.</i></p>
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<p>Potential Changes</p>	<ol style="list-style-type: none"> 1. <i>Identify potential changes to current scope, schedule or budget. Significant issues should also be brought to the attention of the Program Management Team as soon as identified. Also, discuss status of current change orders (approved and potential).</i> 2. 3.
---------------------------------	---

<p>Risk Update</p>	<ol style="list-style-type: none"> 1. <i>Identify new agreement risks or updates to previously identified risks from the Risk and Contingency Management Plan, including suggested risk mitigation/management strategies.</i> 2. 3.
---------------------------	--

<p>Issues, Concerns or Pending Decisions/Actions</p>	<ol style="list-style-type: none"> 1. <i>Identify new issues and/or concerns that may potentially impact the current scope, schedule, and budget that have not been previously addressed. Evaluate the impact to the current agreement and identify strategies taken/planned to mitigate the impacts. Continuously update previously identified issues until resolved.</i> 2. 3.
---	---

Prepared by:

Date:

COLUMBIA RIVER CROSSING PROJECT MILESTONES

(As of February 28, 2013)

Activity ID	Activity Name	February Start	February Finish	January Start	January Finish	Change (Days)	Total Float	Reason for Change
Federal Approvals and Permits (Dashboard) Milestones								
PR0106	RC Section 404 - Revise and Submit Application		11-30-12 A		11-30-12 A	0		
PR0170	RC General Bridge Permit - Submittal		1-30-13 A		1-30-13 A	0		
PR0210	RC FAA 7460 - Preparation - Submittal		7/31/2013		7/31/2013	0	396d	
AG3450	Tolling Expression of Interest		7/1/2013		7/1/2013	0	362d	
AG3470	Project Management Plan		7/1/2013		7/1/2013	0	362d	
PR0200	RC General Bridge Permit - Approval		9/30/2013		9/30/2013	0	241d	
PR4680	RC Prepare and Submit 100% Section 408		11/19/2013		11/19/2013	0	86d	
PR0500	RC Form 7460 Hazard Determination		10/31/2013		10/31/2013	0	275d	
PR0270	MC General Bridge Permit - Revise & Submit Application		12/20/2013		12/20/2013	0	396d	
AG3460	Initial Finance Plan		12/31/2013		12/31/2013	0	234d	
AG3480	TIFIA Master Credit Agreement Letter of Interest		12/31/2013		12/31/2013	0	234d	
PR4530	RC HQ Corps of Engineers Rivers and Harbors Act Section 408 Approval		7/30/2014		7/30/2014	0	124d	
PR0300	MC General Bridge- Final HQ Action and Final Approval		12/21/2014		12/21/2014	0	396d	
PR4760	MC Prepare and Submit 100% Section 408		12/10/2014		12/10/2014	0	79d	
PR4540	MC HQ Corps of Engineers Rivers and Harbors Act Section 408 Approval		8/31/2015		8/31/2015	0	113d	
CRC Project Milestones								
EN4809	Publish FEIS in Federal Register	9-23-11 A		9-23-11 A		0		
EN1800	Record of Decision Signed		12-7-11 A		12-7-11 A	0		
RE1628	RC ROW Certification In Water	4/25/2013	5/1/2013	4/25/2013	5/1/2013	0	94d	
HF0655	Subsurface Utility Engineering Complete		5/24/2013		5/24/2013	0	77d	
HF0275	RC- Prepare/ SR14/ Hayden Island Design Build: Issue Final Request for Proposals		9/4/2013		9/4/2013	0	7d	
WI1000	RC- SR14/ Hayden Island Design Build: Select Design Builder		5/29/2014		5/29/2014	0	0d	
TR5600	Receive Full Funding Grant Agreement		5/29/2014		5/29/2014	0	0d	
A99	River Crossing Construction Start	12/2/2014		12/2/2014		0	0d	
A83	Mainland Connector Construction Start	12/18/2015		12/18/2015		0	42d	
A2835	DB Park & Ride Final Design/Construction Start	12/28/2015		12/28/2015		0	263d	
OT2805	Oregon Transit Contract Award - Transit Oregon	3/21/2016		3/21/2016		0	83d	
WT2765	Washington Transit Contract Award	5/17/2016		5/17/2016		0	40d	
A97	Mainland Connector Construction Complete		1/15/2018		1/15/2018	0	42d	
A2845	Park and Ride Construction Complete		2/5/2018		2/5/2018	0	320d	
WI1240	RC South Bound River Crossing Bridge Available for Transit Systems		5/15/2018		5/15/2018	0	0d	
OT2825	Oregon Transit Construction Complete		8/13/2018		8/13/2018	0	130d	
WT2845	Washington Transit Construction Complete		8/24/2018		8/24/2018	0	121d	
WI1200	Transit Begin Revenue Service -Transit Central Control		9-5-19*		9-5-19*	0	0d	
DM1250	I-5 Bridge Removal	4/2/2020	10/21/2021	4/2/2020	10/21/2021	0	0d	
A181	RC Complete Open to Traffic		1/14/2021		1/14/2021	0	0d	

Change Less than 5 Days: Does not impact the Critical Path(s) due to built in Contingency. Finish Dates Still Met.

Change Between 5 to 20 Days: Does not impact the Critical Path(s) due to built in Contingency. Finish Dates Still Met.

Change Greater than 20 Days: Does not impact the Critical Path(s) due to built in Contingency. Finish Dates Still Met.

Change Greater than 20 Days: Impacts the Critical Path(s). Finish Date is pushed out.

Green with Red text: Change is greater than 20 days, but revisions reflect updated logic/timing of the activities start.

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Activity ID	Activity Name	Start	Finish	Original Duration	Predecessors	Successors
CRC FEB 28 2013 SCHEDULE FINAL						
CRC PROJECT WIDE DELIVERABLES ICP						
CRC DELIVERABLES						
CRC ENVIRONMENTAL						
Section 106 - Cultural Resources						
S106 Mitigation						
EN1150	Treatment Plan & Inadvertent Discovery Plan (Completes at 30% Design by De...	12-8-11 A	3-8-13	360d	EN1800	A99, A3010
EN1140	Interpretive and Other Mitigation	1-20-12 A	10-29-13	497d	EN1800	A99
EN1130	Vibration and Settle Plan	7-31-13	8-3-13	4d	EN1800, DB111, DB247	HF0275
CRC AGREEMENTS						
AGREEMENTS						
8.1.1 COV/Transit Operations and Maintenance Agreement						
Agreement COV/Transit Operations and Maintenance						
AG15800	Draft COV C-Transit LRT O&M Agreement	2-28-13	3-13-13	10d	PM1015	AG15810
AG15810	Internal Review COV C-Transit LRT O&M Agreement	3-14-13	4-10-13	20d	AG15800	AG15900
AG15800	Agency Review COV C-Transit LRT O&M Agreement	4-11-13	6-6-13	40d	AG15810	AG15910
AG15910	Internal Review COV C-Transit LRT O&M Agreement	6-7-13	7-5-13	20d	AG15900	AG15940
AG15940	HQ Review COV C-Transit LRT O&M Agreement	7-8-13	7-19-13	10d	AG15910	AG15920
AG15920	Legal/AG Review COV C-Transit LRT O&M Agreement	7-22-13	8-2-13	10d	AG15940	AG15970
AG15970	FTA Review COV C-Transit LRT O&M Agreement	8-5-13	8-30-13	20d	AG15920	AG15930
AG15930	Sign/Execute COV C-Transit LRT O&M Agreement	9-3-13	9-16-13	10d	AG15970	TR5300
8.1.2 OR/Transit Operations and Maintenance Agreement						
Agreement OR/Transit Operations and Maintenance						
AG15820	Draft OR/Transit Operations and Maintenance Agreement	2-28-13	3-13-13	10d	PM1015	AG15830
AG15830	Internal Review OR/Transit Operations and Maintenance Agreement	3-14-13	4-10-13	20d	AG15820	AG15950
AG15950	Agency Review OR/Transit Operations and Maintenance Agreement	4-11-13	6-6-13	40d	AG15830	AG15960
AG15960	Internal Review OR/Transit Operations and Maintenance Agreement	6-7-13	7-5-13	20d	AG15950	AG16140
AG16140	HQ Review COV OR/Transit Operations and Maintenance Agreement	7-8-13	7-19-13	10d	AG15960	AG15980
AG15980	Legal/AG Review OR/Transit Operations and Maintenance Agreement	7-22-13	8-2-13	10d	AG16140	AG16150
AG16150	FTA Review OR/Transit Operations and Maintenance Agreement	8-5-13	8-30-13	20d	AG15990	AG16000
AG16000	Sign/Execute OR/Transit Operations and Maintenance Agreement	9-3-13	9-16-13	10d	AG16150	TR5300
8.1.3 WA/Transit Operations and Maintenance Agreement						
Agreement WA/Transit Operations and Maintenance						
AG15840	Draft WA/Transit Operations and Maintenance Agreement	2-28-13	3-13-13	10d	PM1015	AG15850
AG15850	Internal Review WA/Transit Operations and Maintenance Agreement	3-14-13	4-10-13	20d	AG15840	AG16160
AG16160	Agency Review WA/Transit Operations and Maintenance Agreement	4-11-13	6-6-13	40d	AG15850	AG16170
AG16170	Internal Review WA/Transit Operations and Maintenance Agreement	6-7-13	7-5-13	20d	AG16160	AG16200
AG16200	HQ Review WA/Transit Operations and Maintenance Agreement	7-8-13	7-19-13	10d	AG16170	AG16180
AG16180	Legal/AG Review WA/Transit Operations and Maintenance Agreement	7-22-13	8-2-13	10d	AG16200	AG16210
AG16210	FTA Review WA/Transit Operations and Maintenance Agreement	8-5-13	8-30-13	20d	AG16180	AG16190
AG16190	Sign/Execute WA/Transit Operations and Maintenance Agreement	9-3-13	9-16-13	10d	AG16210	TR5300
8.1.4 ODOT/MCDD LRT Coordination Agreement						
Agreement ODOT/MCDD LRT Coordination						
AG15860	Draft ODOT/MCDD Coordination Agreement	2-28-13	3-13-13	10d	PM1015	AG15870
AG15870	Internal Review ODOT/MCDD Coordination Agreement	3-14-13	4-10-13	20d	AG15860	AG16240
AG16240	Agency Review ODOT/MCDD Coordination Agreement	4-11-13	6-6-13	40d	AG15870	AG16250
AG16250	Internal Review ODOT/MCDD Coordination Agreement	6-7-13	7-5-13	20d	AG16240	AG16280
AG16280	HQ Review ODOT/MCDD Coordination Agreement	7-8-13	7-19-13	10d	AG16250	AG16260
AG16260	Legal/AG Review ODOT/MCDD Coordination Agreement	7-22-13	8-2-13	10d	AG16280	AG16290
AG16290	FTA Review ODOT/MCDD Coordination Agreement	8-5-13	8-30-13	20d	AG16260	AG16270
AG16270	Sign/Execute ODOT/MCDD Coordination Agreement	9-3-13	9-16-13	10d	AG16290	TR5300
8.1.5 ODOT/WSDOT State Safety Oversight Agreement						
Agreement ODOT/WSDOT State Safety Oversight						
AG15880	Draft ODOT/WSDOT State Safety Oversight Agreement	2-28-13	3-13-13	10d	PM1015	AG15890
AG15890	Internal Review ODOT/WSDOT State Safety Oversight Agreement	3-14-13	4-10-13	20d	AG15880	AG16300
AG16300	Agency Review ODOT/WSDOT State Safety Oversight Agreement	4-11-13	6-6-13	40d	AG15890	AG16310
AG16310	Internal Review ODOT/WSDOT State Safety Oversight Agreement	6-7-13	7-5-13	20d	AG16300	AG16340
AG16340	HQ Review ODOT/WSDOT State Safety Oversight Agreement	7-8-13	7-19-13	10d	AG16310	AG16320
AG16320	Legal/AG Review ODOT/WSDOT State Safety Oversight Agreement	7-22-13	8-2-13	10d	AG16340	AG16350
AG16350	FTA Review ODOT/WSDOT State Safety Oversight Agreement	8-5-13	8-30-13	20d	AG16320	AG16330
AG16330	Sign/Execute ODOT/WSDOT State Safety Oversight Agreement	9-3-13	9-16-13	10d	AG16350	TR5300
8.1.6 WSDOT BNSF Construction and Maintenance Agreement						
Agreement WSDOT BNSF Construction and Maintenance						
AG16360	Draft WSDOT BNSF Construction and Maintenance Agreement	2-28-13	3-13-13	10d	PM1015	AG16370
AG16370	Internal Review WSDOT BNSF Construction and Maintenance Agreement	3-14-13	4-10-13	20d	AG16360	AG16380
AG16380	Agency Review WSDOT BNSF Construction and Maintenance Agreement	4-11-13	6-6-13	40d	AG16370	AG16390
AG16390	Internal Review WSDOT BNSF Construction and Maintenance Agreement	6-7-13	7-5-13	20d	AG16380	AG16420
AG16420	HQ Review WSDOT BNSF Construction and Maintenance Agreement	7-8-13	7-19-13	10d	AG16390	AG16400
AG16400	Legal/AG Review WSDOT BNSF Construction and Maintenance Agreement	7-22-13	8-2-13	10d	AG16420	AG16430
AG16430	FTA Review WSDOT BNSF Construction and Maintenance Agreement	8-5-13	8-30-13	20d	AG16400	AG16410
AG16410	Sign/Execute WSDOT BNSF Construction and Maintenance Agreement	9-3-13	9-16-13	10d	AG16430	TR5300
8.1.7 Bi-State DOT Project Development Agreement						
Agreement Bi-State DOT Project Development Agreement						
AG16520	Draft Bi-State DOT Project Development Agreement	2-28-13	3-13-13	10d	PM1015	AG16530
AG16530	Internal Review Bi-State DOT Project Development Agreement	3-14-13	4-10-13	20d	AG16520	AG16540
AG16540	Agency Review Bi-State DOT Project Development Agreement	4-11-13	6-6-13	40d	AG16530	AG16550
AG16550	Internal Review Bi-State DOT Project Development Agreement	6-7-13	7-5-13	20d	AG16540	AG16580
AG16580	HQ Review Bi-State DOT Project Development Agreement	7-8-13	7-19-13	10d	AG16550	AG16560
AG16560	Legal/AG Review Bi-State DOT Project Development Agreement	7-22-13	8-2-13	10d	AG16580	AG16590
AG16590	FTA Review Bi-State DOT Project Development Agreement	8-5-13	8-30-13	20d	AG16560	AG16570
AG16570	Sign/Execute Bi-State DOT Project Development Agreement	9-3-13	9-16-13	10d	AG16590	TR5300
8.1.8 Bi-State Transit Agreement						
Agreement Bi-State Transit						
AG16600	Draft Bi-State Transit Agreement	2-28-13	3-13-13	10d	PM1015	AG16610
AG16610	Internal Review Bi-State Transit Agreement	3-14-13	4-10-13	20d	AG16600	AG16620
AG16620	Agency Review Bi-State Transit Agreement	4-11-13	6-6-13	40d	AG16610	AG16630
AG16630	Internal Review Bi-State Transit Agreement	6-7-13	7-5-13	20d	AG16620	AG16660
AG16660	HQ Review Bi-State Transit Agreement	7-8-13	7-19-13	10d	AG16630	AG16640
AG16640	Legal/AG Review Bi-State Transit Agreement	7-22-13	8-2-13	10d	AG16660	AG16670
AG16670	FTA Review Bi-State Transit Agreement	8-5-13	8-30-13	20d	AG16640	AG16650
AG16650	Sign/Execute Bi-State Transit Agreement	9-3-13	9-16-13	10d	AG16670	TR5300
8.1.9 COV/WSDOT Water, Sewer and Public Utilities Agreement						
Agreement COV/WSDOT Water, Sewer and Public Utilities						
AG16680	Draft COV/WSDOT Water, Sewer and Public Utilities Agreement	2-28-13	3-13-13	10d	PM1015	AG16690
AG16690	Internal Review COV/WSDOT Water, Sewer and Public Utilities Agreement	3-14-13	4-10-13	20d	AG16680	AG16700
AG16700	Agency Review COV/WSDOT Water, Sewer and Public Utilities Agreement	4-11-13	6-6-13	40d	AG16690	AG16710
AG16710	Internal Review COV/WSDOT Water, Sewer and Public Utilities Agreement	6-7-13	7-5-13	20d	AG16700	AG16740
AG16740	HQ Review COV/WSDOT Water, Sewer and Public Utilities Agreement	7-8-13	7-19-13	10d	AG16710	AG16720
AG16720	Legal/AG Review COV/WSDOT Water, Sewer and Public Utilities Agreement	7-22-13	8-2-13	10d	AG16740	AG16750

RBLD CRC-FEB 2013



CRC PROJECT SCHEDULE: PREDECESSORS AND SUCCESSORS

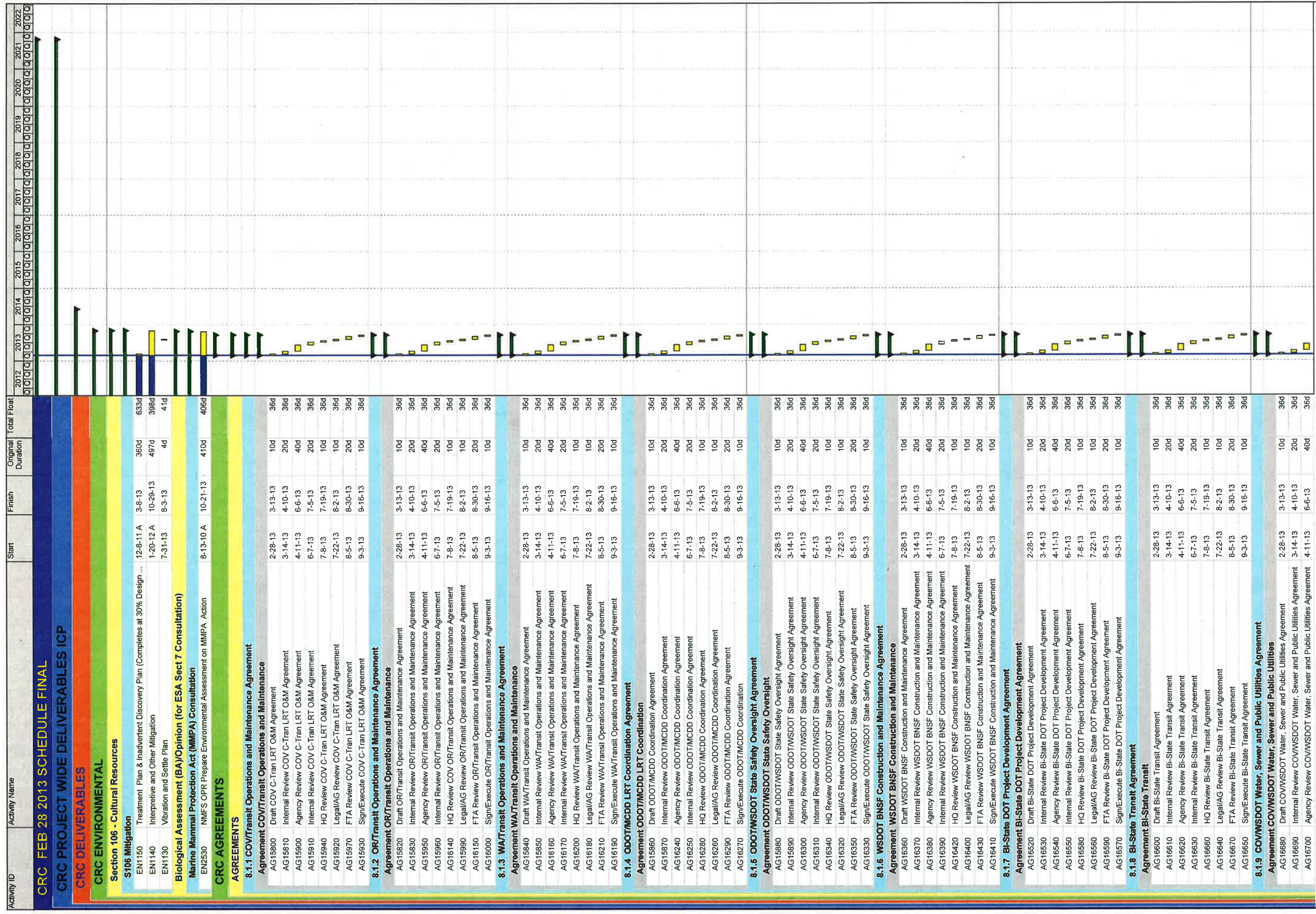
FEBRUARY 28, 2013

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Figure 9.4



RBLD CRC-FEB 2013



CRC PROJECT SCHEDULE: FULL PROJECT SCHEDULE GANTT CHART

FEBRUARY 28, 2013

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Critical and Near Critical Schedule Activities up to 60 Days

This report, in bar chart format, identifies all those schedule activities by criticality -- how many days the activity can be delayed (float) before it impacts the project end date. This particular report is organized by number of days of float, from 0 days of float up to 60 days of float. See Figure 9.5.

Critical Path

The Critical Path bar chart identifies just those schedule activities that, if delayed, will impact the project end date. See Figure 9.6.

CRC Milestones Comparison (2-Month)

The CRC Milestones Comparison Report is basically the Stop Light Report in bar chart format. Like the Stop Light Report, the Federal Approvals and Permits (dashboard) milestones as well as the CRC Milestones are depicted. See Figure 9.7.

60-Day Look Ahead Schedule

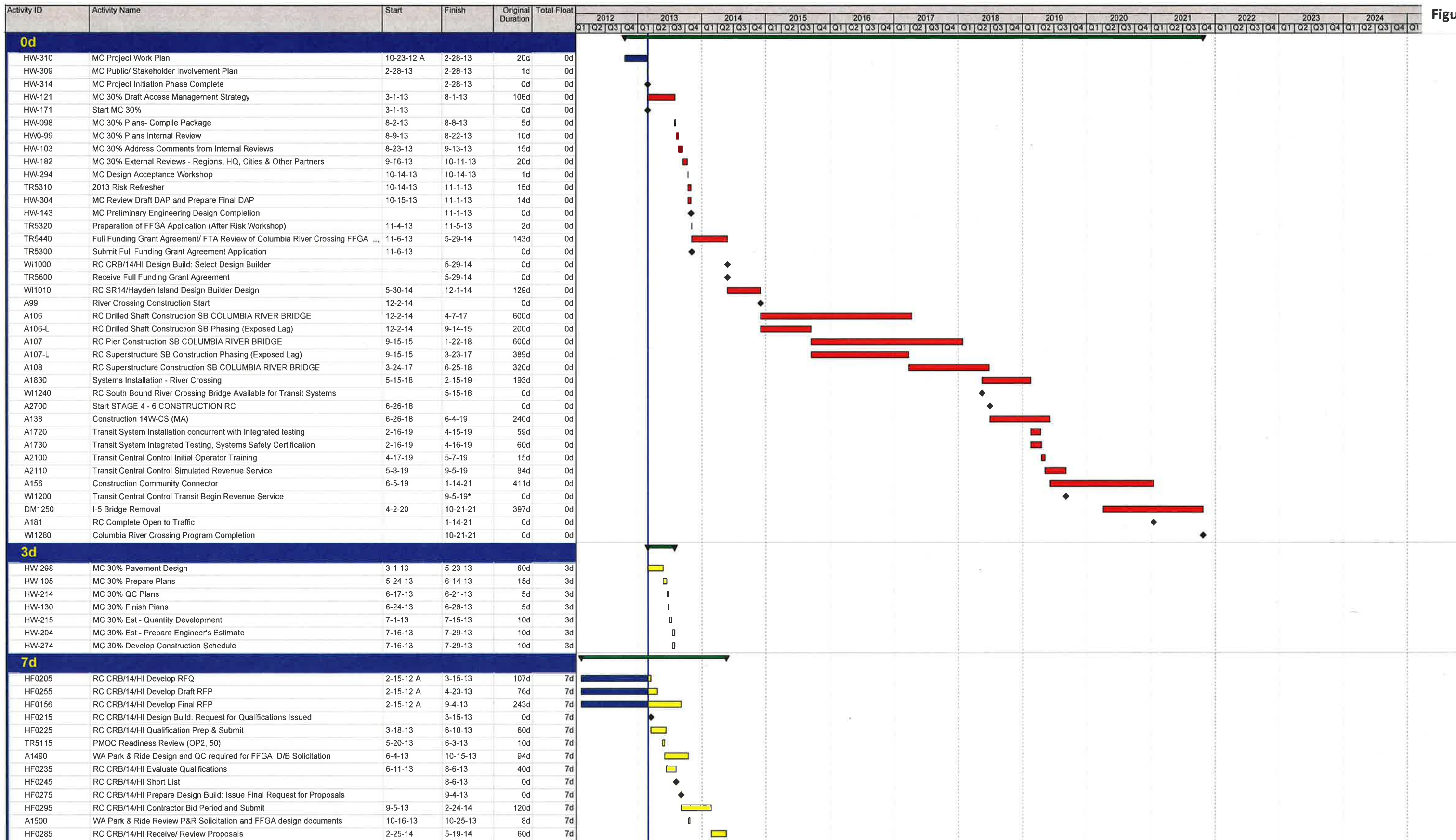
The 60-Day Look Ahead Schedule Report is a snapshot in time, capturing all those schedule activities in a defined 60-day window that are either currently underway or will start and/or finish in that period. See Figure 9.8.

9.3 Contractor/Supplier Reporting Requirements

See Section 5.4.

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Figure 9.5



RBLD CRC-FEB 2013

CRC PROJECT SCHEDULE: CRITICAL AND NEAR CRITICAL UP TO 60 DAYS

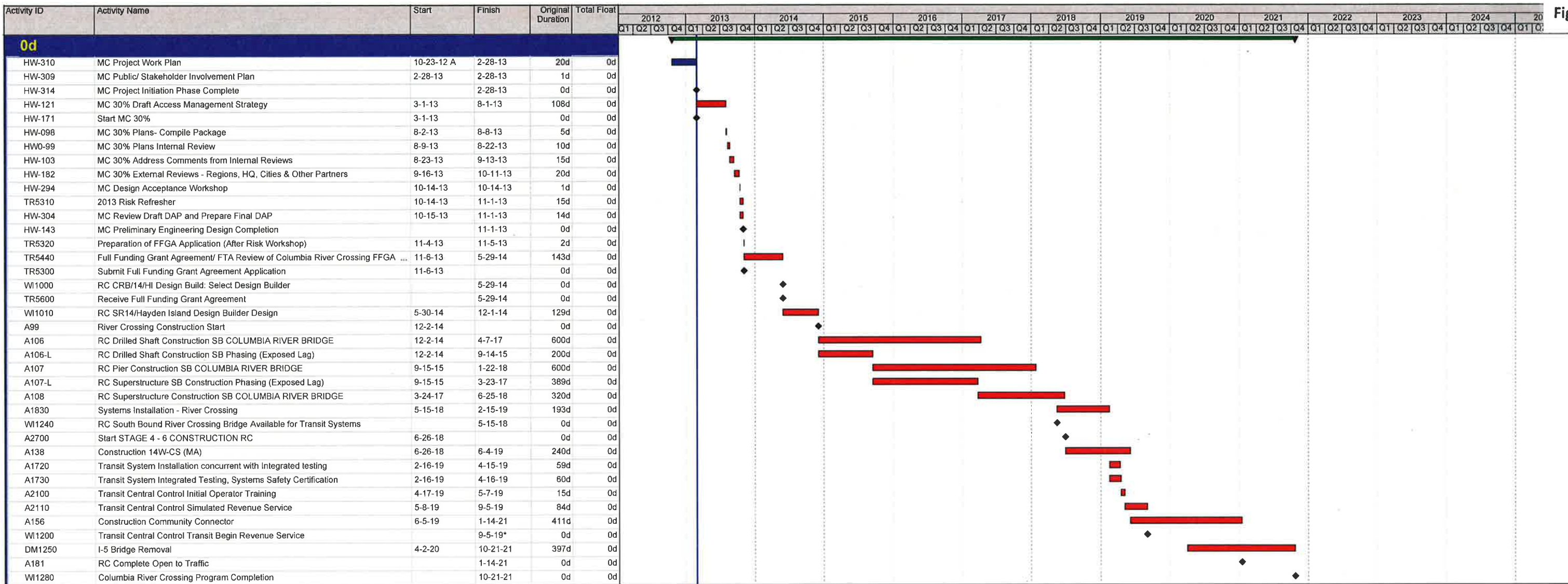
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Figure 9.6



RBLD CRC-FEB 2013

CRC PROJECT SCHEDULE: CRITICAL PATH

FEBRUARY 28, 2013

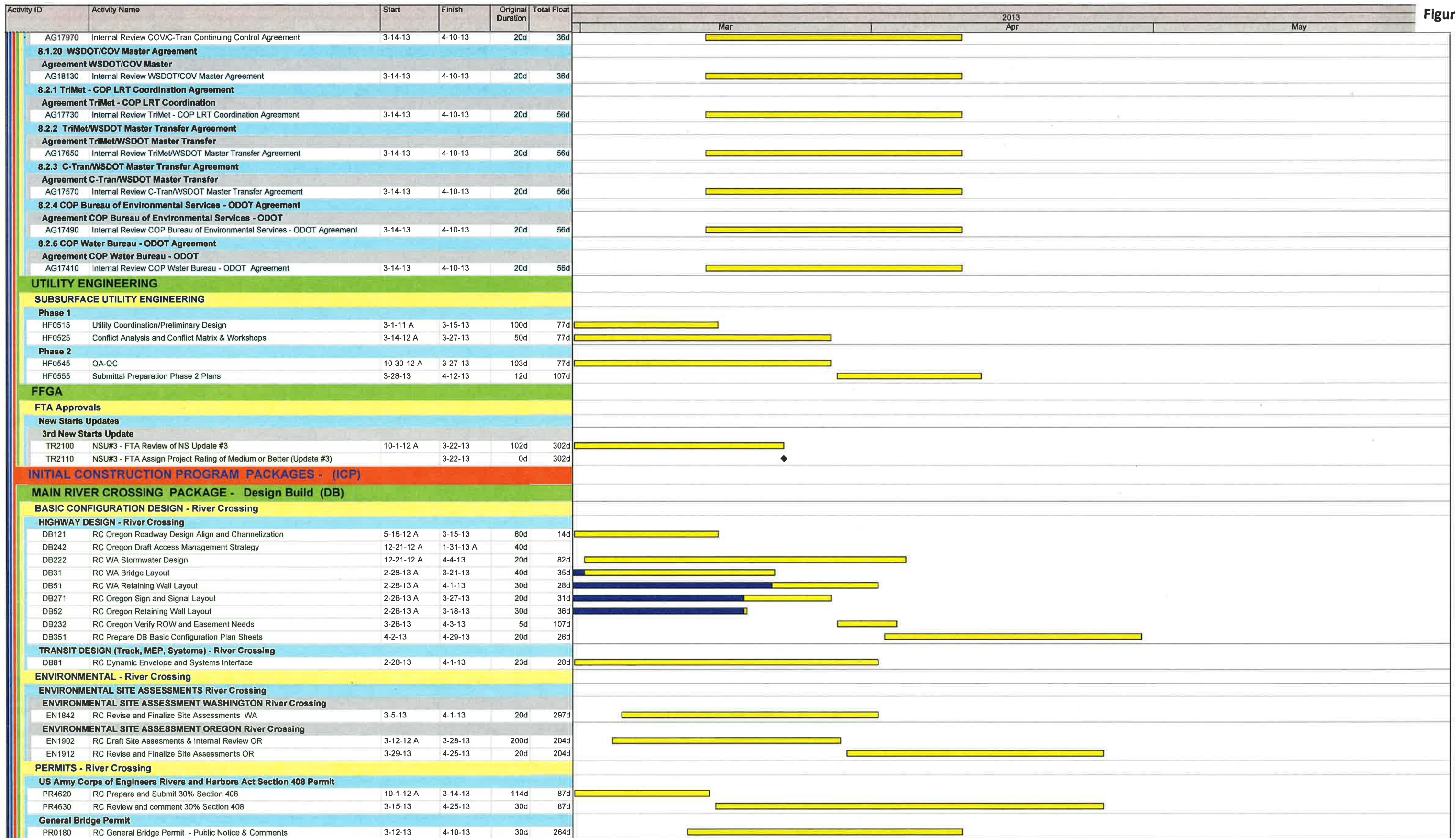
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Figure 9.8



RBLD CRC-FEB 2013

CRC PROJECT SCHEDULE: 60 DAY LOOK AHEAD

FEBRUARY 28, 2013

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10. Interface with CRC Project Reporting Systems

10.1 Cost Management System

Integrated cost reporting with EcoSys EPC software, a web-based project cost management solution, provides the usability of Excel-like spreadsheets, with the power and control of an enterprise database application. It provides visibility into project costs, efficiency in cost management, and provides greater accuracy and accountability.

EPC will be organized by the CRC Work Breakdown Structure and FTA SCC, which will be the common denominator between EcoSys EPC and Primavera P6, the scheduling software.

10.1.1 EcoSys EPC Interface with Primavera P6

The following will be exchanged between the two reporting systems:

- Information from EcoSys EPC to Primavera P6
 - Legislative Budgets
 - Authorized Budgets
 - Project Budgets
 - Commitments
 - Actual
- Information from Primavera P6 to EcoSys EPC
 - Start / Finish Dates
 - CRC Work Breakdown Structure
 - FTA Standard Cost Categories
 - Physical Percent Complete

10.2 Document Control

10.2.1 Prolog or Web-Based Document Tracking System

Upon completion of the monthly progress update, the schedule reports (see Section 9.2) will be sent to Document Control. Other schedule documents to be filed with Document Control are:

- The approved Master Program Schedule.
- The Baseline Master Program Schedule.
- The Contingency Schedule.
- Approved project schedules submitted by contractors/suppliers.

11. References

- CRC Project Management Plan, Chapter 3. Management Control
- CRC Configuration Management and Change Management Guidance
- CRC Cost Control Plan
- FTA Project and Construction Management Guidelines, dated July 2011
- WSDOT Policies and Procedures for Project Scheduling – Project Management and Reporting Systems (PMRS), dated August 2008
- Critical Path Method – <http://whatis.techtarget.com/definition/critical-path-method-CPM>
- Baseline – <http://whatis.techtarget.com/definition/baseline>

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