

# Planning a Complex Project - An Under Appreciated Effort

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## TCM - Cost Engineering on My Mind



# Planning A Complex Project – An Under Appreciated Effort

Presented By:

**Glen R. Palmer, PSP, CFCC**

Owner

GR Palmer Consulting Services, LLC

**Chris W. Carson, PSP, CCM, PMP**

Corporate Director of Project Controls

Alpha Corporation

- **Corporate Director of Project Controls, Alpha Corporation**
  - Responsible for standards, processes, and procedures for a team of schedulers, analysts, and project managers in multiple office locations
  - Provided seminars for hundreds of scheduling professionals in CPM scheduling methodologies, and manages the in-house training program at Alpha
- **Certifications:** PSP, CCM (Certified Construction Manager - CMAA), PMP (Project Management Professional - PMI)
- **University:** University of Virginia, Mechanical Engineering, 1972
- **Professional Field:** 38 years of experience in Construction Management, CM Services especially Scheduling, Estimating, Claims
- **Active in AACEi**
  - Co-Author for “Identifying the Critical Path” RP, author for “Recovery Scheduling” RP
  - Co-author for “Schedule Design” RP, currently underway, one of three Editors for “Forensic Schedule Analysis” RP, Rev. 2, contributor to other RPs
- **Active in PMI College of Scheduling**
  - Managing Director for Scheduling Excellence writing “Best Practices and Guidelines for Scheduling” and “Best Practices and Guidelines for Schedule Impact Analysis”
- **Active in CMAA (Construction Management Association of America)**
  - Served on 9 person committee revising the CMAA’s Time Management Standards of Practice
- **Other activities:**
  - US Editor for the Planning Planet’s Planner User Guide
  - One of 11 member team revising GAO’s Scheduling Best Practices portion of Cost Estimating Guide
  - 2006 AACEi Annual Conference, presentation judged best in the Scheduling Track, “Benefits of Performing a Delay Analysis during Schedule Updates



- A Good Plan
  - A Good Plan Does Not Guarantee a Successfully Executed Project, But a Bad Plan Virtually Always Means Project Failure



## ● Introduction

- The Effort Required To make a Good Plan Is Under Appreciated in the Industry
- Many Organizations Have Forgotten How to Plan
- A Plan Created By the PM And the Scheduler Only Is Not a True Plan



- The Biggest Mistakes Made In Planning
  - If a Person Knows How to Run Scheduling Software, He or She Must Know How to Plan
  - The Project Cannot Afford the Hours Required to Plan the Project
  - The Size of the Planning Group Will Make it Impossible to Get Agreement
  - Waiting Too Long to Plan the Job
  - Attempting to Plan a Project Before the Team Has Plans and Specifications



- Assuming that if a Person Knows How to Run Scheduling Software, He or She Must Know How to Plan
  - Planning a Complex Project Requires Project Field Experience
  - Anyone Can Learn to Operate Software
  - Running a Planning Session Requires Public Speaking Skills
  - In the Old Days Planning and Scheduling Were Two Different Jobs



- Thinking the Project Cannot Afford the Hours Required to Plan the Project
  - The Project Cannot Afford Not to Plan the Project
  - A Good Plan Will Make the Project Substantially More Efficient
  - The Cost For A Good Plan Will Not Impact total Cost
  - Companies Always Find Money to Work On Claims, But there Is Never Enough For Planning

- Assuming that if the Entire Team Is Involved In the Planning Process, the Size Of the Group will Make It Impossible to Get Agreement
  - All Major Stakeholders Need to Be Involved In Planning the Project
  - The Team Experience/Lessons Learned Needs to be Incorporated Into the Plan
  - Risk Management should be Included in Planning
  - This Is A Great Team Building Exercise



- **Waiting Too Long to Plan the Job**
  - Waiting Until A Job Is Won Is Way Too Late to Plan How to Execute the Work On A Fixed Price Project
  - The Plan Impacts the Cost Estimate
  - Need to Have a Pre-Bid Planning Session, Which Can Be Performed at a Higher Level
  - Some Projects Do Not Get a Good Plan Until the Job Gets Into Financial Trouble



- Attempting to Plan a Project Before the Team Has Plans and Specifications
  - Planning a Complex Project Requires Information Enough to Understand the Scope Of Work
  - The Project Management Team **MUST** Know the Plans and Be Able to Work Out Sequencing
  - The Team Must Know the Interrelationships Between Trades, Locations, Processes



## ● Who Needs to Be Involved?

- Project Manager
- Superintendent
- Engineering Manager
- Procurement/Contracts
- Lead Civil/Structural
- Lead Mechanical
- Lead Piping
- Lead Electrical
- Lead Instrumentation
- Construction Manager
- Project Controls Mgr
- Lead Scheduler
- Lead Start-up
- Facilitator
- Major subcontractors



- Prior to Planning or Schedule Development Session, Give Team the Following:
  - Contract
  - Plans & Specs or Program Information
  - Cost Estimate and Basis Of Estimate
  - Schedule Submitted With Bid
  - Project Execution Write-up



- At the Planning Session, the Team Member Expectations Are:
  - Completely Understand His/Her Portion of Estimate
  - Have Already Performed a Constructability Review
  - Know Construction Sequence and Durations
  - Lead Engineers Will Provide Sequence and Durations
  - Know Material Lead Times and Major Delivery Dates
  - Determine Start-up Sequence
  - Understand Commissioning & Close-out Sequences
  - Know Constraints on Project – Funding, Down Time, Owner Input/Furnished Equipment



- The Planning Session Location
  - The Session Should Be Held In a Large Conference Room
  - Engineers and Contractors Need to Be Away From Their Offices to Become Engaged
  - Catered Lunch to Ensure Team Stays
  - Work Surfaces to Spread out Plans & Sketches
  - Team Members That are Truly Engaged In the Process Often Have Break-out Sessions to Discuss Alternatives – Occasionally Finding a Better Approach



- The Planning Session – Opening Remarks
  - Project Manager Introductions & Goals
  - Facilitator Explains “Card Trick” Process
  - Project Scheduler Explains WBS, Scope Exclusions, Weather, Constraints, etc.
  - Leads Discuss their Scope, Engineering Hours, Drawings Required, Estimated Quantities, and their Contractual Requirements
  - Team Members Discuss List of Lessons Learned
  - Risk Register (combined with lessons learned)



- The Planning Session – Opening Remarks (Continued)
  - Facilitator Discusses Construction Support
  - Facilitator Explains the Need For Producing a Meaningful and Achievable Plan & Desired Format
  - Facilitator Explains Team “Buy-In”
  - Facilitator Homework – Unprepared Team
  - Facilitator Explains the Need to Fight For What You Believe In
  - Explain Risk Management Process



- The Gilbane “Card Trick”
  - Developed by Gilbane, A General Contractor With Great Planning And Organizational Skills
  - Uses Colored “Post-it Notes” to Represent Different Disciplines or Subcontractors
  - Uses a Large Paper Calendar on Conference Room Wall – Some Use a Large White Board or Pincushion Wall Covering
  - Other Names – Storyboard Planning, Bar Chart Development



- The Start Of the Planning Session
  - On a Large Complex Project the Starting Point Is Usually the Delivery of Long Lead Equipment

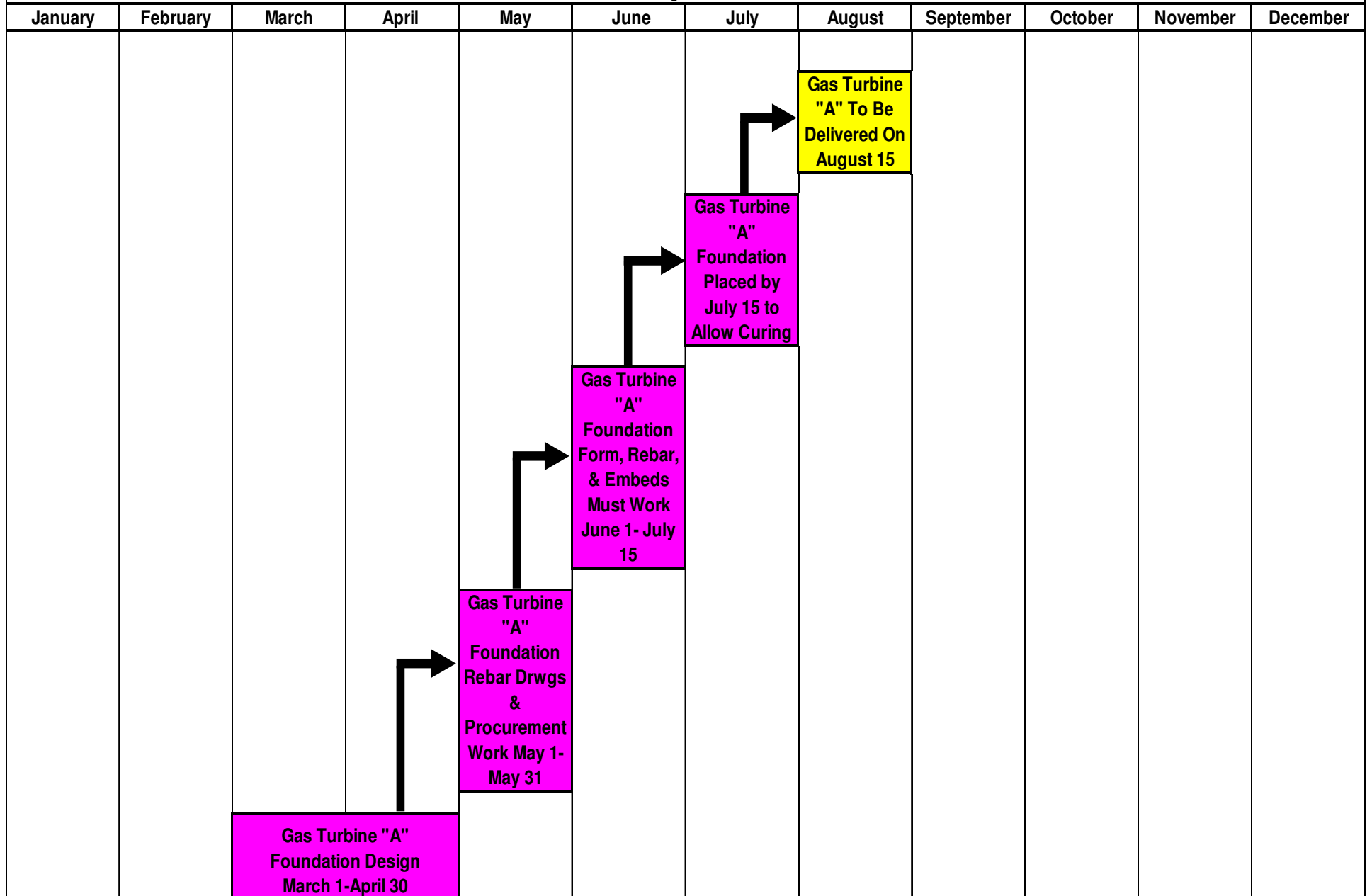
# Project X

January	February	March	April	May	June	July	August	September	October	November	December
					HRSG "A" To Be Delivered On June 30						
							Gas Turbine "A" To Be Delivered On August 15				
						HRSG "B" To Be Delivered On July 30					
								Gas Turbine "B" To Be Delivered On September 15			
										Steam Turbine To Be Delivered On November 30	



- The Next Step of the Planning Session
  - Perform a Backward Pass Through the Foundation Engineering for Each Piece of Equipment
  - This Should Include Cure Time, Winter Concrete Placing, Rainy Season Allowance, Etc.
  - If the Equipment Is Inside a Building, then the Building Foundation and Slab May Need to Be Placed Prior to the Equipment Foundation
  - Building Close-in at Equipment Locations May Drive Another Path of Activities or Sequencing
  - Access Paths may Drive Sequencing – Elevator Shaft Drilling, Modular Construction Installation

# Project X





- The Next Part Of the Planning Session (Continued)
  - Next ,Set the Equipment on Its Foundation and Go Forward through Construction
  - This Same Process Is then Continued through All Major Equipment, Structures and Commodities through System Turnover
  - If the Project Is Not Driven By Equipment Deliveries, then Pick the Important Milestones and Use the Same Planning Approach



- Typical Milestones

- Building – Structure Weather Tight
- Building – Foundation Complete
- Port – First Run Dredging Complete, Wharf Complete
- Pipe Line – Frost Out of the Ground
- Bridge – Steel, Girders, Bascule Equipment Delivered
- Access to Parts of Site
- Limitations on Construction – Pile Driving Restricted Times, Habitat Nesting Times, Wetlands Impact on Site



- Why Use the “Card Trick” Approach?
  - Need to Be Able to Visualize Entire Plan
  - Computer Generated Plan Is Soon Too Large to Display Entire Plan on Screen
  - The Different Color “Post-its” Make It Easy to See If the Plan Works
  - Many People In the Industry Are Less Comfortable With a Computer Generated Bar Chart
  - Card Trick Is on the Wall for Team to Review
  - Process Generates Discussions about Sequencing





- The Different Color “Post-its” Make It Easy to See If the Plan Works
  - If the Yellow “Post-Its” are Foundations And the Purple “Post-its” are Equipment, then Things Look Good
  - If the Yellow “Post-Its” are Equipment and the Purple “Post-its” are Foundations, then Things Are Not So Good
  - The Same Visualization Works for Piping Versus Electrical



- Dedicate Specific Colors for Risks & Constructability Issues
  - Choose a Color for Risks
    - Write Down Each New Risk and Stick Next to Affected Activity
    - Saves Interruption from Main Discussion
  - Choose a Color for Constructability Issues
    - Place Next to Affected Process or Activity
    - Used as Memory Jog
    - Review at End, Make Necessary Changes
    - Saves Time in Discussing Details While Still Working out Basic Sequencing



- If Desired, Can Display Logic
  - Some Schedulers Use Yarn or String to Model Relationships between Activities
  - May Help to Clarify Logic Between Activities
  - Particularly Good for Special Relationships



- Document the Plan
  - Use a Camera to Record the Plan
  - Have the Scheduler Input all Activities and Relationships as the Plan is Developed
  - Print a Copy of the Overview Plan



## ● The Planning Session

- These Session Typically Take 1-3 Days Depending on Complexity Of Project
- At the End of the Session Each Team Member Is Asked to Sign-Off on the Plan Signifying “Buy-in”
- The Output of the Planning or Schedule Development Session is an Overview or High Level Schedule – Sometimes Called an Outline Schedule
- Overview Schedule Captures Main Sequences, Constraints, Milestones, Full Scope of Work



- After the Planning Session
  - Project Scheduler Inputs Plan Into Scheduling Software
    - During Session or Immediately Afterwards
  - Clear Up any Unforeseen Issues that Impact Plan Such as Project Calendars
  - Subdivides Higher Level Plan into Detailed Schedule
  - All Elaborated Details Must Roll Up into Overview Schedule to Ensure Continuing Team Buy-in
  - The Output Of this Effort Becomes the Project Baseline Plan Unless - the Planning Effort was for Schedule Recovery, then It Becomes the Revised Baseline



- Facilitator Requirements
  - An Off-Team Facilitator Works Best Due to the Need to Control the Group, Ask Difficult Questions, Give Homework, Etc.
  - Facilitator Needs:
    - Great Communication Skills
    - Credibility
    - Great Project Experience
    - Keep All Team Members Engaged
    - Does Not Allow Team to Get Bugged Down with Distractions – Use Risks and Constructability Issue Post-it Notes to Allow Team to Move on



Thank You  
For Attending!

# Contact Information



**Name:** **Chris W. Carson, PSP, CCM, PMP**  
**Title:** Corporate Director Of Project Controls  
**Company:** Alpha Corporation  
**Email Address:** [chris.carson@alphacorporation.com](mailto:chris.carson@alphacorporation.com)  
**Phone Number:** +1 (757) 342-5524

**Name:** **Glen R. Palmer, PSP, CFCC**  
**Title:** Owner  
**Company:** GR Palmer Consulting Services, LLC  
**Email Address:** [gpalmer@gpalmer.com](mailto:gpalmer@gpalmer.com)  
**Phone Number:** +1 (603) 591-6754