

BASELINE SCHEDULING BASICS

Part 2: May 3, 2007

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Baseline Scheduling

- How should you benefit from this session?
 - ◆ Understanding of complex concepts
 - ◆ Understanding of legal risks
 - ◆ Overview of review standards
 - ◆ Understanding of complex terminology
 - ◆ QC – Program & checklists
 - ◆ Recognition of gamesmanship

Introduction – Complex Concepts

- Schedule Approvals
 - ◆ Traits necessary to approve
 - ◆ Time frame recommendations for approval
- Failure to approve schedule
 - ◆ What happens then?
 - ◆ Best way to minimize risk
- Early Completion schedules
- Ownership of float

Review Definitions

- **Critical Path Method (CPM)** – representation of a project plan by a network that depicts the duration, sequence and interrelation of the work activities.
- **Critical Path** – longest path (or sequence) of activities, driven by their relationships, lags, leads, calendars, and constraints, through the project.
- **Total Float** – the amount of time an activity can slip without impacting project completion (contingency time).
- **Logic/Relationship Types** – description of the interrelation between the individual work activities

Schedule Approvals

- ◆ Schedule traits & features to win approval
 - ◆ Meets specifications
 - ◆ Matches Owner dictated sequencing
 - ◆ Starts and finishes on time
 - ◆ Provides a 'reasonable' plan of work
 - ◆ Critical path (LP) includes proportional share of activities
 - ◆ Includes Owner mandated milestones
 - ◆ Includes contractual scope of work
 - ◆ Provides 'reasonable' use of resources
 - ◆ Does not include hidden tricks such as unknown lags, float sequestering, positioning for claims

Schedule Approvals

- ◆ Time frame recommendations
 - ◆ No industry standards
 - ◆ Important to get an approved schedule in place
 - ◆ Two-Tiered schedules
 - Consider a pre-construction or outline schedule submitted early, covering early work
 - More detailed schedule with more time to develop
 - ◆ Cost and resource loading require more time
 - Consider submitted schedule for preliminary schedule as soon as logic worked out prior to loading
 - ◆ Data needs to be captured periodically while schedule is in review (can do informal updates)
 - ◆ Actual data will help minimize confusion and claims positioning by either side

Failure to Approve Schedule

- ◆ What happens if schedule is not approved?
 - ◆ Examine the legal situation if not resolved
 - In a claim situation, any schedules used for management of the project will be used for analysis, regardless of formal approval
 - ◆ Examine the management situation
 - Schedules are necessary for planning and monitoring
 - If the schedule is used to manage the project, it becomes the “schedule”
 - ◆ Schedules used for billing, if not approved, could hold up invoices

Failure to Approve Schedule

- ◆ How to minimize risk?
 - ◆ Require review deficiencies in writing
 - ◆ Make corrections for reasonable review comments
 - ◆ Formally submit all revised submittals
 - ◆ Show re-submittal cycle in schedule
 - ◆ Keep a copy of official submittal schedule (baseline) without progress
 - ◆ Capture update information even while developing schedule
 - ◆ If stalemate, correct all reasonable, document unreasonable requests carefully when submitting last schedule
 - ◆ Use last submitted (the best meeting of the minds for the plan) schedule for updates

Early Completion Schedules

- ◆ Unintentional Early Completion
 - ◆ Review durations and other components carefully
 - ◆ Do not leave float in baseline schedule
 - ◆ Constrain Substantial Completion for contractual date
 - ◆ Re-sequence or provide contingency time so schedule does not complete early
- ◆ Intentional Early Completion
 - ◆ Check specification requirements for early completion
 - ◆ Document or require documentation that project was bid with general conditions to match project duration
 - ◆ If Contractor, notify Owner that intention is to finish early
 - ◆ If Owner, suggest formal change order to move the completion date to the scheduled completion
 - ◆ Negotiate the completion during baseline review

Review (or QC) Standards

Develop Standardized Schedule Review Checklist for schedule review and internal Contractor quality control



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

P R I C E	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				

Review Standards

- Compliance with specifications
- Owner milestones or constraints
- Start and End dates
- Schedule Architecture
 - ◆ Software settings and rules
 - ◆ Verify calculations & no progress
 - ◆ Statistics
 - ◆ Critical Path settings

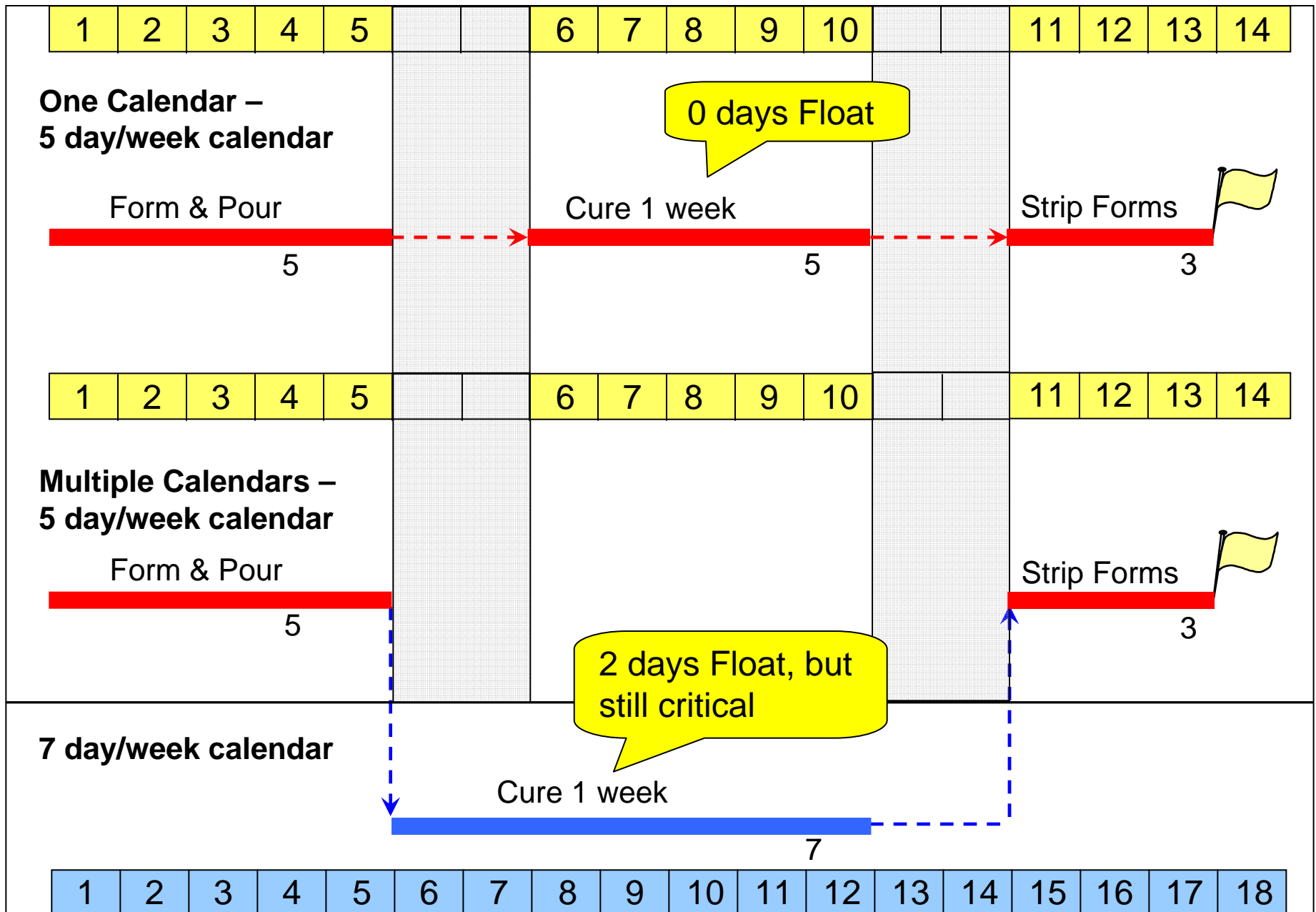
Review Standards

- Schedule Architecture (continued)
 - ◆ Dictionaries (activity, resource code)
 - ◆ Calendars
 - ◆ Evaluate activities
 - ◆ Descriptions & scope coverage
 - ◆ Ratio work/non-work activities
 - ◆ Ratio trade work
 - ◆ Types (owner, utilities, management, etc.)
 - ◆ Relationship types

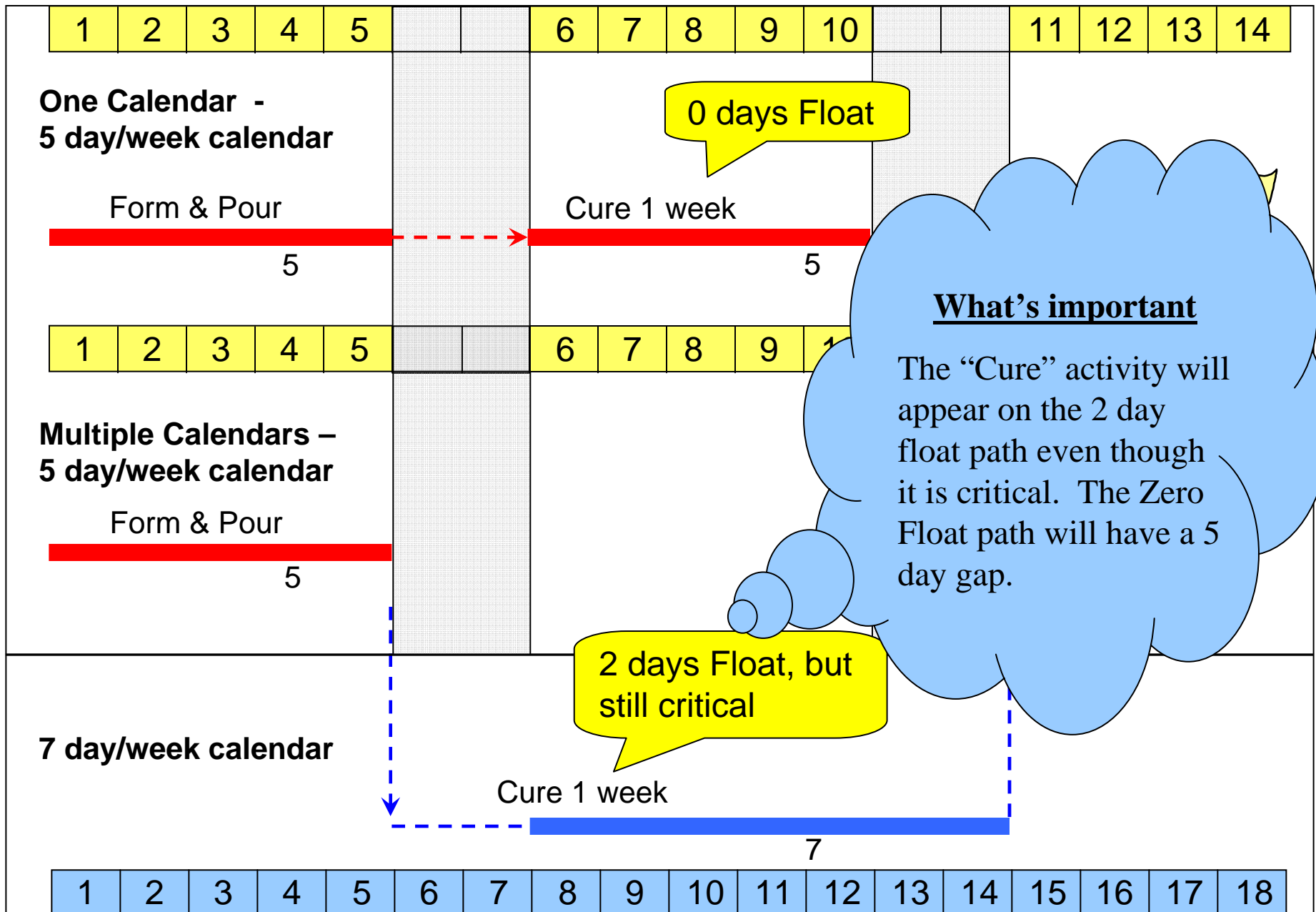
Work Calendars

- Purpose
 - ◆ Tailor the schedule to specific work or non-work periods
- Examples
 - ◆ Holiday periods
 - ◆ Non-work periods (e.g., winter months for sitework activities)
 - ◆ Adverse weather planning (based on NWS average records)
 - ◆ 7 day activities vs. 5 day activities (curing or submittals)
 - ◆ Fixed time periods (e.g., available work areas)

Different Calendars = Different Float



Different Calendars = Different Float



Work Calendar Best Practices

- Use the least number of calendars that you can, while reasonably modeling the project
- Multiple calendars make analysis more difficult
- Multiple use of calendars will amplify or reduce the effects of delay

Review Standards

- Schedule Architecture (continued)
 - ◆ Logic
 - ◆ Statistics (lags, leads, relationship types)
 - ◆ Evaluate Critical Path
 - ◆ Develop rules of thumb for ratio of CP activities
 - Based on type of project, facilities/infrastructure
 - Also review near-critical activities

Review Standards

- 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

Review Standards

- Use Pivot Tables or other data collecting & collating methodologies

The screenshot displays a Microsoft Excel window titled "Microsoft Excel - Volvo Pivot Table.xls". The main window shows a PivotTable with the following data:

Unique ID	Task Name1	Task Name2	Task Name3	Task Name4	Task Name5	Duration	Type	TA
991	Volvo/Lynnhaven	Begin Project	(blank)	(blank)	(blank)	0 days	Fixed U	
		Begin Project Total						
		Volvo/Lynnhaven Parkway Total						
995	Volvo/Lynnhaven	Mobilization	(blank)	(blank)			xed U	
		Mobilization Total						
		Volvo/Lynnhaven Parkway Total						
996	Volvo/Lynnhaven	Office Setup	(blank)	(blank)			xed U	
		Office Setup Total						
		Volvo/Lynnhaven Parkway Total						
1	Volvo/Lynnhaven	NTP	(blank)	(blank)			xed U	
		NTP Total						
		Volvo/Lynnhaven Parkway Total						
992	Volvo/Lynnhaven	Preconstruction	(blank)	(blank)	(blank)	0 days	Fixed U	

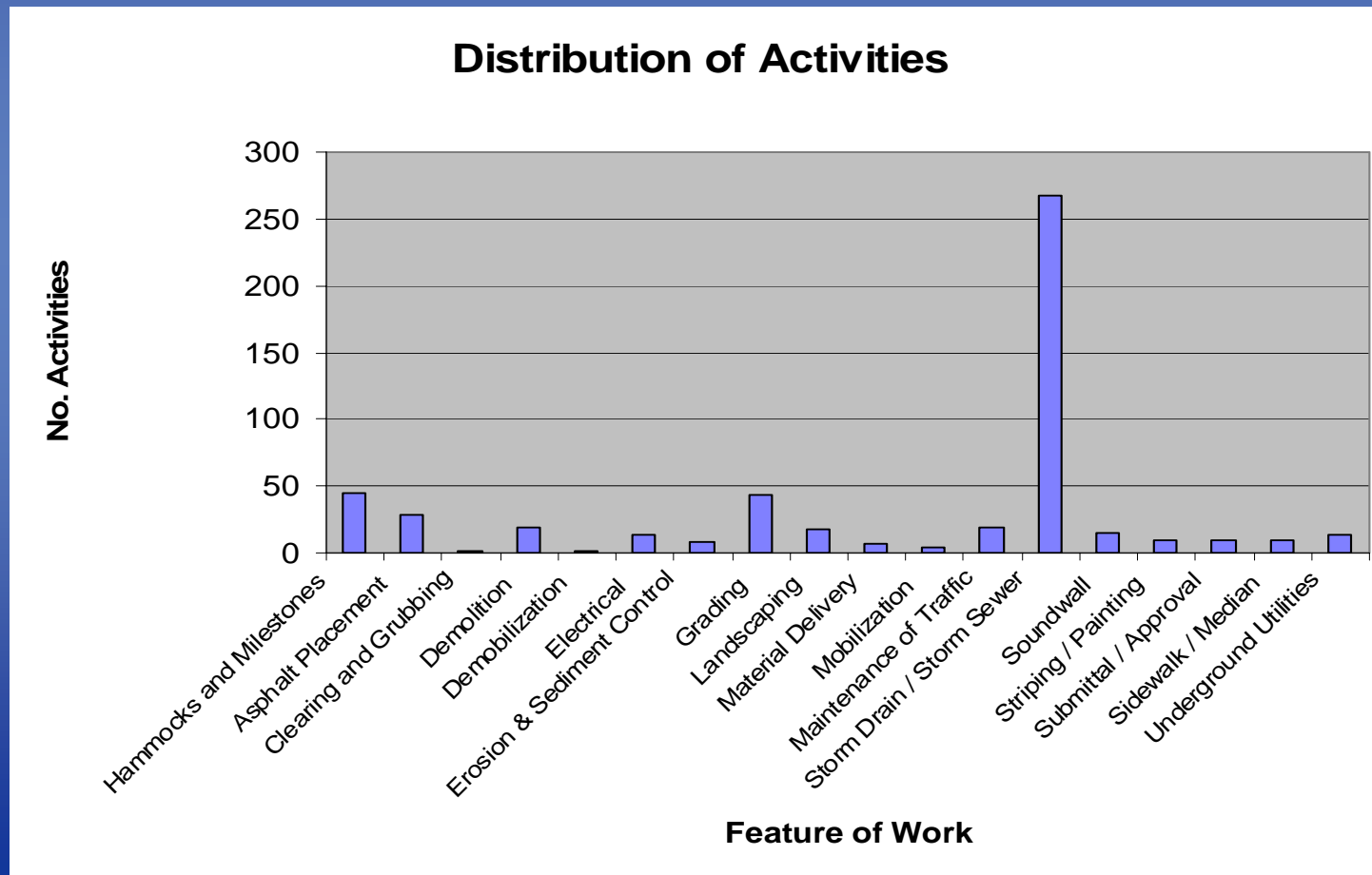
The PivotTable Field List pane is open, showing the following fields:

- ID
- Unique_ID
- Task_Name1
- Task_Name2
- Task_Name3
- Task_Name4
- Task_Name5
- Duration
- Type
- TASK OUTLINE LEVEL

The "Add To" dropdown is set to "Row Area".

Review Standards

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



Review Standards

- Require or provide Written Narrative
 - ◆ Check specifications
 - ◆ Develop checklist for narrative
 - ◆ Develop sequencing plan
 - ◆ Good narrative explains the plan

Review Standards

- Develop a good narrative checklist



Alpha Corporation

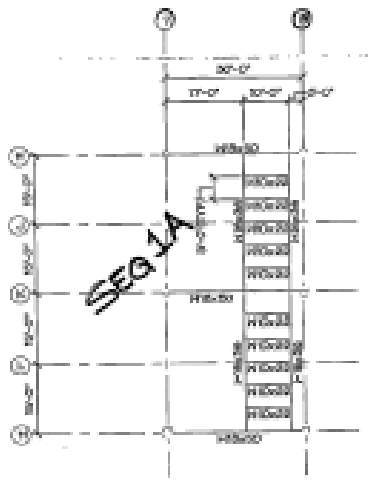
Checklist for a Baseline Schedule Written Narrative

The purpose of the Narrative is to provide a summary of the work, explain the plan for construction, show how the schedule meets the specification and plan contractual requirements, identify potential problems, and summarize the Critical Path. The major components of the Written Narrative are:

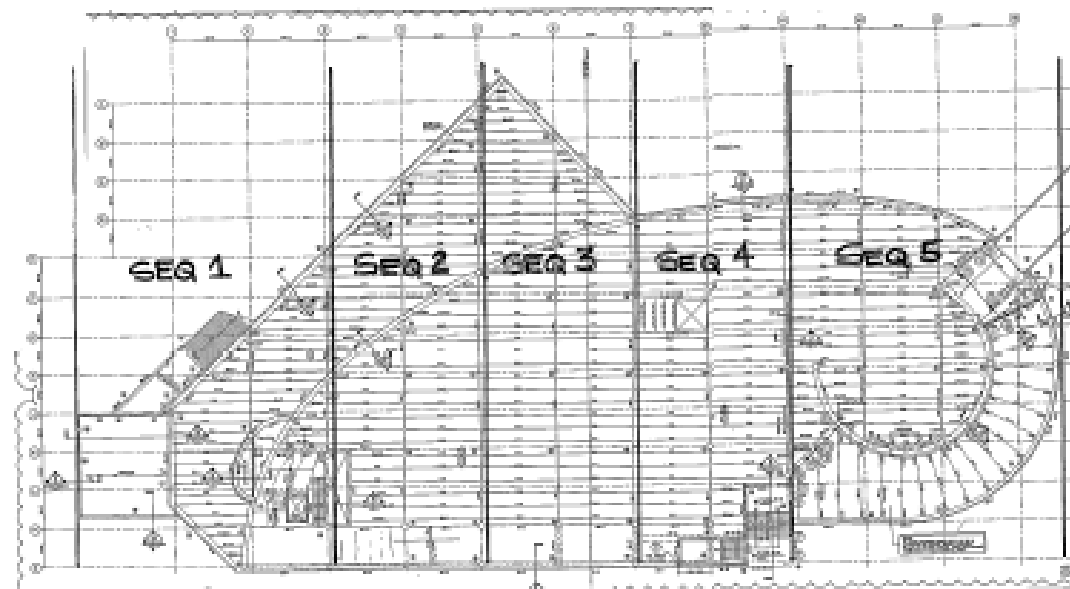
- General description of the scope of work.
- Identification of any area designations.
- General description of the sequencing, including any necessary legend.
- Identification of any deviations from the contractually mandated sequencing.
- Identify any phasing.
- Identification of all Milestones that are contractually mandated.
- Identification of any other Milestones.
- Identify Traffic Control Plan, if applicable.
- Identification of problem areas of the project, and steps taken to limit risk.
- Identify any road closings, or utility coordination shutdowns, or other conflicts.
- List and explain Calendars.
- Explain Adverse Weather planning methodology incorporated in the schedule.
- Identify any unusual logic relationships, such as Start-to-Start or Finish-to-Finish Activity Types and rationale.
- Identify purpose and use of all relationship lags.
- Explain any Activity ID coding.

Review Standards

- Develop & provide Sequencing Plan



SF102 - 1ST FLOOR MECH. SUPPORT FRM.



SF303, SF304 - 2ND FLOOR FRM. PLAN

Gamesmanship

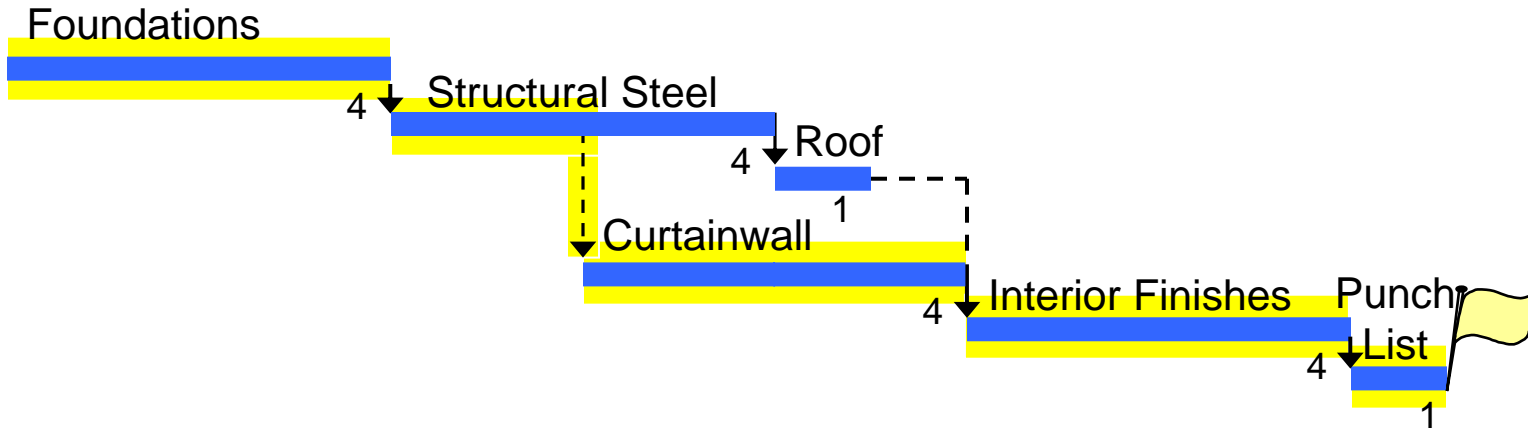
- Approaches used to control outcome, or is it just bad scheduling?
 - ◆ No schedule or very late submittal
 - ◆ Incomplete product submittals (statused as done)
 - ◆ Missing management activities (fab, etc.)
 - ◆ Overview schedule (minimal detail) or highly convoluted schedule (too much logic)
 - ◆ Constraint driven schedule
 - ◆ Calendar schedule (especially MSP)

Gamesmanship

- Software calendar/date failure or just bad scheduling?
 - ◆ MS Project
 - ◆ Status date? Adjustable? Good feature? How does it calculate? Who understands it?
 - ◆ Calendar schedule ability (just type in dates), where's the logic?
 - ◆ Primavera P3eC, Version 5.0
 - ◆ How many ways can you say "date"?
 - ◆ Remaining & Remaining Late Start/Finish; calculated or manual, leveled or not (but not a resource calendar)
 - ◆ Plain old "Start" or "Finish" – what do they mean; who's in charge?
 - Start - "Remaining Start date until activity is started, then set to the Actual Start date"
 - Finish - "Activity Planned Finish date when...not started, the Remaining Finish date when ... in progress, and the Actual Finish date once ... completed."
 - ◆ Be sure to understand how the software you are using works with progress
 - ◆ Need industry standardization

Update Process

Microsoft Project



Months

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----



Update Process

Microsoft Project

Does not automatically reschedule uncompleted work

Foundations



Structural Steel



Roof



Curtainwall



Interior Finishes



Punch List

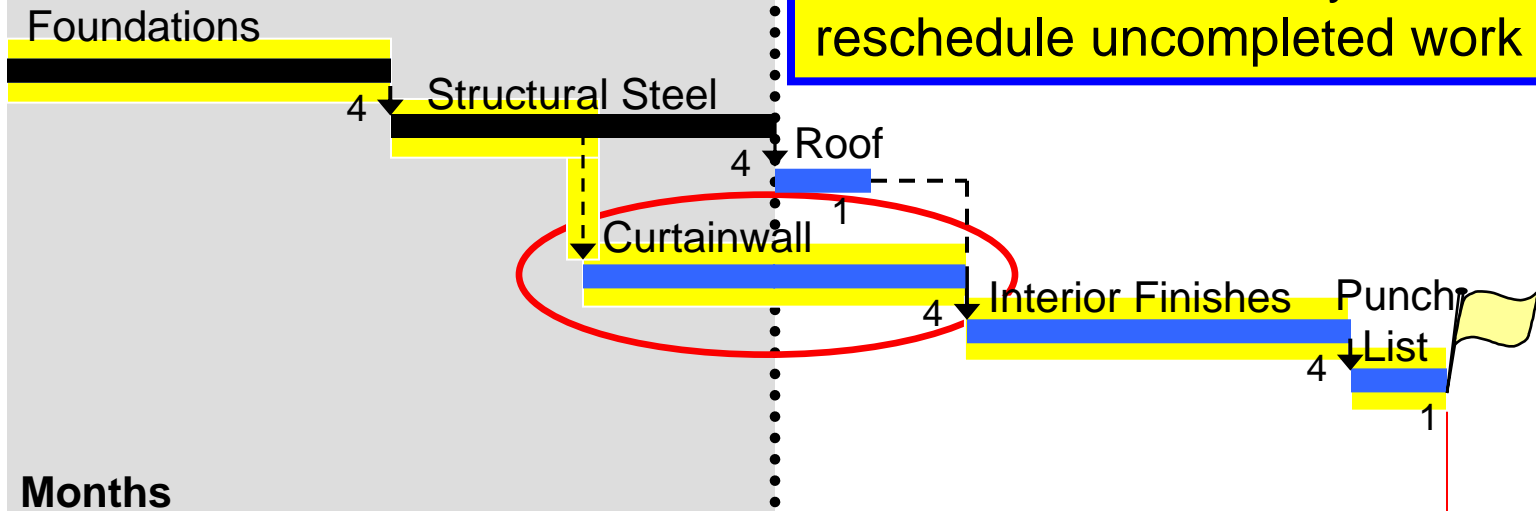


Months



Update Process

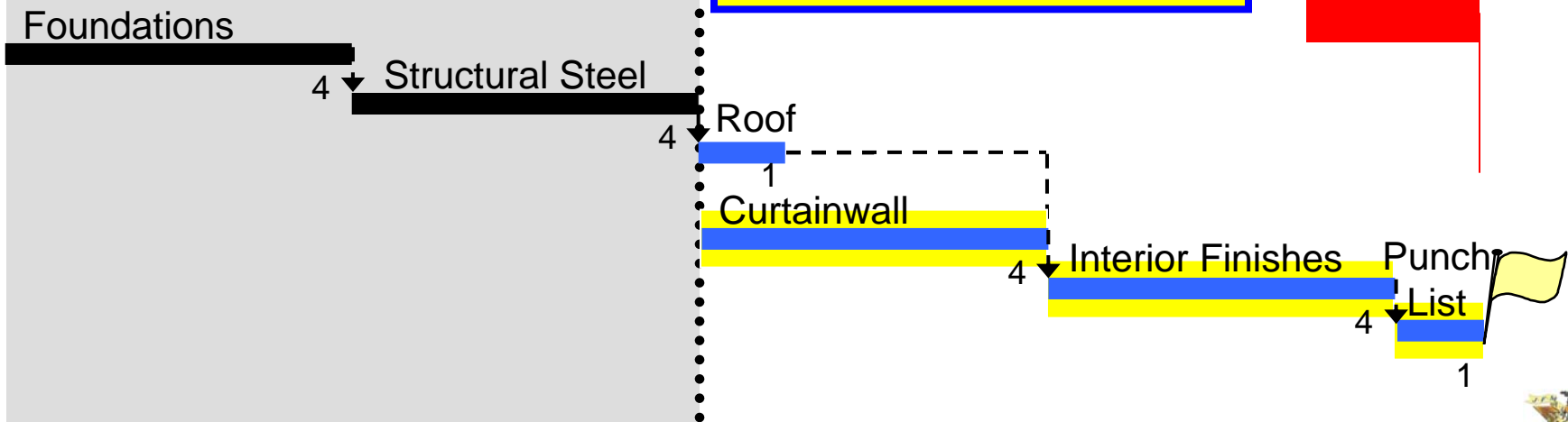
Microsoft Project



Months



Primavera



Microsoft Project

- Reschedule Uncompleted Work to Start on Current Date

If you want to make sure there's no work scheduled for dates that have already passed, you can reschedule uncompleted work to start on the current date for selected tasks or for the entire project. This can be advantageous if your project has fallen behind schedule and you want your project to accurately reflect how much work still needs to be done to complete the project.

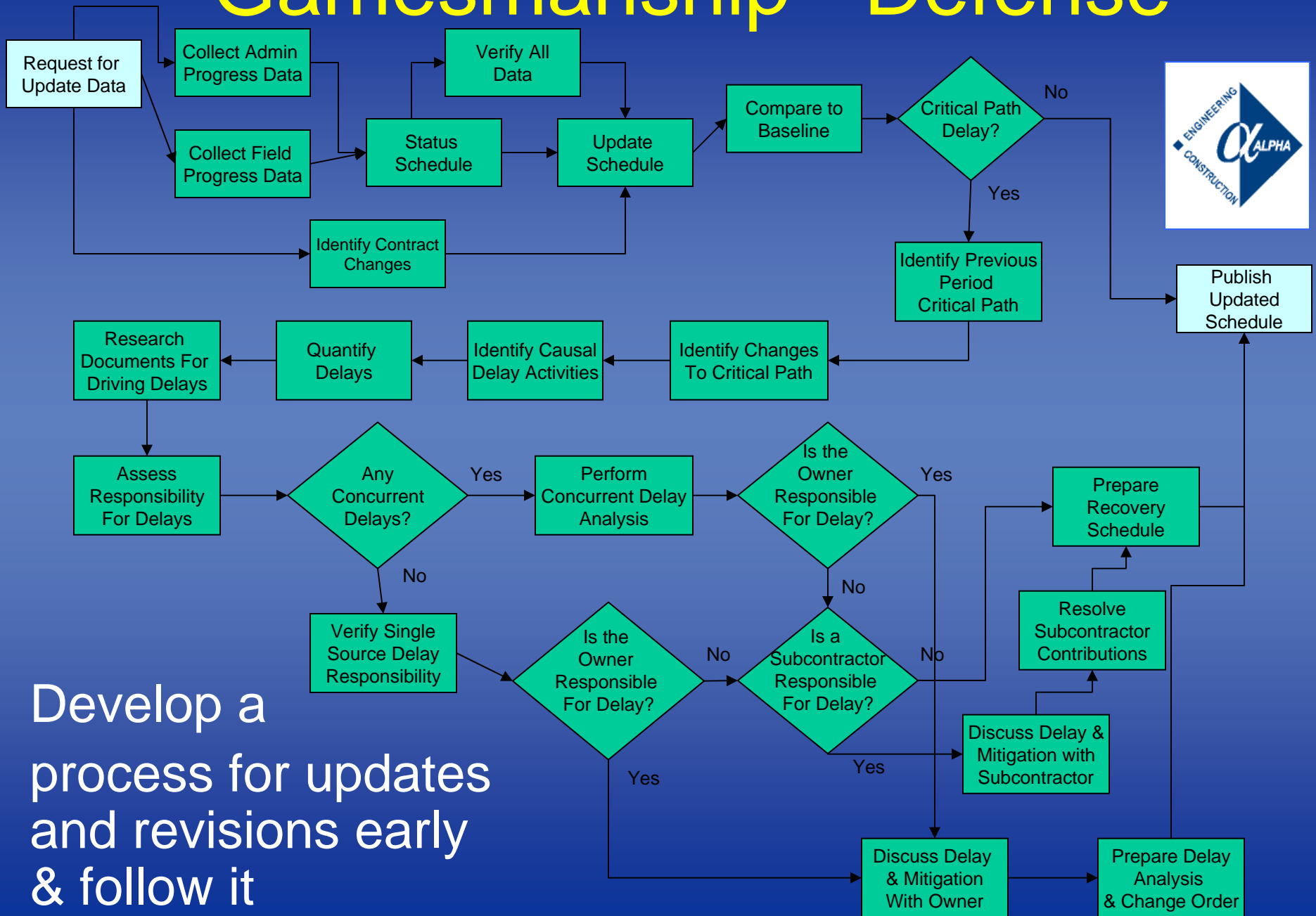
Gamesmanship

- Tricks used to benefit schedule creator
 - ◆ Contrived Critical Path
 - ◆ Runs primarily through Owner items
 - ◆ Runs primarily through A&E review
 - ◆ Inappropriate successor relationships
 - ◆ Constraints & calendars corrupt path
 - ◆ Sequestered float (everything is critical)
 - ◆ Hidden float (lags, durations, calendars)
 - ◆ Out of proportion detail in trade work
 - ◆ Inappropriate length of Critical Path
- Definition of Critical Path (LP, $TF < ?$)
- Any risk shifting behavior

Gamesmanship - Defense

- Approaches
 - ◆ Minimize risk shifting contract language and behavior
 - ◆ Partnering
 - ◆ Develop process for updates and revisions early in project
 - ◆ Follow the process
 - ◆ Get involved in Dispute Resolution/Claims Avoidance
 - ◆ Reconcile schedule gain/loss with each update
 - ◆ Identify causes and responsibility for delay
 - ◆ Require and provide recovery when schedule slips
 - ◆ Timely legitimate time extensions
 - ◆ Do not allow issues to fester

Gamesmanship - Defense



Develop a process for updates and revisions early & follow it

Gamesmanship - Defense

- Defense against schedule tricks
 - ◆ Careful and detailed schedule review
 - ◆ Analysis of Critical & Near Critical Path
 - ◆ Keep good records
 - ◆ Insist on accurate dates
 - ◆ Promote or insist on maintaining schedule so it is current, providing a good model
 - ◆ Good specifications
 - ◆ Experienced schedulers and reviewers
 - ◆ Field buy-in of schedule
 - ◆ Management use of schedule

Gamesmanship - Defense

Track path to each milestone or constraint separately – multiple critical paths should be isolated and reported individually

Table #4, Milestone Tracking (See Milestone Descriptions in Table #3, above)

APMW Milestones	2005						2006											
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	-171																	
4A	16																	
4B		48																
4C		99	99															
4D	LD	128	108	98		90												
4E	LD	163	147	113		84												
5A		-35	-48	-80		-118	-137											
5B		-14	-7	-38		-79	-127	-155	-182	-212	-243	-248						
5C		384	325	314		293	-186	98										
5D		12	-14	-44		-79	-87	-98										
5E		26	-1	-29		-56	-56	-57	-51									
5F		86	60	32		8	9	26	25									
5G		128	108	99		75	46	19	25									
6A	LD	12	10	2		4	4	-3	-19	4	-23	0	-19					
6B	LD	11	8	0		32	50	64	31	65	58	36	24					
7A	LD	86	72	57		64	-5	-4	-2	-4	-26	43	20					
7B	LD	22	19	11		2	-32	-31	-27	-27	-45	16	2					
7C	LD	-21	-26	-38		0	-11	-10	-6	-6	-24	37	35					
7D	LD	-31	-38	-46		-10	-27	-26	-24	-24	-42	21	23					
7E	LD	4	1	-7		7	15	21	23	-7	22	20	4					
8		-27	-32	-41		0	1	1	1	1	1	14	16					

*Variance is defined as (Contractual Finish Date)– (Milestone Planned or Actual Date) in calendar days. A negative variance is a milestone completion delay while a positive variance is early completion.

Green – Milestone finish date variance is equal or less than zero calendar days.

Gamesmanship - Defense

- Suggested Reading
 - ◆ Jim Zack, Ex.: “Construction Scheduling Games & Ways to Win”
 - ◆ Donald F. McDonald, Ex.: “Tripping Hazards in Schedules”
- Documents are available at AACE website

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See You in the Next Webinar!

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