International Experts in Claims Analysis, Dispute Resolution, and Project Management for Process, Oil & Gas, Pipeline, Power, Industrial, Infrastructure, and Building Construction Projects

LONG INTERNATIONAL

Schedule Quality Assurance Services

OVERVIEW

Many project schedules are often poorly prepared and require extensive rebaselining during project execution to become a useful project management tool to properly measure progress, determine the effect of changes in scope, and forecast the completion of contractual milestones and overall project completion dates. Poorly prepared schedules do not provide a reliable tool to measure the amount and responsibility for delays that occur during project execution to provide a basis for a time extension or to assess the need for acceleration to mitigate delays. To rectify these common problems with project schedules, Long International provides Schedule Assurance Services.

1. Scope of the Project Schedule

Long International will review the list of schedule activities to determine that the schedule accurately reflects the contractual Scope of Work. Typical scope of work activities for a process plant project include, but are not limited to, the following tasks:

A. Engineering

- Process Design, Plant Layout and Detailed Design
  - Discipline-Specific Activities
  - HAZOP and Design Reviews
  - Modules
  - EPC Contractor Interfaces

B. Procurement

- Component Procurement
  - Equipment
  - Bulk Materials
  - Shop Testing and Qualification
  - Transportation
- Pipe and Module Fabrication and Assembly
  - Fabrication and Assembly
  - Testing and Qualification
  - Transportation

C. Construction

- Site Preparation
  - Earthmoving/Soil Preparation
  - Laydown Area Preparation
  - Storage Area/Warehousing Construction
  - Waste Disposal Construction
  - Security Construction
  - Temporary Office/Support Base and Services Construction
- Construction
  - Process Units
  - Utilities
  - Piperacks
  - Main Control Rooms, Administration, Workshop Buildings, and Shelters
  - Main/Backup Power Supply and Substations
  - Wharf
  - Tank Farm
  - Other Plant Systems
- System Completion and Turnover
  - Safety Systems
  - Main Control Room Systems
  - Electrical and Instrumentation Systems
  - Mechanical Systems
  - Plant Utility Systems
  - Other Plant Systems

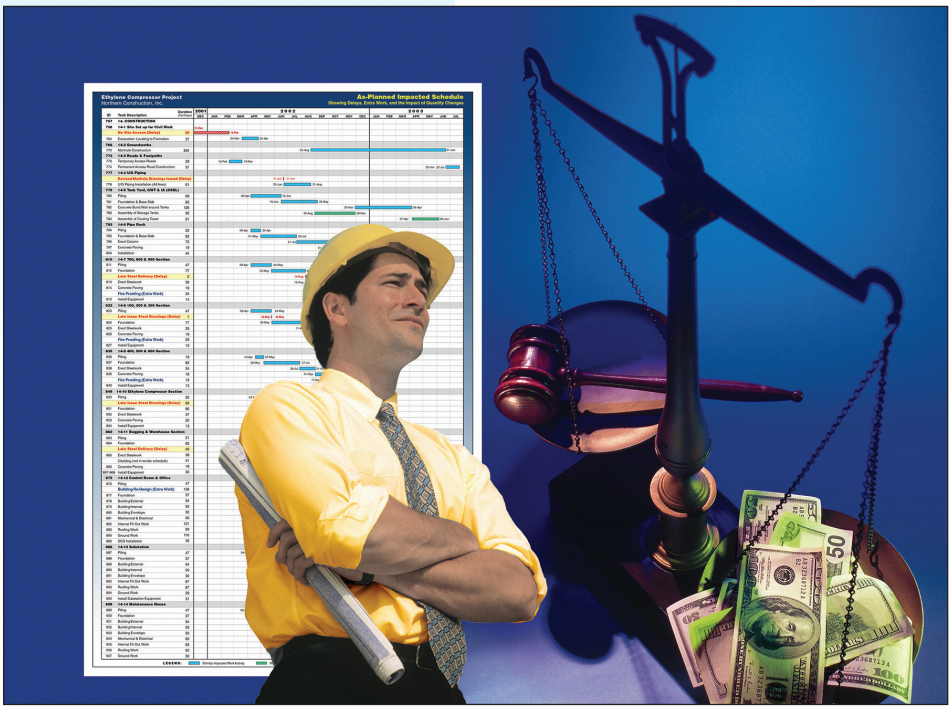
D. Pre-Commissioning and Start-up

- System Testing and Qualification
- Safety Systems
- Main Control Room Systems
- Electrical and Instrumentation Systems
- Mechanical Systems
- Plant Utility Systems
- Other Plant Systems

E. QA/QC

- Owner Approvals
- Engineering Model Reviews
- Safety Reviews (HAZOP)
- Equipment Inspection and Factory Acceptance Tests
- Pipe Fabrication and Module Shop Inspections
- On-site Construction Inspections
- Testing and Qualification Reviews

For offshore projects, different scope of work and activity definitions will be included in the project schedule. Activities for the engineering, procurement, fabrication, and assembly of the hull, topsides, risers, subsea mooring, and other work necessary for sailaway, as well as offshore installation, start-up, and commissioning will be evaluated. Based on the contractual requirements for offshore projects, a similar analysis will be prepared to ensure that all contractual scope is included in the project schedule.



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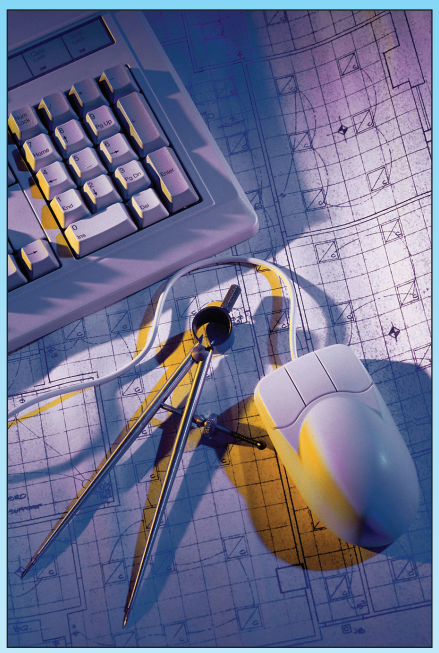
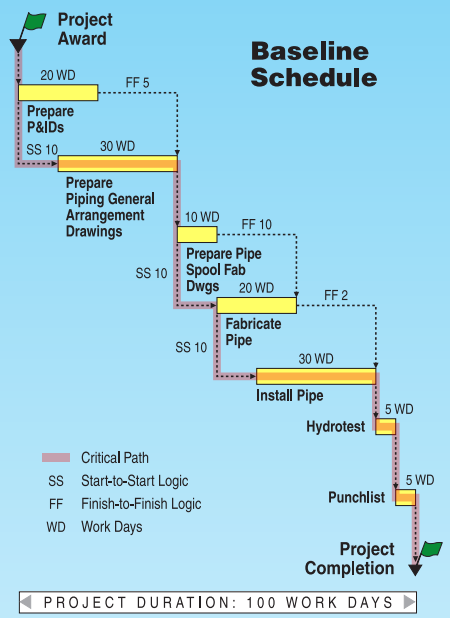


2. Schedule Metrics Comparison

Long International will evaluate the project schedule metrics and provide an analysis of whether the schedule integrity is within standard industry practice. Long International will also identify and list the specific activities that may require action by the Owner or Contractor:

- Activity Types – Tasks, Milestones, Hammocks, WBS. . . . . ☑
- Activity Status – Number Completed, In-Progress, Not Started . . . . . ☑
- Number of Activities per US$1 MM of Cost. . . . . ☑
- Number of Activities per Month Cycle Time . . . . . ☑
- Average Activity Duration (Days) . . . . . ☑
- Number of Activity Calendars. . . . . ☑
- Percent of Activities with Network Ties. . . . . ☑
- Number of Constrained Activities. . . . . ☑
- Average Activity Float (Days) . . . . . ☑
- Resource Loading . . . . . ☑
  - Number of Resource Types . . . . . ☑
  - Number of Resource Categories . . . . . ☑
  - Percent of Activities with Resource Loading . . . . . ☑
  - Resource Driven? (Yes/No) . . . . . ☑
  - Resource Leveling? (Yes/No) . . . . . ☑
- Float Ratio = Average Activity Float/Average Activity Duration . . . . . ☑
- Startup Scheduling? (Yes/No) . . . . . ☑
- Are Activities Balanced over the Project Duration? . . . . . ☑
- ⅓ Duration Point Reviews – What Percent of the Activities Have Not Started?. . . . . ☑
- Vertical & Horizontal Traceability. . . . . ☑
- Excessive Activity Duration Check . . . . . ☑
- Excessive Float Check . . . . . ☑
- Excessive Negative Lag Check . . . . . ☑
- Activity Code Assignment Check . . . . . ☑
- Planned v. Actual Labor Resource Check . . . . . ☑
- Planned Duration v. Actual Duration Check. . . . . ☑
- Percent Complete v. Remaining Duration Analysis . . . . . ☑
- Change in Schedule Calculation Mode? (Yes/No) . . . . . ☑
- Other Metrics Requested by Client. . . . . ☑



3. Schedule Logic Review

Long International will review the project schedule to answer the following questions:

- Do all activities have at least one successor? ☑
- Do all activities have at least one predecessor? ☑
- Have activities with an unreasonably large amount of float been investigated to determine if the float is justified? (It could be an indicator that activities are not properly linked in the schedule.) ☑
- Have activity relationship gaps or overlaps been included for appropriate activities, and are the assumptions well defined for these logic gaps or overlaps? ☑
- When a scope change occurs (especially on the critical path) and the scope change activities are entered into the schedule, does the changed scope automatically update the schedule completion date and other contractual milestones through the logic dependencies? ☑
- Do constrained dates exist in the schedule, such as "start no later than" or "must finish on" constraints, and has the reasoning for these constraints been examined and justified? ☑
- Was the engineering percentage completion and material received at the time of start of field construction or major fabrication checked to be sure that the progress is consistent with the contract basis for progress measurement? ☑
- Do any activities have a large negative or positive lag in the relationships? Activities with large positive and negative lags should be identified, as they can distort the logic. Can positive lags be better represented by adding new activities? ☑
- Do any activities have progress but no actual start date? ☑
- Are any activities completed without an actual finish date? ☑
- Are there any logic structures in the schedule that may lead to potential claims? ☑
- Is the schedule calculated based on "Retained Logic" or "Progress Override?" ☑

4. Critical Path Evaluation

Long International will review the reasonableness and completeness of the critical path for the engineering, procurement, construction, and pre-commissioning activities, and any available near-critical path activity chains. Where potential vulnerabilities to the critical path are identified, recommendations to mitigate the delays will be made.

The critical path can be influenced by preferential logic, work activity estimated durations, and calculation methods used by the CPM software. Long International will determine if there is any evidence that preferential logic was utilized to force the critical path. In addition, we will determine if activity durations are consistent when compared to similar activities.

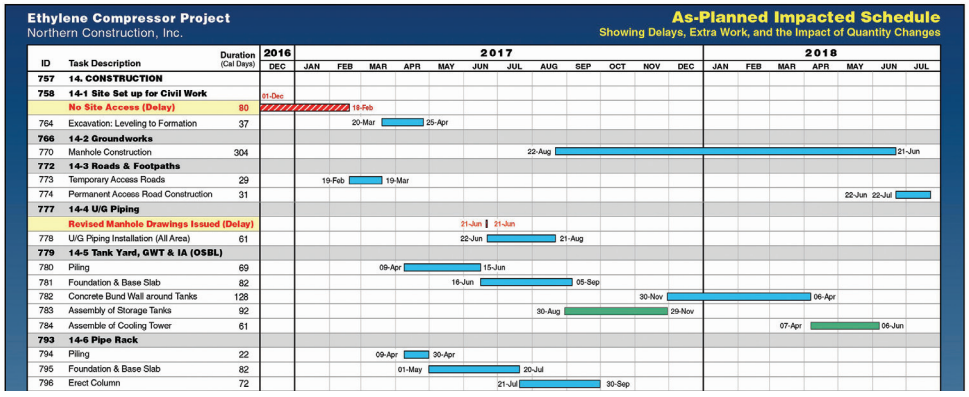
There are numerous side paths for subordinate tasks which normally can be performed without affecting the critical path. However, these subordinate tasks, if improperly scheduled or unduly delayed in performance, can become critical and thus change the critical path for the entire project. Long International will evaluate potential problems with side paths.

Long International will evaluate near-critical paths and identify activities that are likely to impact contractual milestones and the project completion date, but have not been identified as being on the critical path. These identified activities will be placed on a watch list for evaluation on future schedule updates. Long International will also identify activity chains where Owner approval or review is required, thus providing the Owner with awareness where its timely performance is essential to not delay the Contractor's work or the project.

5. Schedule Comparisons

Long International will compare schedule updates to the baseline/rebaseline schedule or to previous schedule updates to identify changes made to the current schedule. Diagnostics include the following:

- Added and Deleted Activities
- Activity Start and Finish Delays
- Activity Duration Changes
- Changes to the Critical/Near-Critical Paths
- Significant Changes to the Schedule Logic
- Added Constraints
- Changes in Schedule Calculations
- Changed Activity Coding
- Added or Changed Resources
- Identify Comments entered into the Schedule Log Field
- Changed Scope Activities added to the Schedule

6. Deliverables

For each of the aforementioned analyses, Long International will prepare a Narrative Report along with Tables/Exhibits detailing the information analyzed for each review. In addition, Long International will export the schedule data into an Excel spreadsheet for our client's review. If requested, Long International will also meet with the client's project management and project controls personnel to review the results of the analyses.