Schedule Review

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Chris Carson, PSP, CCM
Corporate Director of Project Controls

- Responsible for developing corporate standards, training, recruiting and oversight for scheduling, estimating, and dispute resolution projects
- 4 years of 5 year Masters Degree Program in Mechanical Engineering, University of Virginia, 1968 - 1972
- Certified as a PSP (Planning and Scheduling Professional), AACE
- Certified as a CCM (Certified Construction Manager), CMAA
- Over 37 years experience in all phases of construction management and hands-on CPM scheduling experience
- Principal Author for AACE "Recovery Scheduling Recommended Practice", and Co-Author for "Schedule Design Recommended Practice" in development
- Received national award from PMI College of Scheduling in 2009 for "Significant Contributions to the Scheduling Industry"
- Managing Director for the PMI College of Scheduling "Scheduling Excellence Initiative" project charged with writing:
  - Best Practices and Guidelines for Scheduling
  - Best Practices and Guidelines for Schedule Impact Analysis
- Presents scheduling topics at PMI College of Scheduling, AACE, CMAA, and DBIA national conferences
- Provides CMAA and PMI College of Scheduling webinars
- Active in AACE on Planning and Scheduling Committee as well as the Claims and Dispute Resolution Committee
- Trained hundreds of schedulers, and provided 37 years of scheduling, analysis and testimony, as well as seminars on scheduling and claims

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Alpha Corporation

- International engineering and construction company, providing professional services
- Structural & Civil Design, Construction and Program Management, CM Services, Scheduling, Estimating, Dispute Resolution, Quality Assurance and Control, Primavera Software Services, Training
- Offices in Dulles, Baltimore, Norfolk, Winchester, Miami, Seattle, Charlottesville, North Carolina, Georgia, Dublin, Ohio, Dubai, U.A.E.
- Ranked 45th Largest Construction Manager in the U.S., ENR, 2008
- Ranked 28th Largest Program Manager in the U.S., ENR, 2008

Properly Reviewing a Schedule

- Goals
  - Confirm that schedule is reasonable and attainable
  - Understand Contractor's Means & Methods
  - Establish a good baseline for monitoring
  - Verify durations
  - Verify logic and sequencing
  - Identify claims positioning issues
  - Identify risks in schedule and assumptions
  - Document concerns, work with scheduler to finalize a quality schedule

Schedule Review

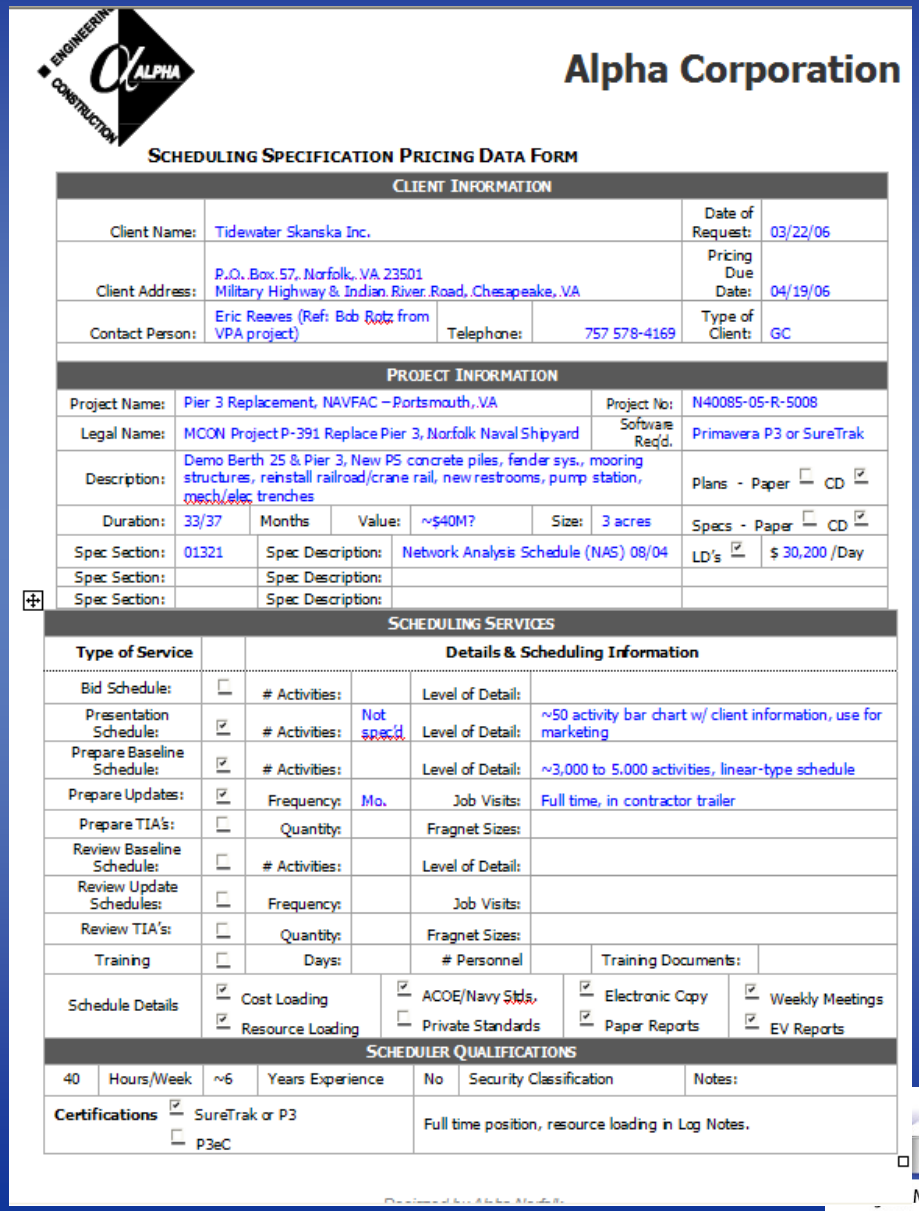
- Baseline Schedule Review
  - Review Scheduling Specification
  - Confirm Submittal Completeness
  - Gain Familiarity with Project
  - Import Schedule & Verify
  - Review Schedule Architecture
  - Review Schedule Construction
  - Review Narrative
  - Review Sequencing
  - Evaluate Metrics & Statistics
  - Perform Analysis
  - Write Report

Baseline Schedule Review

Review Scheduling Specification

- Section 01320 or 01.32.16
- Check Related Specifications Sections or Special Provisions
- Software requirements
- Data exchange requirements
- Master dictionaries/reports
  - Activity Code requirements
  - ID Coding requirements
- Preconstruction meeting
- Qualifications of scheduler
- Required submittal contents
- Owner mandated milestone treatment
- Float ownership
- CPM Network requirements
- Duration definitions & restrictions
- Initial schedule submission
- Full detailed project schedule (baseline) submission
- Schedule updates
- Delays & time extensions
  - Notification Requirements
- Early completion schedules
- Final as-built submittal
- Cost & Resource loading
- Narrative Requirements
- Prohibitions on manipulation

Schedule Specification



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SCHEDULING SPECIFICATION PRICING DATA FORM

CLIENT INFORMATION

Client Name:	Tidewater Skanska Inc.			Date of Request:	03/22/06
Client Address:	P.O. Box 57, Norfolk, VA 23501 Military Highway & Indian River Road, Chesapeake, VA			Pricing Due Date:	04/19/06
Contact Person:	Eric Reeves (Ref: Bob Rotz from VPA project)	Telephone:	757 578-4169	Type of Client:	GC

PROJECT INFORMATION

Project Name:	Pier 3 Replacement, NAVFAC – Portsmouth, VA				Project No:	N40085-05-R-5008	
Legal Name:	MCON Project P-391 Replace Pier 3, Norfolk Naval Shipyard				Software Req'd.	Primavera P3 or SureTrak	
Description:	Demo Berth 25 & Pier 3, New PS concrete piles, fender sys., mooring structures, reinstall railroad/crane rail, new restrooms, pump station, mech/elec trenches					Plans - Paper ☐ CD ☑	
Duration:	33/37	Months	Value:	~$40M?	Size: 3 acres	Specs - Paper ☐ CD ☑	
Spec Section:	01321	Spec Description:	Network Analysis Schedule (NAS) 08/04			LD's ☑	$ 30,200 /Day
Spec Section:		Spec Description:					
Spec Section:		Spec Description:					

SCHEDULING SERVICES

Type of Service		Details & Scheduling Information					
Bid Schedule:	☐	# Activities:		Level of Detail:			
Presentation Schedule:	☑	# Activities:	Not spec'd	Level of Detail:	~50 activity bar chart w/ client information, use for marketing		
Prepare Baseline Schedule:	☑	# Activities:		Level of Detail:	~3,000 to 5.000 activities, linear-type schedule		
Prepare Updates:	☑	Frequency:	Mo.	Job Visits:	Full time, in contractor trailer		
Prepare TIA's:	☐	Quantity:		Fragnet Sizes:			
Review Baseline Schedule:	☐	# Activities:		Level of Detail:			
Review Update Schedules:	☐	Frequency:		Job Visits:			
Review TIA's:	☐	Quantity:		Fragnet Sizes:			
Training	☐	Days:		# Personnel		Training Documents:	
Schedule Details	☑ Cost Loading ☑ Resource Loading	☑ ACOE/Navy Stds. ☐ Private Standards		☑ Electronic Copy ☑ Paper Reports		☑ Weekly Meetings ☑ EV Reports	

SCHEDULER QUALIFICATIONS

40	Hours/Week	~6	Years Experience	No	Security Classification	Notes:
Certifications	☑ SureTrak or P3 ☐ P3eC			Full time position, resource loading in Log Notes.		

- Use a checklist to capture specification requirements
- Identify time allowed for review and response

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Baseline Schedule Review

Gain Familiarity with Project

- Review Plans & Specifications
- Review specialty specifications like DOT Bridge & Road Manual
- Visit job site
- Review construction methodology
- Review any new or unusual techniques
- Bring in expertise if necessary

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Baseline Schedule Review

Confirm Submittal Completeness

- Compare to schedule specification requirements
- Notify Contractor immediately if not complete
- Do not start review until submittal is complete
- Typical missing items:
  - Schedule Narrative
  - Electronic File
  - Explanation of Calendars, Lags, Activity Codes, Constraints, Resources, Costs
  - Milestones and Milestone definitions
- Consider two part review if costs or resources are missing

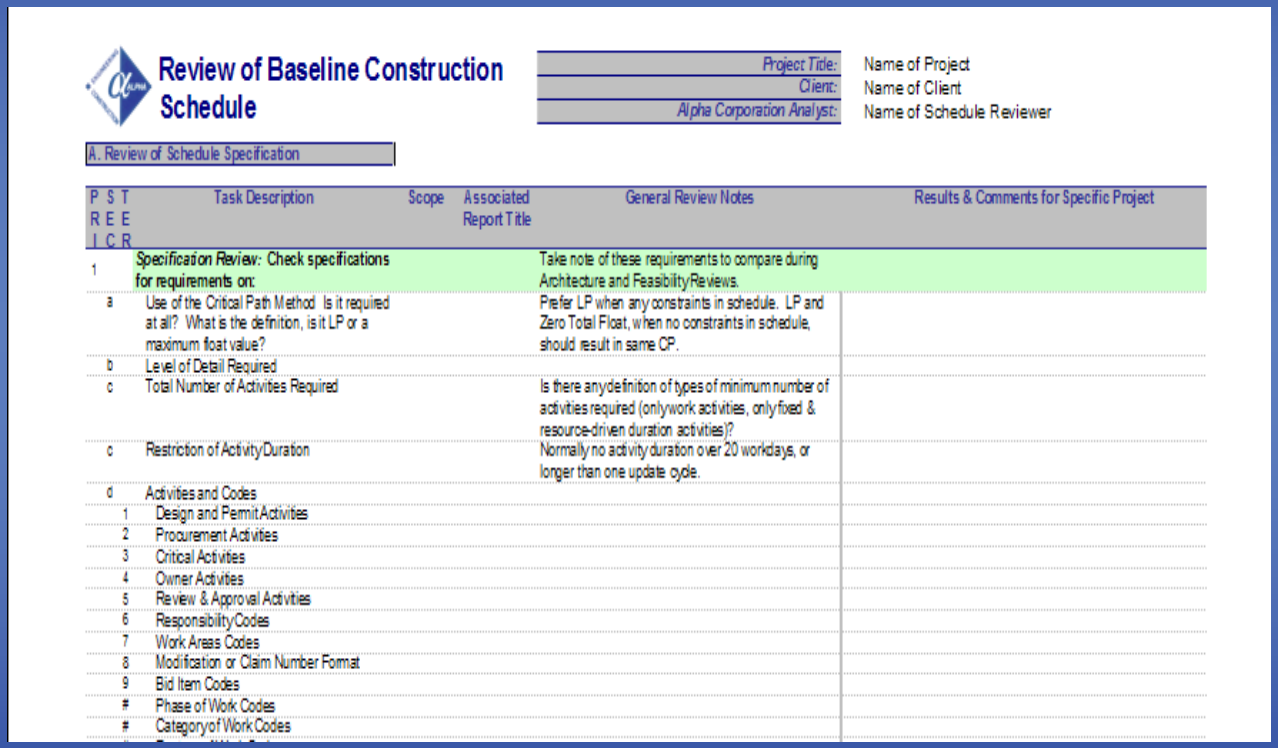
Baseline Schedule Review

Import Schedule & Verify

- Keep original submittal file, make copy to review
- Should review in original software if possible
- Recognize that there are issues with the import function in many software packages
- Develop checklist to identify potential import issues
- Example - Primavera P3 to P5 import :
  - In P3, Lags are driven by Predecessor Calendar
  - In P6, Lags can be driven by choice of Calendars
  - Default P6 setting to drive Lags is not the Predecessor Calendar
- Must verify that imported schedule used to analyze is identical to original submitted schedule

Baseline Schedule Review

- Develop a checklist for reviews



Review of Baseline Construction Schedule

Project Title:	Name of Project
Client:	Name of Client
Alpha Corporation Analyst:	Name of Schedule Reviewer

A. Review of Schedule Specification

PRIOR	STEP	Task Description	Scope	Associated Report Title	General Review Notes	Results & Comments for Specific Project
1		***Specification Review:*** **Check specifications for requirements on:**			Take note of these requirements to compare during Architecture and Feasibility Reviews.	
	a	Use of the Critical Path Method Is it required at all? What is the definition, is it LP or a maximum float value?			Prefer LP when any constraints in schedule. LP and Zero Total Float, when no constraints in schedule, should result in same CP.	
	b	Level of Detail Required				
	c	Total Number of Activities Required			Is there any definition of types of minimum number of activities required (only work activities, only fixed & resource-driven duration activities)?	
	c	Restriction of Activity Duration			Normally no activity duration over 20 workdays, or longer than one update cycle.	
	d	Activities and Codes				
	1	Design and Permit Activities				
	2	Procurement Activities				
	3	Critical Activities				
	4	Owner Activities				
	5	Review & Approval Activities				
	6	Responsibility Codes				
	7	Work Areas Codes				
	8	Modification or Claim Number Format				
	9	Bid Item Codes				
	#	Phase of Work Codes				
	#	Category of Work Codes				

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Baseline Schedule Review

- Review Schedule Architecture
  - Check Schedule Rules & Settings
  - Recalculate Schedule, verify no change
  - Review Organizational Tools
- Review Schedule Construction
  - Evaluate Activities
  - Review Logic
  - Evaluate Critical Path

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Baseline Schedule Review

Review Schedule Architecture

- Check Schedule Rules & Settings
  - Retained Logic vs. Progress Override
    - Won't affect Baseline Schedule, but could cause optimistic predictions during updates
  - Resource and Cost rules
    - Estimate to Complete setting might allow Estimate at Completion to change
  - Understand all settings and how they affect Earned Value & reports
  - Identify how Critical Path is calculated
    - Longest Path
    - Total Float value

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Baseline Schedule Review

Review Schedule Architecture

- Recalculate Schedule, ensure no change
  - If completion date changes, may need to send it back to the scheduler for verification
  - Check NTP and Completion dates
- Check all interim Milestone dates
- Review Organizational Tools
  - Review Activity Code Dictionaries
  - Review Resource Code Dictionaries
  - Review Calendars
  - Review WBS

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Baseline Schedule Review

Review Schedule Construction

- Evaluate Activities
  - Sort by Activity Description
    - For good guidelines, see AACE publication No. 23R-02, Recommended Practice for Identification of Activities
    - See if descriptions are consistent and unique
    - Ensure all items that could delay project are represented by activities, such as procurement and other admin work
    - Compare descriptions for reasonable and comparable Original Durations
    - Confirm that descriptions capture full scope of work
  - Sort by Original Duration
    - Check for specification maximum times
    - Check for reasonable ODs

Baseline Schedule Review

Review Schedule Construction

- Review Logic
  - See AACE publication No. 24R-03, Recommended Practice for Developing Activity Logic for guidelines
  - Check open-ended relationships
    - Should only be two; start and end
    - Reduces accuracy of network calculations
    - Watch for “dangling” activities: SS or FS with negative Lag which leave Predecessor open-ended upon updates
  - Evaluate relationships
    - Check on all Lags
    - Filter by trade, check same-trade relationships
    - Filter by Contractor, check those relationships

Baseline Schedule Review

Review Schedule Construction

- Evaluate Critical Path
  - Is it reasonable and customary?
  - Does it start at beginning of project and run to completion?
  - Does it have an appropriate level of detail?
  - Are there manipulations driving the Critical Path?
    - Float sequestering where everything is critical
    - Manipulation where Critical Path runs inappropriately through all owner responsibilities
    - Critical Path is the only highly detailed string of activities in the project
    - Nothing is critical due to heavy constraint use
    - Numerous lags, perhaps not identified, inserted in the Critical Path, forcing it through specific activities
    - Is there weather planning included in Critical Path activities or will any adverse weather cause slippage?

Baseline Schedule Review

Review Schedule Construction

- Evaluate Near Critical Paths
  - How much work is just off Critical Path?
  - Check Longest Path and lowest Total Float paths (Recommend review of TF < ½ Reporting Period)
- Sort by Total Float
  - Check reasonableness of high float items
  - Is there a consistent range of TF?
  - Lots of high TF activities means underdeveloped logic
  - All low TF suggests inappropriate logic
- Sort by Late Start
  - This is the worst case expectation of work flow
  - Start at end of schedule & see if reasonable
  - Organize by Late Start, Order Week Ascending, see if the amount of work planned each week is possible
  - Check trade stacking, can they fit into spaces?

Baseline Schedule Review

Review Schedule Construction

- Sort by Early Start
  - Organize by Early Start, Order Week Ascending, again see if the amount of work planned each week is reasonable
  - Are there trades stacking up?
- Organize by Early Start, Sort by Late Start
  - Summarize to Early Start, review overlaps between weeks
  - Specifically review strong overlaps (points out missing relationships)
  - Helps focus on small segments of project working concurrently

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Baseline Schedule Review

Review Schedule Construction

- Review resources
  - Check for resource “soft” logic used to control flow of manpower from area to area
  - Schedules without reasonable soft logic will likely show lots of high Total Float values
  - Overuse of soft logic can sequester Total Float and force Critical Path
  - Durations should be resource-based; that is calculated by production rate x quantity, so resource planning must be taken into account

Schedule Review Feedback

- Manipulation of Logic & Durations

> Consigli has revised the project schedule to reflect schedule delay impacts to date, including design delays, additional scope impacts, and delays in the approval of change requests. The schedule update dated 10/29/07 indicates that the overall project start date has been delayed 6 months, and the overall schedule duration has been extended 1 month, from 12 months to 13 months as compared with the original baseline schedule dated 3/5/07. This change request only represents additional general conditions costs Consigli is incurring as summarized below and detailed in the attached Exhibit 1:

Quote above from Contractor Change Request 009 – F. L. Olmsted National Historic Site

Alpha Response, "The October 2007 schedule forecasts contract completion as October 31, 2008. It includes a net increase of 101 activities and 267 relationships; approximately doubling the activities in the schedule and nearly tripling the relationships, as the March schedule had a total of 115 activities and 141 relationships. The schedule depicts the claimed six month demobilization period as well as the various design changes. The schedule also includes a significant amount of development over the March schedule. Consigli must provide specific explanation to the NPS as to the nature of the changes made and, in particular, define whether the changes represented changed scope due to the various sets of design revisions, or whether they represented corrections to deficiencies in the original baseline schedule."

Change Request Amount - $4.5M

Baseline Schedule Review

Review Written Narrative

- At a minimum, Narrative should identify sequence and work flow
- Identify stages and phasing
- Provide the Area Designation Plan
- Summary of the work
- Explain plan for construction
- Identify potential problems or risks
- Summarize the Critical Path; does it match the schedule?
- Identify all Milestones
- Explain schedule components:
  - Activity ID Coding, Activity Coding, Resources, Lags, Constraints, unusual logic relationships
- Adverse weather planning

Baseline Schedule Review

Review Sequencing

- Use Narrative as guide
- Check for missing Activity Codes that may not include work in sequences
- Choose layout with sequencing
- Compare to specification requirements
- Summarize to sequences, then drill into each sequence
- Check reasonableness of logic
- Check overlap of sequences
- Check other layouts

Baseline Schedule Review

Generate Metrics

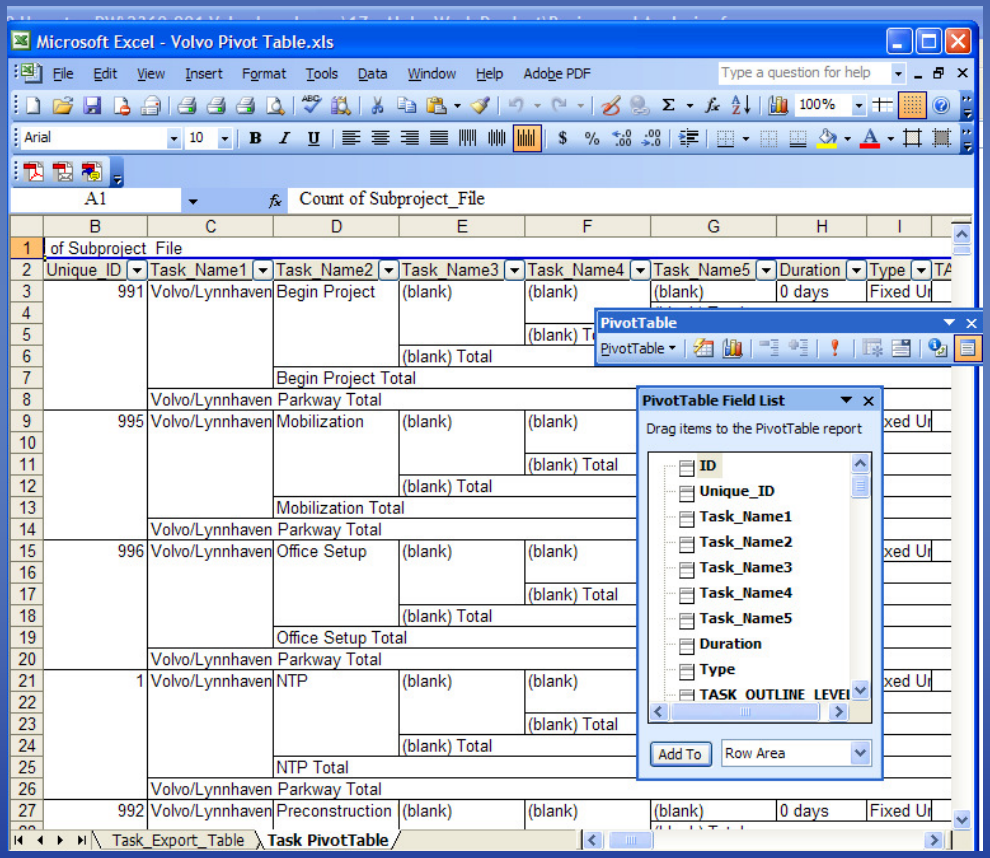
- Counts
  - Activities by type (procurement, construction, Owner responsibilities)
  - Activities by trade (Section number, work package)
  - Activities on Longest Path
  - Relationships
    - Total by types
    - Lags
  - Constraints
- Verify appropriate & consistent level of detail

Baseline Schedule Review

- Data retrieval from schedule
  - Develop data crunching methodologies
    - Master layouts with filters
    - Export filters to export to Excel or Lotus
    - Standard Pivot tables
    - Input/output worksheet spreadsheets
    - Graphical depictions for reasonableness
      - Histogram distributions
      - Tables
      - Charts

Baseline Schedule Review

- Use Pivot Tables or other data collecting & collating methodologies



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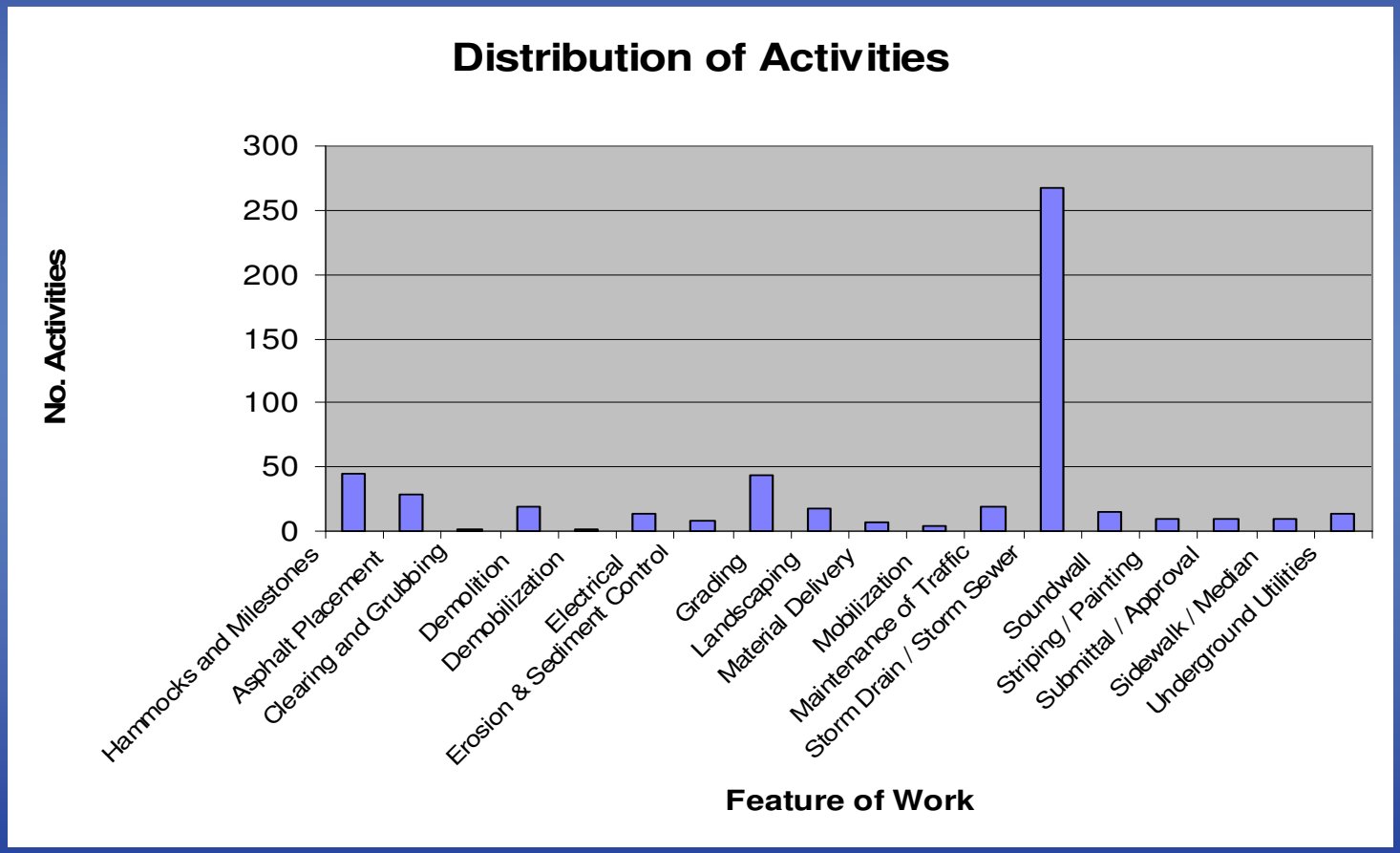
Baseline Schedule Review

Generate Statistics

- Recommend use of Pivot Tables
- Use statistics to identify inconsistencies
  - Ratio work/non-work activities
  - Ratio trade work
  - Ratio durations (helps spot partial overdevelopment)
  - Ratio work in each sequence
  - Percentage of activities on Longest Path and Near Critical Paths

Baseline Schedule Review

Histogram of Activity Work Scope (showing out of proportion detail in trade activities)



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Baseline Schedule Review

Perform Analysis

- Review types of constraints
- Remove constraints, one by one
- Look at results with each removal and identify effects
- Evaluate total number of constraints
  - Date constraints; should be minimum and only those dictated by Owner
  - Don’t allow mandatory constraints which sequester float
  - Logic constraints; watch for float removal constraints like Zero Total or Free Float
  - Network should be logic driven, not constraint driven
- Constraints can cause multiple Critical Paths
  - Requires analysis of each path in baseline and updates

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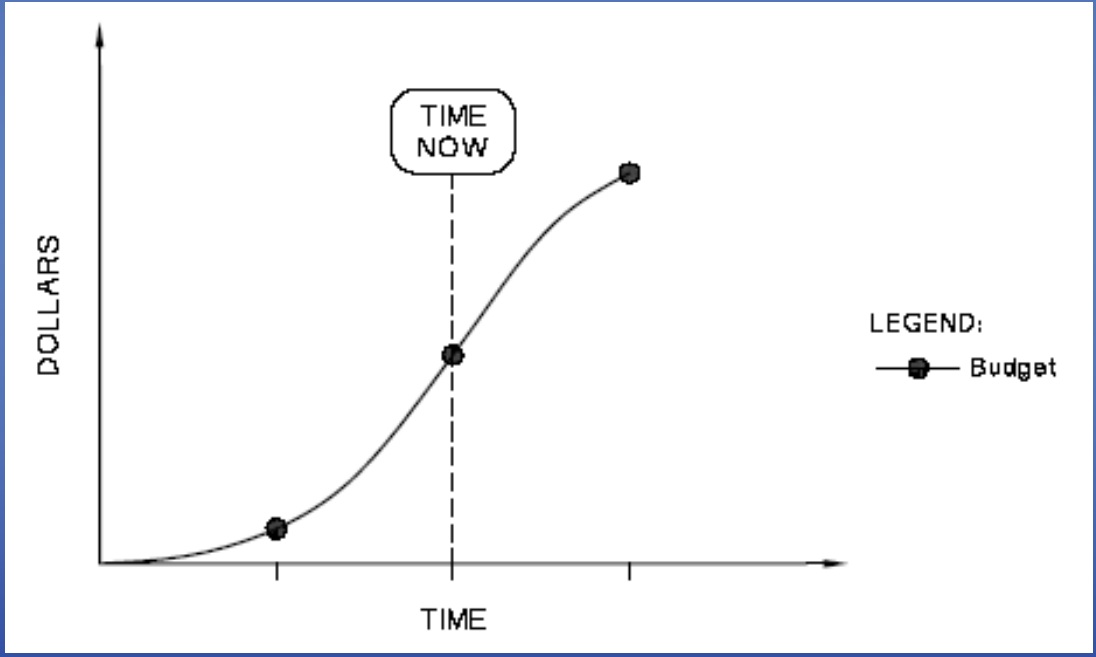
Baseline Schedule Review

Perform Analysis

- With Cost Loading, use Earned Value
  - Review S-Curve for reasonableness
  - Don’t use Banana Curves, the Late Start curve provides a deceptive lower performance range
  - Remember that this sets the baseline for monitoring the progress

Baseline Schedule Review

- Review shape of Earned Value S-Curve (BCWS)
  - Might point out front-end loading or unreasonable plan
  - May show too aggressive expectations for billing



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Baseline Schedule Review

Write Report

- Organize checklist to match report
- Provide Executive Summary
- Provide recommendations for Best Practices improvement in schedule
- Provide Deficiency List
- Require response to Deficiency List
- Do not dictate means and methods
- Keep report professional without addressing assumed motivation for schedule features
  - Don't say, "Use of so many constraints is clearly a devious attempt to pervert Critical Path"

Update Schedule Review

- General process similar to Baseline
  - Review Scheduling Specification
  - Review Plans & Specifications
  - Confirm Submittal Completeness
  - Import Schedule & Verify
  - Data Validation
  - Review Schedule Architecture
  - Review Schedule Construction
  - Review Narrative
  - Review Sequencing
  - Evaluate Statistics
  - Write Report

Update Schedule Review

- Update Schedule Review
  - Same steps as Baseline Review
    - Review Scheduling Specification
    - Review Plans & Specifications
    - Confirm Submittal Completeness
    - Import Schedule & Verify
  - Data Validation – must be done with each update
  - Same steps as Baseline Review
    - Review Schedule Architecture
    - Review Schedule Construction
    - Review Narrative

Update Schedule Review

- Data Validation
  - Field information – should have been kept on a daily basis
    - Verify Actual Start Dates
    - Verify Actual Finish Dates
    - Verify Predicted Finish for any activity started but not finished
    - Verify Percent Complete if schedule is cost loaded
    - Prefer Remaining Duration, not Percent Complete, for time reporting
      - Superintendents generally cannot provide accurate Percent Complete
  - Data validation is very important

Update Schedule Review

- Data Validation
  - Office information
    - Watch status of buyout process; purchase orders & subcontracts – what is not bought out
    - Verify Submittal & Approval status
    - Verify status of administrative tasks
      - Utility paperwork status
      - Permits – site, building, right-of-way, Health Department
      - Environmental releases, etc.
    - Verify status of materials fabrication and order time - “Lead Time” – this is an area where schedule manipulation can occur

Update Schedule Review

- Data Validation
  - Owner information
    - Independently verify status of Owner controlled activities
      - Owner utility applications & progress
        - Electricity
        - Gas service
        - Water & sewer
        - Telephone
        - Cable or data
        - Security system
      - Delivery dates for Owner furnished equipment
      - Other Owner contractual work
      - Verify coordination with Owner work

Update Schedule Review

- Calculate Schedule
  - Ensure software setting is Retained Logic
  - Verify Data Date is correct date
  - Calculate schedule
- Check for Out-of-Sequence Work
  - Change setting temporarily to Progress Override
  - If the completion date changes significantly, there is a lot of critical out-of-sequence work needing correcting
  - If minimal change, no significant out-of-sequence work
  - Change the setting back to Retained Logic (default)

Update Schedule Review

- Prepare for Schedule Analysis
  - Use standard Layout with comparison to last update
  - Check for slippage in Substantial Completion date or Milestones
    - If no slippage, project predicts on time completion
      - Perform standard analysis, use standard reports and publish
    - If slippage, will need additional analysis of slipped schedule

Update Schedule Review

- Standard Schedule Analysis (On-Time Completion)
  - Three basic components to monitor
    - Critical Path progress
      - Slippage will directly delay work
    - Near Critical progress
      - Slippage could easily overtake Critical Path and delay work
    - Non-Critical (“mass volume”) work
      - Lack of progress will cause trade stacking and over-crowding of work space at a later date
      - Could easily allow too much work for areas available
      - Good place to use Earned Value for monitoring
      - Can use Float Dissipation to monitor
      - Can use other methods to monitor

Update Schedule Review

- Standard Schedule Analysis (On-Time Completion)
  - Two types of paths to watch
    - Critical Path to end of project (Substantial Completion)
    - Critical Path to Interim Milestones
  - Critical Path to end of project
    - Ideally use Longest Path
    - Monitor minimum Total Float value Critical Path as well
  - Critical Paths to Interim Milestones
    - One path per each Milestone to watch
    - This can be time consuming, but necessary
    - Slippage in interim Milestones and achieving final Milestone can be basis for acceleration claims

Update Schedule Review

- Standard Schedule Analysis (On-Time Completion)
  - Identify current period Critical Path (Longest Path)
  - Identify current period Near-Critical activities
  - Identify Milestones to review
    - Owner mandated only
    - Watch particularly for Milestones with Liquidated Damages
  - Identify historical trends and statistics (mass volume)
    - Graphics are powerful in the report
  - Identify resource problems or concerns
  - Identify risks, either continuing or new

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Update Schedule Review

- Historical Comparisons & Statistics
  - Run Tipper (TPR) reports (Actual Dur/Original Dur)
  - Run Total Float dissipation (Erosion of Float) reports
  - Run Free Float dissipation reports (for disruption)
  - Review Out-of-Sequence work by trade
    - Which trade is causing most out-of-sequence work?
    - Are they working out-of-sequence due to other trade failures to complete?
    - Or working in open areas without regard for planning?
  - Run Resource reports
    - Are appropriate resources working?
    - Check against Tipper reports

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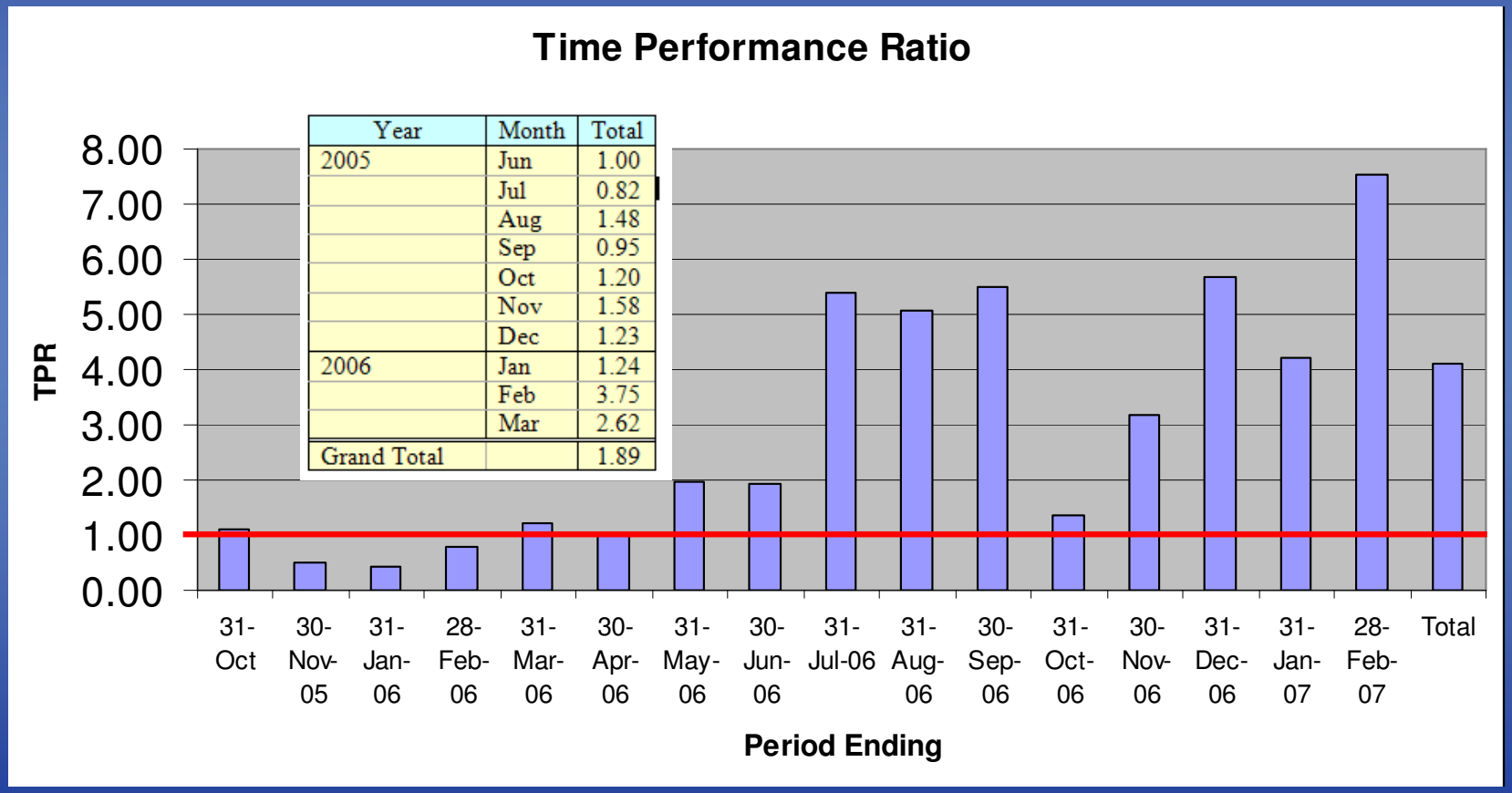
Update Schedule Review

Review (TPR) Time Performance Ratio trending (AD/OD)



Year	Month	Total
2005	Jun	1.00
	Jul	0.82
	Aug	1.48
	Sep	0.95
	Oct	1.20
	Nov	1.58
	Dec	1.23
2006	Jan	1.24
	Feb	3.75
	Mar	2.62
Grand Total		1.89

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Update Schedule Review

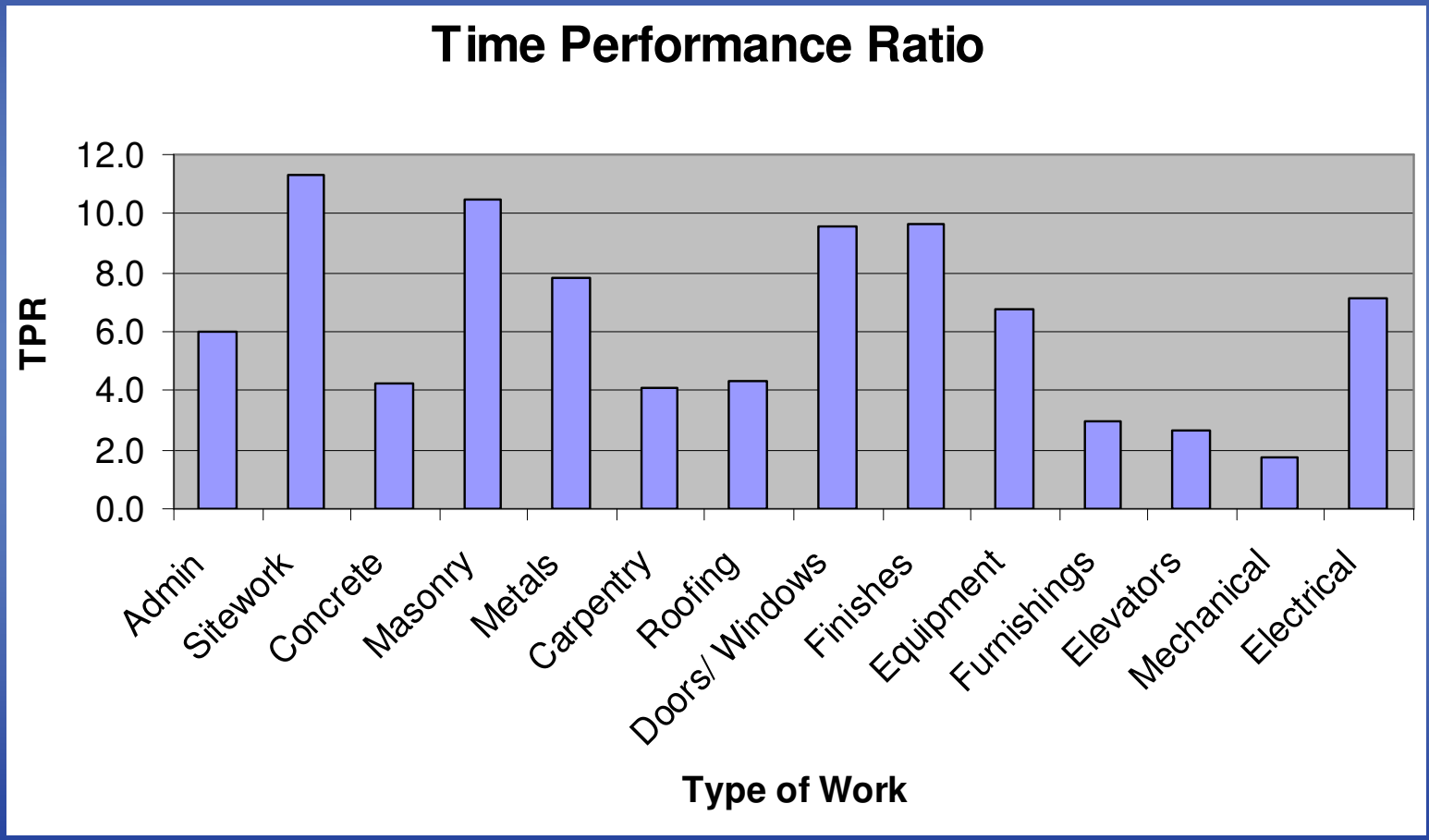
Review (TPR) Time Performance Ratio trending by Milestone by Responsible Contractor (AD/OD)

Table #3a, TPR Responsibility Summary

Milestone	HB	HBRC	HRU	JCD	WCE	WM	Grand Total
1	0.78	3.00	30.00	1.00	2.30		4.49
3	1.77		10.75				8.51
4	1.67		1.00	0.83			1.03
5	5.83			0.50		1.00	2.33
70	0.86	1.00			1.00		0.99
90			1.00				1.00
7A	8.40	0.15	1.20	1.45			1.87
7B	3.96	0.05	1.40				2.67
7C	2.01	0.05	1.33				1.48
7D	4.27		0.78				2.52
7E	2.55						2.55
8A	5.60						5.60
8B	4.19						4.19
9A			2.70	1.71			2.32
9B				1.01			1.01
Grand Total	3.55	0.97	2.84	1.23	1.26	1.00	1.84

Update Schedule Review

Review (TPR) Time Performance Ratio per trade (AD/OD)



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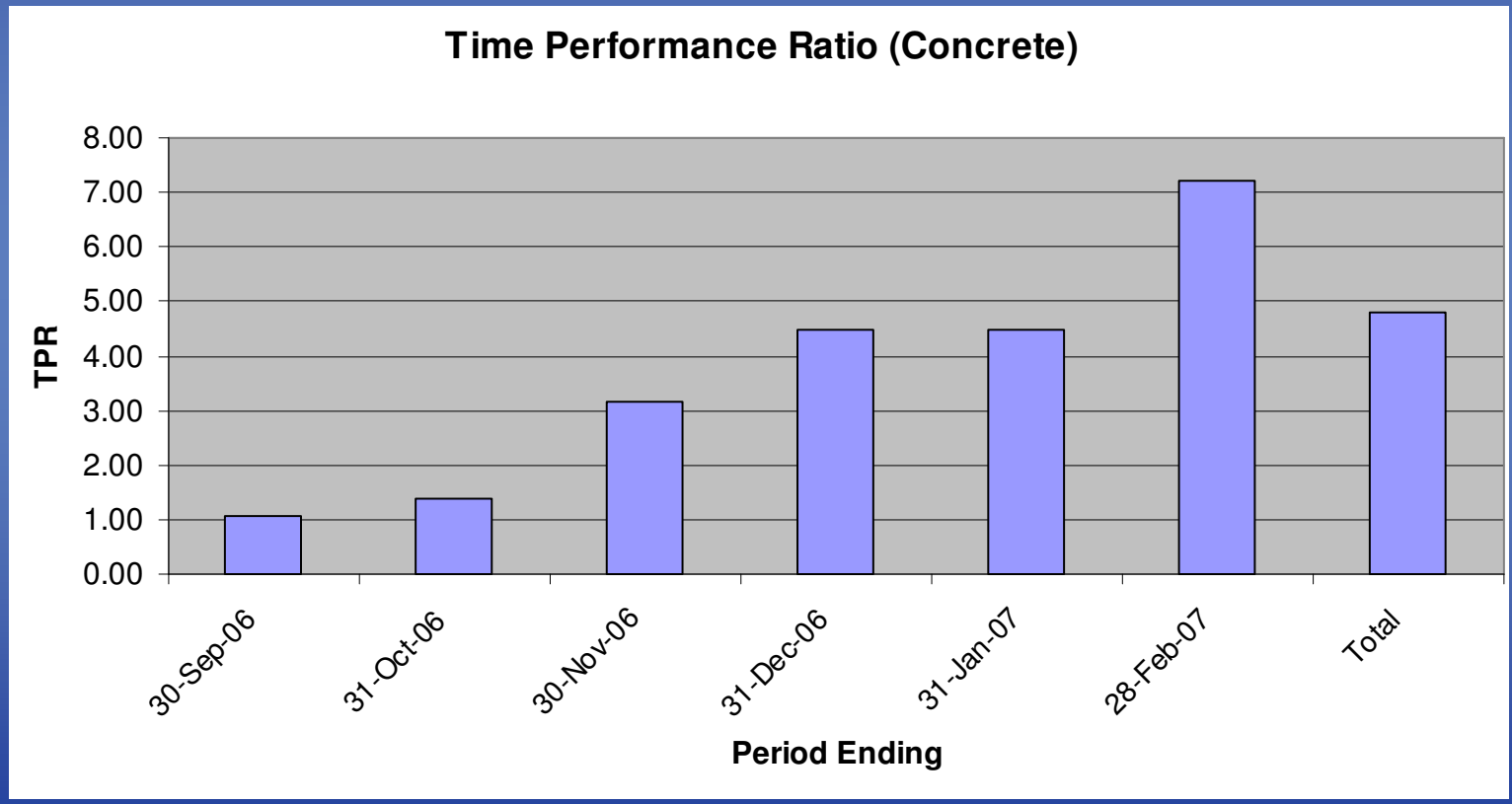
Review (TPR) Time Performance Ratio trending per update by trade (AD/OD)



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Update Schedule Review

Trade Monitoring by Crew – no resource loading available, load single crew resources into activities

APM Terminals Yard Project **Resource Comparison - Planned vs. Actual**

	Planned Resources							Actual Resources					Difference
	Date	Crew 1 Cut/Fill	Crew 2 Grade	Stone	Pave	Surface Pave	Striping	Total Crews Scheduled	English Crews Onsite	Higgerson Buchanan Crews Onsite	Basic Crews Onsite	Spivey Crews Onsite	Total Crews Onsite	Manpower Over (+) / Under (-)
	1-Mar	3	5	3	3			14					0	
	2-Mar	2	2	3	2			9	2	4			6	-3
	3-Mar	3	3	3	3			12		2	3		5	-7
	4-Mar	3	2	3	1			9	8	1			9	0
	5-Mar	3	2	3	2			10					0	
	6-Mar	3	2	2	3			10					0	
0	7-Mar	3	2	2	3			10					0	
7	22-Jun					1	2	3					0	
8	23-Jun					2	2	4					0	
9	24-Jun					2	2	4					0	
0	25-Jun					2	3	5					0	
1	26-Jun					2	2	4					0	
2	27-Jun					1	2	3					0	
3	28-Jun						2	2					0	
4	29-Jun						2	2					0	
5	A Negative Number Indicates Insufficient Resources								Over (+) or Under (-) Staffed					-10

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Trade Monitoring by Crew

Trade Monitoring

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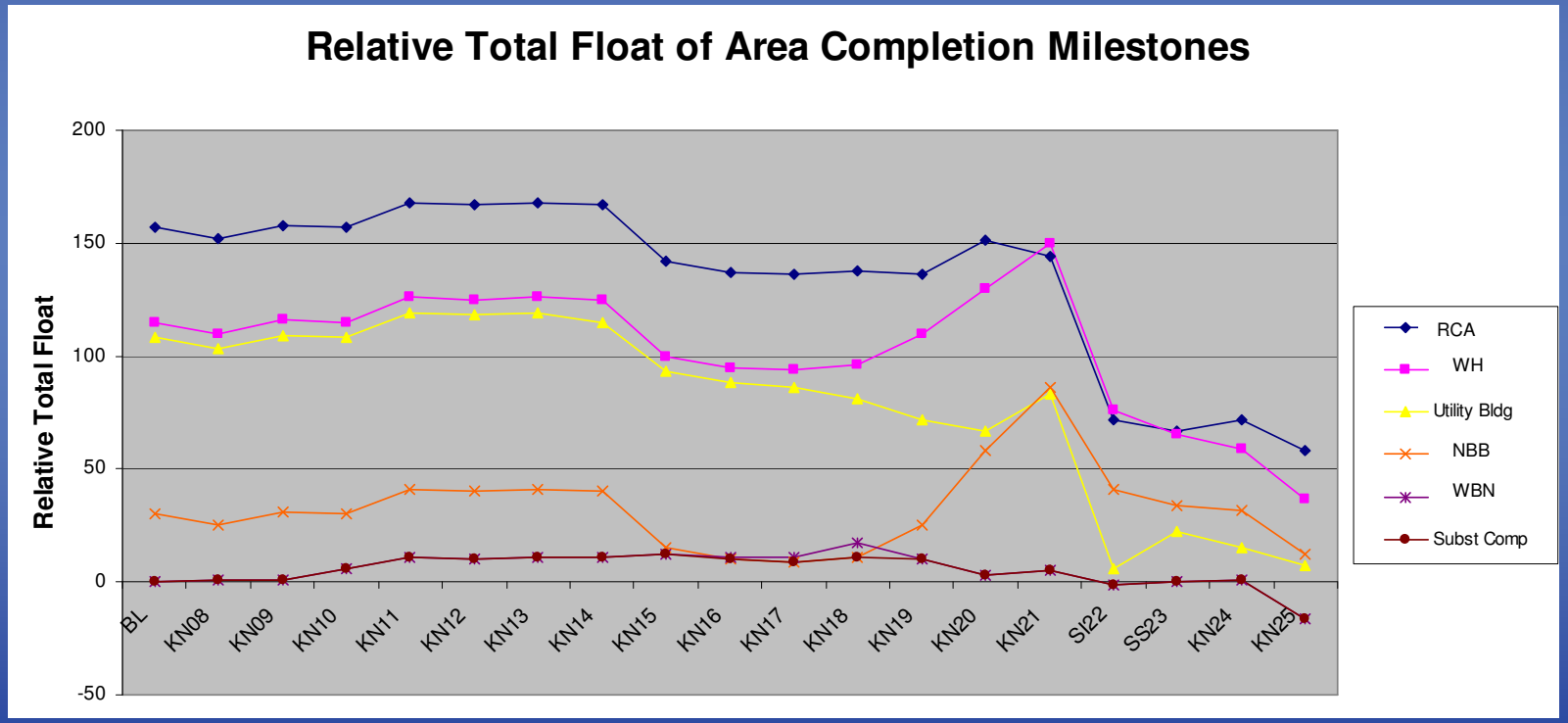
Update Schedule Review

- Watch erosion of float, do not let it continue
  - Print by trade when assessing available resources



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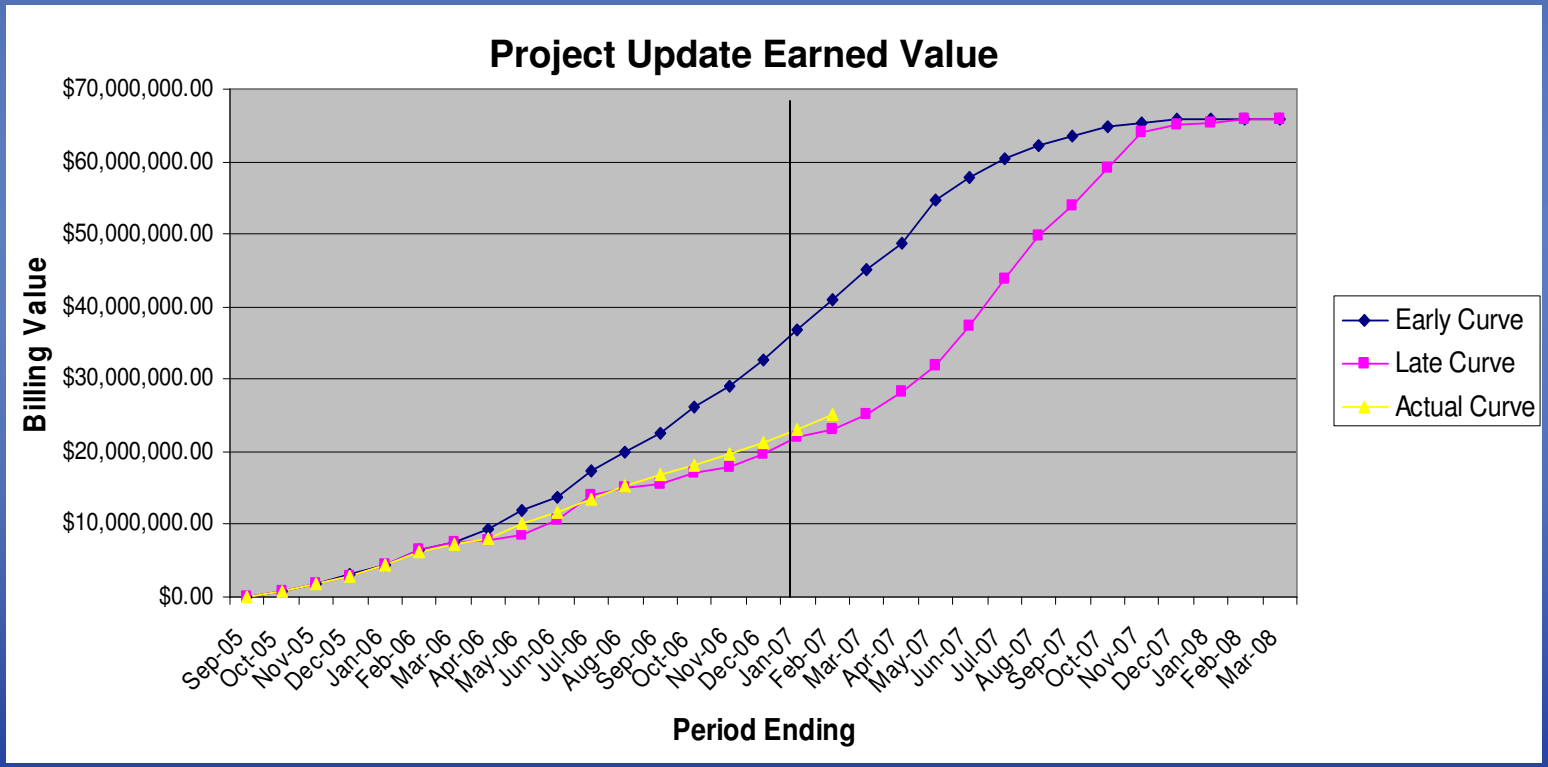
Monitoring by Float Dissipation

Update Schedule Review

- Earned Value Management Reporting
  - Earned Value and Actual Costs
  - Compared against Planned Value



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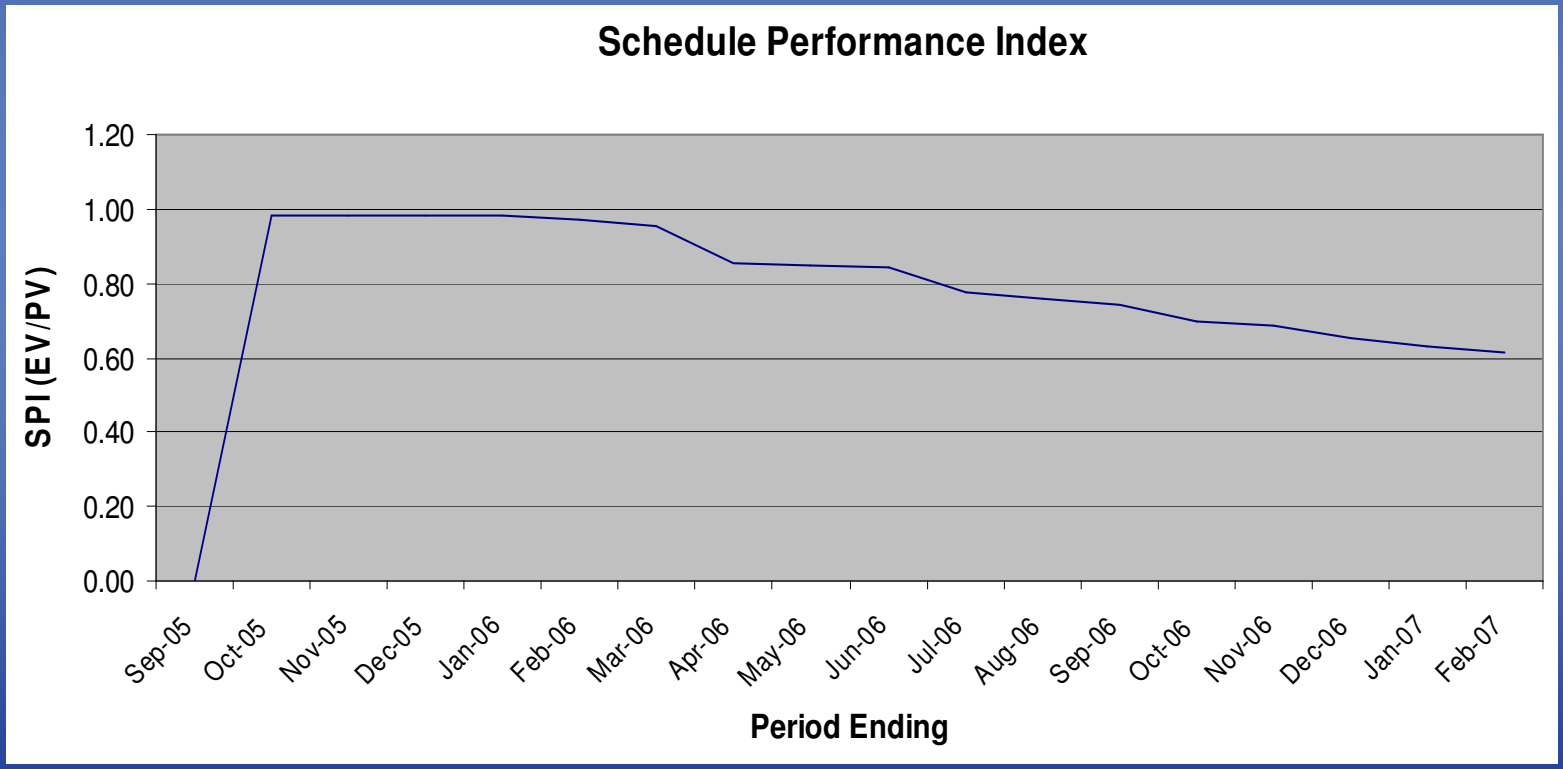
Update Schedule Review

- Earned Value Management Reporting
  - SPI and CPI metrics
  - Watch trending



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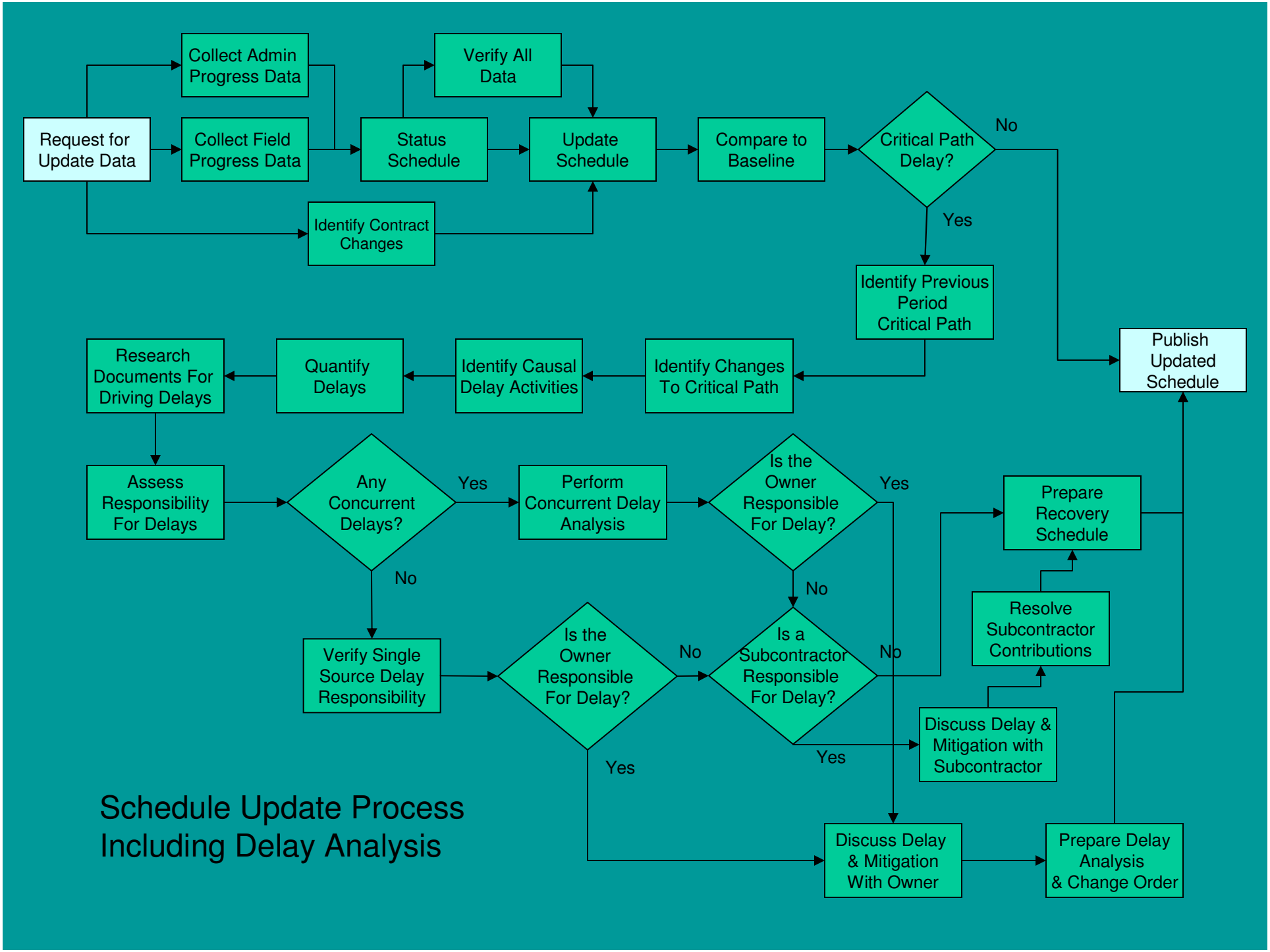
Update Schedule Review

- Schedule Analysis – Sequencing Review
  - Set up a Layout for Sequence
    - Group by Phase or Location
      - Look for out-of-sequence work by trade
    - Summarize to Phase
    - Neck for non-work periods
    - Review the sequence shown by the summary bars
  - Set up a Layout for Responsibility
    - Group by Responsibility
    - Summarize to Responsibility
    - Neck for non-work periods
    - Review trade workload

Update Schedule Review

- Schedule Analysis – Constructability
  - Set up a Layout for weekly work
    - Group by Early Start
    - Order by Week
    - Sort by ES, EF , TF
    - Zoom in to weekly week
    - Set Major Vertical Sight Lines to one week
    - Expose column for Responsibility and Location
    - Review work to be done weekly over the next few months for reasonableness


Request for Update Data
Collect Admin Progress Data
Collect Field Progress Data
Verify All Data
Status Schedule
Update Schedule
Identify Contract Changes
Compare to Baseline
Critical Path Delay?
No
Yes
Identify Previous Period Critical Path
Identify Changes To Critical Path
Identify Causal Delay Activities
Quantify Delays
Research Documents For Driving Delays
Publish Updated Schedule
Assess Responsibility For Delays
Any Concurrent Delays?
Yes
No
Perform Concurrent Delay Analysis
Is the Owner Responsible For Delay?
Yes
No
Prepare Recovery Schedule
Resolve Subcontractor Contributions
Verify Single Source Delay Responsibility
Is the Owner Responsible For Delay?
No
Is a Subcontractor Responsible For Delay?
No
Yes
Discuss Delay & Mitigation with Subcontractor
Yes
Discuss Delay & Mitigation With Owner
Prepare Delay Analysis & Change Order
Schedule Update Process Including Delay Analysis

Update Schedule Review

- Slippage in repetitive activities
  - Note risk of repetitive slippage
  - Assess if slippage is repetitive, and if the activity is typical of all repeated sequences
  - NOTE: A 4 day slip on one level of a 20 floor highrise is an 80 day slip to the project
  - This is true of large linear repetitive projects as well; roadways, bridges, airports (work at gates)
  - These types of slippage are major problems; must be dealt with immediately and seriously

Repetitive Activity Slippage

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Repetitive Activity Slippage

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Update Schedule Review

- Schedule Analysis (Slipped Completion)
  - If slippage is due to the Owner, then a time extension is owed to the Contractor
  - If slippage is due to the Contractor or his Subcontractors, then the Contractor owes the Owner a Recovery Schedule
  - If the Owner causes a delay and the Sub or GC causes a concurrent delay, then a time extension is owed to the Contractor with no costs; and no recovery schedule required
  - Understand excusable/inexcusable and compensable/non-compensable time
  - Clean up all Owner caused delays each period

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Update Schedule Review

- Schedule Analysis (Slipped Completion)
  - Identify previous period Critical Path (Longest Path)
  - Use layout to compare against current schedule
  - Identify current Critical Path & changes from previous
  - Identify which activities slipped and drove progress
    - Causal Activities drive progress
    - Identify Start Gain or Loss
    - Identify Production Gain or Loss
  - Identify specific Causal Activity or Activities for delay
  - Develop process for dealing with slipped completion before needed

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Update Schedule Review

- Schedule Analysis (Slipped Completion)
  - Quantify start and production changes for each causal activity by working from the beginning of the period, using a standard layout with current baseline as schedule target
  - Verify the totals
  - Research the issues that caused the changes to the causal activities
    - Interview Owner project admin team
    - Review project documents; issue files, minutes, RFI/submittal logs, field reports, photographs
    - This research is usually a discussion about reasonably current problems – quick, painless, and easy

Update Schedule Review

- Schedule Analysis (Slipped Completion)
  - Identify the Driving Issues that Affect the Causal Activities
  - Assess Responsibility for Driving Issues
  - Review Concurrency of Driving Issues– Can Be Delay and/or Acceleration/Mitigation
  - Work Through Concurrent Driving Issues from the Beginning of the Period, Identifying first driving issue, establishing any concurrency with next driving issue
  - Perform a Careful Concurrent Delay Analysis, Record in Clear Graphical Format
  - Assign Responsibilities for All Driving Concurrent Delays

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Update Schedule Review

- Schedule Analysis (Slipped Completion)
  - If Contractor team is responsible for any driving delays, or portions of Concurrent Delay, recovery schedule is required
    - Predetermine how much slippage is allowed before requiring a recovery schedule
    - Request recovery schedule immediately
  - If Owner is Responsible for Any Driving Delays, or Portions of Concurrent Delay
    - Discuss with Owner
    - Request Time Impact Analysis from Contractor
    - Collaborate and determine best approach; Owner Mitigation, paid Contractor Mitigation, or Time Extension

Update Schedule Review

- Report should include general status summaries:

APMT Dashboard — 10/7/2005

Schedule Status

Project	Phase		Status			NTP	Contract Finish	Early Finish	Contract Time Expired
Dredge	Construction	50%	Ahead	28	CD	5/4/2005	1/16/2006	12/19/2005	57.4%
Wharf	Construction	39%	Behind	34	CD	11/29/2004	11/18/2006	12/22/2006	42.2%
Yard	Construction	5%	On Time			7/11/2005	7/30/2007	7/30/2007	10.6%
Off Site Road	Design Build		On Time			8/1/2005	1/15/2007	1/15/2007	11.0%
Wetlands	Design Complete		N/A			N/A			
Dominion	Design - Various		N/A			N/A			
Buildings	Design		N/A			N/A			
On Site Rail	Design - Concept		N/A			N/A			
Off Site Rail	Design - Concept		N/A			N/A			

Current Issues

Project	Date	Description	TF	Notes	BIC
Wharf	7/13/2005	#18 Tierods	N/A	Cold galvanizing of tierod threads has clogged threads preventing couplings from being attached. *Not critical*	CH2MHILL
Wharf	7/15/2005	HZ bulkhead Eastward deflection by 24-inches	?	Design correction completed. Contractor given NTP. Schedule affects will be assesed when 36" piles (A-F) must stop due to repair operation.	CH2MHILL
Wharf	8/1/2005	HZ bulkhead 252 - 437	N/A	Shear studs missing (see non-compliance notices) *Not critical*	Weeks
Wharf	8/3/2005	Concrete pile damage	-15	First 3 driven piles developed cracks. Waiting on repair methods from Weeks.	Weeks
Wharf	8/17/2005	Concrete pile out of tol.	N/A	Joints between sections are greater than allowed 1/4-inch. *Not critical*	Weeks

Open Non-compliance Notice

Project	Date	Title	TF	Notes	BIC
Wharf	6/23/2005	Submittal Schedule	N/A	Submittal schedule not providedas required by specifications	Weeks
Wharf	6/23/2005	Holes cut in AZ-18 piles	N/A	Holes cut to allow water drainage during jetting operations	Weeks
Wharf	8/1/2005	Improper handling walers	N/A	Unloading without protection causing surface coat scratches	Weeks
Wharf	8/2/2005	AZ-18 w/o shear studs	N/A	AZ-18's stabbed w/o shear studs	Weeks
Wharf	8/4/2005	AZ-18 w/o shear studs	N/A	AZ-18's being driven w/o shear studs	Weeks
Wharf	8/17/2005	Out of tolerance 36" pile	N/A	Joint offsets greater than 1/4"	Weeks
Wharf	8/18/2005	Improper handling AZ-18	N/A	Scratched coating	Weeks
Wharf	8/22/2005	Out of tolerance 36" pile	N/A	Joint offsets greater than 1/4"	Weeks

RFIs

Project	Open	Closed	Avg Time Out
Wharf	9	55	
Yard	4	14	
Buildings	0	0	
On Site Rail	0	0	

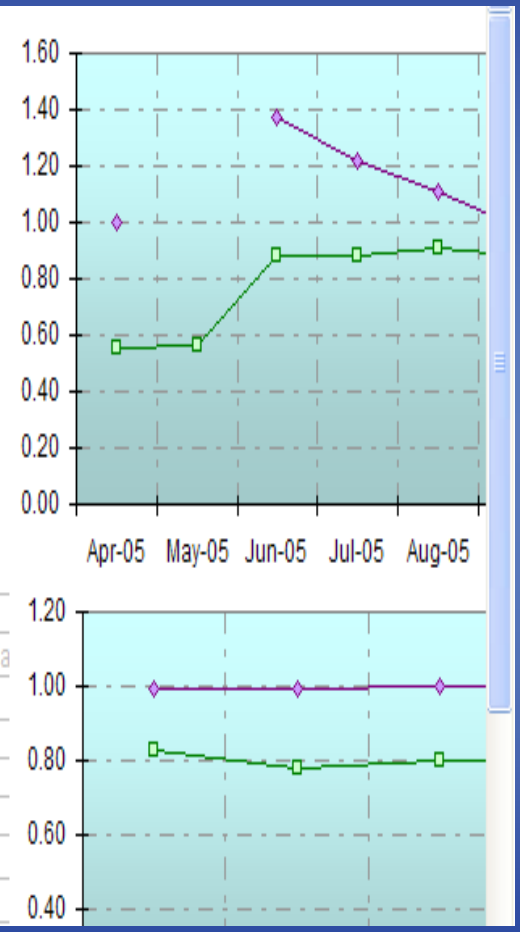
Submittals

Project	Open	Reviewed	Avg Time Out
Wharf	34	186	43.4
Yard	10	37	22.4
Buildings	0	0	0.0
On Site Rail	0	0	0.0

Update Schedule Review

- Include Earned Value metrics in report

1	Wharf												
2	2005	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3	Earned Value ($M)				6.0	8.9	22.1	30.5	36.4	36.5	42.8	46.8	51.0
4	Actual Cost ($M)				6.0	4.6	17.4	27.7	27.7	37.2	38.3	43.4	45.9
5	CPI[1]				1.00	1.90	1.37	1.22	1.11	0.98	1.12	1.08	1.11
6	SPI[2]				0.55	0.56	0.88	0.88	0.91	0.88	0.88	0.87	0.89
7	2006	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
8	Earned Value ($M)	56.4	60.9	60.7	72.0	78.2	82.5	87.1	85.9				
9	Actual Cost ($M)	52.2	55.2	60.4	70.0	76.5	80.6	83.8	90.7				
10	CPI[1]	1.08	1.10	1.00	1.03	1.02	1.02	1.04	0.95				
11	SPI[2]	0.70	0.90		0.96	0.97	0.99	0.95	0.91				
12	Yard												
13	2005	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
14	Earned Value ($M)											16.7	18.2
15	Actual Cost ($M)											16.8	18.4
16	CPI[1]											0.99	0.99
17	SPI[2]											0.83	0.78
18	2006	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
19	Earned Value ($M)	19.5	22.9	29.0	32.4	35.4	40.6	44.5	53.1				
20	Actual Cost ($M)	19.5	23.3	29.2	32.3	35.2	40.9	46.5	53.1				
21	CPI[1]	1.00	0.99	0.96	1.00	1.01	0.99	0.96	1.00				
22	SPI[2]	0.80	0.80	0.86	0.87	0.88	0.87	0.84	0.85				



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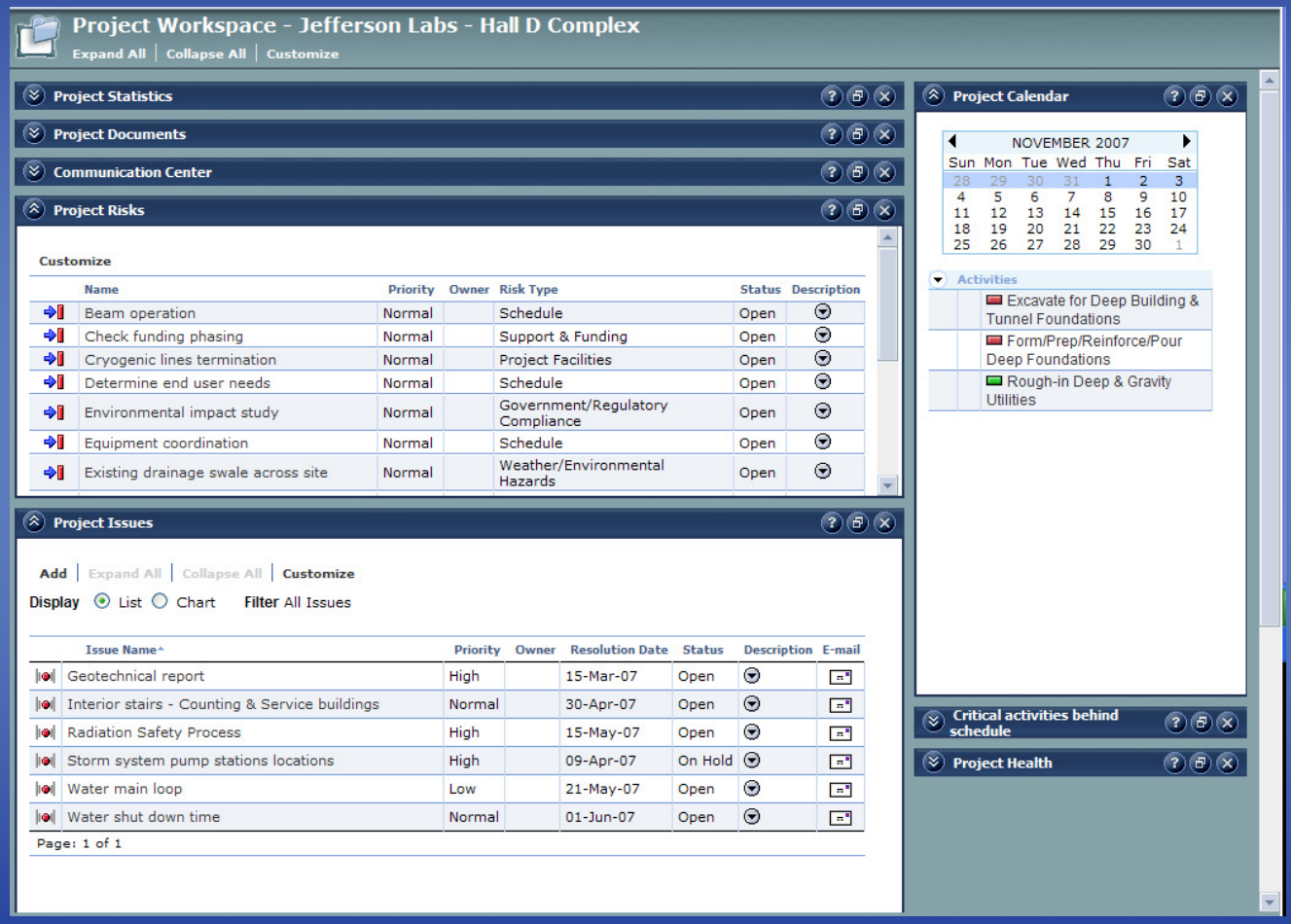
Update Schedule Review

Customized reports – Enterprise - myPrimavera



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Update Schedule Review

Review - Standard Reporting Format

Project Name
Client Name

Updated Schedule Narrative

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V. SUMMARY

ENCLOSURE LIST

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- Table I

Alpha Corporation
Month DD, YYYY

Management Schedule Report

Sussex State Prisons No. 1 and 2 Firing Range and Tower

Contract Number T99-1 5457-05

Contract

Original Contract Completion Date:	February 10, 2008	Current Contract Completion Date:	February 10, 2008
Original Substantial Completion Date:	February 3, 2008	Current Substantial Completion Date:	February 3, 2008
Notice to Proceed Date:	March 12, 2007	Time Added through Mod #2:	0 Calendar Days
Original Contract Duration:	335 Calendar Days	Current Contract Duration:	335 Calendar Days
Original Contract Value:	$2,581,200.00	Current Contract Value:	$2,581,200.00
		Funds Added through Mod #2:	$0.00
		Contract Cost Growth:	0.00%

Schedule Progress Update

Predicted Completion Date:	May 13, 2008	The project is behind 93 Calendar Days as of this update.
Predicted Substantial Completion Date:	May 13, 2008	The project is behind 84 Calendar Days as of this update.
Last Update Predicted Completion Date:	April 29, 2008	The project is behind 14 Calendar Days compared to the last update.

Narrative of Progress This Period

Work completed last month for the site includes boring conduit under roadway, forming and pouring of side walls at rifle range, excavating and installing the remaining balance of the water line and completion of chlorination and treatment of the water lines, backfill of foundation walls in the classroom area. Building work consisted of forming and placing rebar for ceiling slab at the tower, cleaning split face masonry, installation of baffles at range and tower, setting roof trusses and installation of roof sheathing, felt, ice and water shield, as well as starting the hanging and finishing of drywall.

Upcoming Critical Work

Next period's critical path runs through activities for completion of work on the tower, including ceiling slab placement, setting metal stairs and landing, installing ladder, doors and hardware, painting, caulking and final clean up and closeout of the project.

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Schedule Review Comments

- Review provides claims avoidance opportunities
- Review identifies risks
- Always request recovery schedule when Contractor has slipped completion of any milestone
- Always resolve Owner caused delays to limit exposure to constructive acceleration delays
- Be reasonable, goal is to get a good schedule in place and update regularly
- Do not be confrontational or judgmental in report
- Watch trending of work slippage
- Owner should support report recommendations
- Provide a clear Discrepancy List necessary for Contractor to correct

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PMI College of Scheduling

Schedule Review

June 16, 2009

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