

SECTION 01 32 16

CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Specific requirements for the preparation, submittal, updating, status reporting and management of the construction Progress Schedule.
- B. Provide Construction Schedules for Work included in Contract in accordance with requirements in this Section. Create Construction Schedule using Critical Path Method (CPM) computer software capable of mathematical analysis of Precedence Diagramming Method (PDM) plans. Provide printed activity listings and bar charts in formats described in this Section.
- C. Combine activity listings and bar charts with narrative report to form Construction Schedule submittal for Owner and the Owner's Representatives.
- D. Related Specification Sections include, but are not necessarily limited to:
 - 1. Division 00 - Bidding Requirements, Contract Forms and Conditions of the Contract.
 - 2. Division 01 - General Requirements.

1.2 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for this item. Include the cost of construction scheduling in overhead cost for this project.

1.3 SCHEDULING STAFF

- A. Employ or retain services of individual experienced in critical path scheduling for duration of Contract. Individual shall cooperate with Owner's Representative and shall update schedule (Progress Schedule) monthly as required by the Contract's General Conditions, to indicate current status of Work.

1.4 QUALITY ASSURANCE

- A. The person preparing and revising the construction Progress Schedule shall be experienced in the preparation of schedules of similar complexity.
- B. Within five (5) days from award of the Contract, Contractor shall submit to Owner's Representative the name of the person responsible for the preparation, maintenance, updating and revision of all schedules.
 - 1. Qualifications necessary:
 - a. At least five (5) years verifiable experience in the preparation and updating of complex construction schedules for projects of similar type, size and complexity.

- b. Proficient in the use of Microsoft® Project® 2007.

1.5 DEFINITIONS

A. The following definitions shall apply to this Specification Section:

1. **BASELINE SCHEDULE:** The initial as-bid, detailed, cost and resource loaded Progress Schedule prepared by the Contractor to define its plan for constructing the Project as required by the Contract Documents, and accepted by the Owner or Owner's Representative as meeting the requirements of the Contract Documents for specified constraints, sequences, milestones and completion dates.
2. **PROGRESS SCHEDULE:** The initially accepted Baseline Schedule, or subsequently approved Revised Baseline Schedules, updated each month to reflect actual start and finish dates of schedule activities and all time impact events whether caused by Contractor or Owner or factors beyond the control of either party.
3. **REVISED BASELINE SCHEDULE:** The initially accepted Baseline Schedule revised to reflect only approved changes.
4. **WORKING SCHEDULE:** A schedule developed from the Progress Schedule, utilizing scheduling software features not allowed for Baseline and Progress Schedules at the Contractor's sole discretion, to indicate the Contractor's plan for executing the Work, and providing for schedule recovery when approved time extensions are not sufficient to provide for timely completion due to Contractor inefficiencies beyond the control of the Owner or outside the risks accepted by the Owner.

1.6 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Scheduler qualifications.
3. Baseline Schedule: Submitted within 30 days after Effective Date of Agreement.
4. Monthly Progress Schedules.
5. Revised Baseline Schedules.
6. Working Schedules.
7. Look-Ahead Schedules.

1.7 GENERAL REQUIREMENTS

A. Contractor shall prepare and submit Baseline and Progress Schedules and updates and revisions to them as specified herein.

1. All scheduling to be performed in Microsoft® Project® 2007.

2. The Baseline and Progress Schedules shall be a calendar day-based and cost-loaded Critical Path Method (CPM) network diagram with supporting data.

B. Disallowed Scheduling Software Features:

1. The following specific features are not allowed to be applied in the Baseline and Progress Schedules:
 - a. Resource leveling.
 - b. Activity or event constraints, other than those specified by the Contract Documents.
 - c. Leads and lags:
 - 1) Create specific activities with specific durations in-lieu-of leads and lags.
 - 2) Durations shall have positive values.
 - d. Default progress data:
 - 1) Start and finish dates shall not be automatically updated.
 - 2) Update with actual start and finish dates documented from field reports.
 - 3) Work activities shall be updated by actual Work progression, not cash flow driven.
 - 4) Updating of activity percent complete and remaining duration shall be independent functions, not one parameter calculated from the other.
 - 5) Out-of-sequence progress shall be accounted for through retained logic, not a default option of progress override.
 - e. Multiple calendars.
2. Any float suppression techniques or other software features that corrupts the pure mathematical model calculating the critical path.
 - a. The following CPM schedule outputs will be rejected without further review:
 - 1) Schedules indicating the start of the critical path at a date point or activity beyond the date of Notice to Proceed, or schedules indicating a discontinuous critical path from Notice to Proceed to Contract completion.
 - 2) Schedules defining critical activities as those on a path or paths having some minimum value of float.
 - 3) Schedules with multiple critical paths.
 - 4) Schedules indicating a completion date beyond the contractual completion date.

3. Contractor, at Contractor's sole discretion, may employ the disallowed scheduling software features for Contractor's exclusive use in preparing a Working Schedule.
- C. Float Time:
1. Neither the Owner nor the Contractor owns the float; the project owns the float.
 2. As such, liability for delay of the project completion date rests with the party actually causing delay to the project completion date.
- D. By preparing and submitting the Baseline Schedule, the Contractor represents that it can and intends to execute the Work and portions thereof within the specified times and constraints and that its bid covers the costs associated with the execution of the Work in accordance with the Construction Schedule.
- E. Contractor shall provide an electronic copy on Sharepoint for the Baseline Schedule and Progress Schedule and all monthly updates of both to accompany hard copies of the schedules and tabular reports.
1. Electronic submittal shall be in a format compatible with Microsoft® Project® 2007.
 2. Contractor shall provide with the schedules, a procedural outline of the system shut-downs and proposed tie-ins, and the Owner's O&M staff, which shall be subject to approval of the Owner.

1.8 SUBMITTAL PACKAGES

- A. Baseline Schedule:
1. CPM time-scaled network diagram:
 - a. Three (3) prints of each sheet.
 - b. Minimum sheet size: 11 IN x 17 IN.
 - c. Provide electronic format.
 2. Supporting data:
 - a. Three (3) sets of a list of project activities including the following:
 - 1) Holidays that will be observed during construction.
 - 2) Number of planned working days and shifts per week.
- B. Monthly updates that include the following:
1. Narrative Schedule Report.
 2. Revised Baseline Schedule as appropriate.
 - a. Update to reflect approved Change Orders occurring since the prior update.

- b. If no new approved Change Orders since prior update, provide a narrative report indicating such, and acknowledging the pertinence of the previously approved Baseline Schedule.
 3. Updated Progress Schedule.
 4. Explanation of changes in logic, duration of activities.
 5. The number of opaque reproductions which Contractor requires, plus three (3) copies which will be distributed by the Owner's Representative.
 - a. Do not submit fewer than three (3) copies.
 6. Upload electronic version (pdf) to SharePoint.
- C. Look-Ahead Rolling Schedule:
 1. A four-week rolling schedule shall be provided by the Contractor at each progress meeting.
 - a. The schedule shall provide an accurate representation of the work performed the previous week and work planned for the current week and subsequent two (2) weeks.
 2. The schedule shall be provided in a tabular format with bars representing work duration.
 - a. The schedule shall refer to activity ID numbers on the Baseline and Progress Schedules.
 - b. Activities that are on the critical path and activities that are behind schedule shall be noted by color, highlight, or underscore.
 3. Derived from the Working Schedule, if applicable.
- D. Narrative Schedule Report:
 1. Schedule reports for Initial Baseline and Revised Baseline Schedules shall include the following minimum data for each activity:
 - a. Preceding and succeeding activities.
 - b. Activity description and number.
 - c. Durations of activities:
 - 1) Original durations.
 - 2) Remaining durations.
 - d. Earliest start date (by calendar date).
 - e. Earliest finish date (by calendar date).
 - f. Actual start date (by calendar date).
 - g. Actual finish date (by calendar date).
 - h. Latest start date (by calendar date).
 - i. Latest finish date (by calendar date).

- j. Float.
 - k. Percentage of activity completed.
 - l. Activity constraints specified by the Contract Documents.
 - m. Type of Tabulation (Initial or Updated).
 - n. Project Duration.
 - o. Project Contractual Completion Date.
 - p. The date of commencement of the Work as stated in the Notice to Proceed.
 - q. If an updated (revised) schedule, cite the new project completion date and project status and date of revision.
2. Shall be organized in the following sequence with all applicable documents included:
- a. Contractor's transmittal letter.
 - b. Work completed during the period.
 - c. Identification of unusual conditions or restrictions regarding labor, equipment or material.
 - d. Description of the current critical path.
 - e. Changes to the critical path and scheduled completion date since the last schedule submittal.
 - f. Description of problem areas.
 - g. Current and anticipated delays:
 - 1) Cause of delay.
 - 2) Impact of delay on other activities, milestones and completion dates.
 - 3) Corrective action and schedule adjustments to correct the delay.
 - h. Pending items and status thereof:
 - 1) Permits.
 - 2) Change orders.
 - 3) Time adjustments.
 - 4) Non-compliance notices.
 - i. Reasons for an early or late scheduled completion date in comparison to the contract completion date.

1.9 START-UP, DEMONSTRATION, TRAINING, AND FINAL COMPLETION

- A. The Baseline Schedule must include broad-based activities for start-up, operator training, and final completion.

1. At least 90 days prior to any activities, submit a detailed schedule in conformance with the requirements
 - a. Identify task for the substantial completion notification.
 - b. Pre-demonstration period:
 - 1) Identify equipment start-up for all major equipment.
 - 2) Identify all operator trainings required by individual Specification Sections.
 - 3) Complete submission of all required submittals.
 - c. Demonstration period: Identify the demonstration period for each project classified system.

1.10 SCHEDULING CONFERENCE

- A. Contractor shall schedule and Owner's Representative will conduct a scheduling conference with Contractor's project manager and construction scheduler.
 1. Conference must take place within 10 business days after the Preconstruction Conference.
 2. Owner's Representative will review the requirements of this Specification Section and other specified scheduling and sequencing requirements with Contractor.
 3. Baseline Construction Schedule:
 - a. Provide five (5) copies of a Baseline Schedule in the form of an arrow or precedence diagram covering the following project phases and activities:
 - 1) Schedule of Submittals of Shop Drawings and schedule dates for fabrication and delivery of key and long lead time items.
 - 2) Contractor's submittal information shall show intended submittal dates and shall include, as a minimum, the maximum allowable review period.
 - 3) The information shall provide sufficient durations for reasonable administration of re-submittals, fabrication and transportation to produce realistic delivery dates for those procurement items.
 4. Owner's Representative shall review the schedule and provide comments.
 5. Provide approval of the schedule or request a meeting to review the schedule with Contractor within seven (7) days of receipt of the schedule.
 6. If requested, Contractor shall participate in a review and evaluation of the schedule with Owner's Representative.
 7. Any revisions necessary as a result of this review shall be resubmitted for review by Owner's Representative within five (5) business days.

- B. Contractor shall submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations.
 - 1. Contractor shall be prepared to discuss the proposed work plan and schedule methodology that comply with the Contract requirements.
 - 2. If Contractor proposes deviations to specified construction staging of the project, then the general time-scaled logic diagram shall also display the deviations and resulting time impacts.
 - 3. Contractor shall be prepared to discuss the proposal.
- C. Contractor shall provide the Preliminary Schedule of Values for the work to be performed.
 - 1. This document must match the total quantities and costs associated with the scheduled tasks.
- D. Owner's Representative will review the logic diagram, WBS coding structure, and activity identification system, and provide required Baseline Schedule changes to Contractor for implementation within seven (7) days following the Conference.
- E. Scheduling Conference (are required on a weekly basis until agreement to the Baseline Schedule is reached).
 - 1. Contractor to provide copies of the revised schedule.
 - 2. Contractor to address specific comments from the previous meeting.
 - 3. Contractor to revise the narrative as required.

1.11 BASELINE SCHEDULE

- A. Schedule shall include, but not be limited to, activities that show the following that are applicable to the project:
 - 1. Project characteristics, salient features, or interfaces, including those with outside entities that could affect time of completion.
 - 2. Project start date, scheduled completion date and other milestones.
 - 3. Work performed by Contractor, subcontractors and suppliers.
 - 4. Submittal development, delivery, review and approval, including those from Contractor, subcontractors and suppliers.
 - 5. Procurement, delivery, installation and testing of materials, plants and equipment.
 - 6. Testing and settlement periods.
 - 7. Utility notification and relocation.
 - 8. Erection and removal of falsework and shoring.
 - 9. Finish work and final cleanup.
 - 10. Project float as the predecessor activity to the scheduled completion date.

- B. Schedule shall have not less than 50 activities, unless otherwise authorized by the Owner's Representative.
1. The number of activities shall be sufficient to assure adequate planning of the project, to permit monitoring and evaluation of progress, and to do an analysis of time impacts.
 2. Schedule activities shall include the following:
 - a. A clear and legible description.
 - b. Start and finish dates.
 - c. A duration of not less than one (1) working day, except for event activities, and not more than 20 working days, unless otherwise authorized by the Owner's Representative.
 - d. At least one (1) predecessor and one (1) successor activity, except for project start and finish milestones.
 - e. Required constraints: Only contractually required constraints may be inserted into the Baseline Schedule.
 - f. Codes for responsibility, stage, work shifts, location and contract pay item numbers.
- C. Early Completion Time:
1. Contractor may show early completion time on any schedule provided that the requirements of the contract are met.
 2. Contractor may increase early completion time by improving production, reallocating resources to be more efficient, performing sequential activities concurrently or by completing activities earlier than planned.
- D. Working durations shall be planned to incorporate the effects of normal weather impacts. See General Conditions Article 12.2 for the "Baseline Rain Day Determination"



- E. Working durations shall be planned to incorporate allowed time for days caused by Epidemic or Pandemic (COVID-19). Allowed time shall be built into the Contractor's schedule. The calendar days to be included shall be as follows based upon total contract time (to Substantial Completion):

Contract Time < 60 Calendar Days	No Days Allowed
Contract Time ≥ 60 Calendar Days but < 180 Calendar Days	14 Calendar Days Allowed
Contract Time ≥ 180 Calendar Days	14 Additional Calendar Days Per Each Six (6) Additional Months of Contract Time



Working durations shall be planned to incorporate allowed time for days caused by Epidemic or Pandemic (COVID-19) and abandonment of the project.

1.12 PROGRESS SCHEDULE

- A. Develop Progress Schedule based on approved Baseline and Revised Baseline Schedules.
 - 1. All restrictions on use of constraints, leads and lags, resource leveling, etc., shall also apply to Progress Schedules.
- B. The Progress Schedule will be updated once per month for monitoring progress.
 - 1. Contractor may submit one (1) additional update per month for its own convenience.
- C. Indicate progress by making entries on the most recently accepted version of the network diagram and supporting data to show:
 - 1. Activities completed.
 - 2. Activities started.
 - 3. Remaining duration for each activity started but not yet completed.
 - 4. Percent complete based on value of work in place and value of equipment or material delivered and properly stored.
 - 5. Status of activity due to be completed by the next scheduled progress meeting.
- D. Computerized Progress Schedule and percent completion of Work shall be used to verify Contractor's payment requests.
 - 1. Progress payments will not be processed by the Owner's Representative unless the updated Progress Schedule has been submitted concurrently with a pay request and found acceptable by the Owner's Representative.

1.13 REVISIONS TO PROGRESS SCHEDULE

- A. Contractor shall submit data for a revised Progress Schedule within five (5) days of the occurrence of any of the following:
 - 1. When contractor-caused delay in completion of any activity or group of activities indicates an overrun of the Contract Time or Control Dates by 30 working days or 10 percent of the remaining duration, whichever is less.
 - 2. When delays in submittals, deliveries, or work stoppages are encountered making necessary the replanning or rescheduling of the Work.
 - 3. When the schedule does not represent the actual progress of the Work.
 - 4. When a change order significantly affects the contract completion date.

- B. The revised Progress Schedule shall be the basis of a Working Schedule showing:
 - 1. How Contractor intends to return to schedule.
 - 2. How Contractor intends to avoid falling behind schedule on future activities.
- C. Show changes on the network diagram and supporting data including:
 - 1. New activities and their duration.
 - 2. Modifications to existing activities.
- D. Provide written narrative report as needed to define:
 - 1. Problem areas, anticipated delays, and impact on the current schedule.
 - 2. Corrective action recommended, and its effect.
 - 3. Major changes in scope.
 - 4. Revised projections of progress and completion.
- E. Except as provided in the following subparagraphs 1 and 2, the cost of revisions to the Progress Schedule resulting from changes in the Work shall be included in the cost for the change in the Work, and shall be based on the complexity of the revision or Change Order, man-hours expended in analyzing the change, and the total cost of the change.
 - 1. The cost of revision to the Construction Schedule not resulting from authorized changes in the Work shall be the responsibility of the Contractor.
 - 2. The cost of revision to the Construction Schedule for the Contractor's convenience shall be the responsibility of the Contractor.
- F. The revised network diagram and supporting data for the Progress Schedule shall be submitted to the Owner's Representative upon completion of the revisions, but not later than the next progress meeting.
- G. Revisions to the Progress Schedule for the Contractor's convenience:
 - 1. Must be approved by the Owner's Representative before Contractor changes the sequence of Work.

1.14 TIME IMPACT ANALYSIS (TIA)

- A. The accepted initial Baseline Schedule or subsequently accepted Revised Baseline Schedule shall be used for TIA.
- B. Contractor shall submit a written TIA to the Owner's Representative with each request for adjustment of Contract Time, or when Contractor or Owner's Representative consider that an approved or anticipated change may impact the critical path or contract progress.
 - 1. The TIA must be attached to any change order prior to approval of any change to time or cost.

- C. The TIA shall illustrate the impacts of each change or delay on the current scheduled completion date or internal milestone, as appropriate.
1. The analysis shall use the Baseline or Revised Baseline Schedule (accepted Baseline Schedule) that has a data date closest to and prior to the event.
 2. If the Owner's Representative determines that the accepted Baseline Schedule used does not appropriately represent the conditions prior to the event, the accepted Baseline Schedule shall be updated to the day before the event being analyzed.
 3. The TIA shall include an impact schedule developed from incorporating the event into the accepted Baseline Schedule by adding or deleting activities, or by changing durations or logic of existing activities as appropriate to the nature of the change event.
 4. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the accepted Baseline Schedule, the difference between scheduled completion dates of the two (2) schedules shall be equal to the adjustment of Contract Time.
- D. Contractor shall submit a TIA in duplicate within 15 working days of receiving a written request for a TIA from the Owner's Representative.
1. Contractor shall allow the Owner's Representative two (2) weeks after receipt to approve or reject the submitted TIA.
 2. All approved TIA schedule changes shall be shown on the next update schedule.
- E. In the event of a TIA rejection:
1. If a TIA submitted by the Contractor is rejected by the Owner's Representative, the Contractor shall meet with the Owner's Representative to discuss and resolve issues related to the TIA.
 2. If agreement is not reached, the Contractor will be allowed 15 days from the meeting with the Owner's Representative to give notice.
 3. Contractor shall only show actual as-built work, not unapproved changes related to the TIA, in subsequent update schedules.
 4. If agreement is reached at a later date, approved TIA schedule changes shall be shown on the next update schedule.
 5. Owner's Representative will withhold remaining payment on the schedule contract item if a TIA is requested by Owner's Representative and not submitted by Contractor within 15 working days.
 6. The schedule item payment will resume on the next estimate after the requested TIA is submitted.
 - a. No other contract payment will be retained regarding TIA submittals.

1.15 NARRATIVE SCHEDULE REPORT

- A. Narrative Schedule Report shall list Activities Started This Month; Activities Completed This Month; Activities Continued This Month; Activities Scheduled To Start or Complete Next Month; Problems Encountered This Month; Actions Taken to Solve These Problems.
- B. Narrative Schedule Report shall describe changes made to Construction Schedule Logic (i.e., changes in Predecessors and Lags); Activities Added to Schedule; Activities Deleted from Schedule; any other changes made to Schedule other than addition of Actual Start Dates and Actual Finish Dates and changes of Data Date and Remaining Durations for recalculation of mathematical analysis.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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