

SECTION 01 32 16 CONSTRUCTION SCHEDULE

PART 1 GENERAL

1.1 SUMMARY

- A. Section consists of Construction Schedule requirements including:
 - 1. Schedule of Values.
 - 2. Construction Schedule Requirements.
 - 3. Construction Schedule Updates.
 - 4. Time Impact Analysis.
- B. Purpose: The Construction Schedule ensures adequate planning, coordination, scheduling, and reporting during execution of the work by the Contractor. It shall assist the Contractor and Contracting Officer (CO) in monitoring the progress of the work, evaluating proposed changes, and processing Contractor's monthly progress payments. It shall include the dates in the contract, phases, milestones, occupancies, holidays, weather consideration, a critical path, and the requirements of this section.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path. They start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: Allocation of the Schedule of Values for completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by the Contracting Officer.
- C. Critical Path Method (CPM): Method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: Longest connected chain of interdependent activities through the network schedule that establishes minimum overall Project duration and contains no float.

- E. Float: Measure of leeway in starting and completing an activity.
 - 1. Float: Not for the exclusive use or benefit of the Government or Contractor but is jointly owned.
 - 2. Free Float: Amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total Float: Measure of leeway in starting or completing an activity without adversely affecting planned Project completion date.
- F. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- G. Resource Loading: Allocation of manpower and equipment necessary for completion of an activity as scheduled.

1.3 SUBMITTALS

- A. Electronic Copies: Schedules and reports submitted shall be posted on the Project management software website in native electronic file formats. The intent of the Government is to limit the number of printed reports to those determined by the Project team as essential.
- B. Schedule of Values: After Contract Award and before Pre-Construction conference, submit schedule of dollar values based on Contract Price Schedule.
- C. Construction Baseline Schedule: Schedule shall be submitted within 30 calendar days following Contract Award and before the Pre-Construction conference. Submit two paper copies of baseline schedule, large enough to show entire schedule for entire construction period. Utilize Schedule of Values in preparation of Construction Baseline Schedule.
- D. Critical Path Method (CPM) Reports: Concurrent with CPM schedule, submit three paper copies of the following computer-generated reports. For each activity, include activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of predecessor and successor tasks for activities sorted in ascending order by activity number and then early start date, or actual start date if known.
 - 3. Total Float Report: List of activities sorted in ascending order of total float.
- E. Construction Schedule Updates: On or before 7th day preceding progress payment request date, submit estimates of percent completion of each schedule activity and necessary supporting data. Provide two paper copies.

- F. Construction Schedule Revisions and Time Impact Analysis: For each Construction Schedule revision, submit two paper copies of a Time Impact Analysis. Incorporate a Fragmentary Network (Fragnet) into currently accepted Construction Schedule that demonstrating how Contractor proposes to incorporate a modification, change, delay, or Contractor request.

1.4 QUALITY ASSURANCE

- A. Contractor shall meet with Contracting Officer on day of the preconstruction conference to go over:
1. Review software limitations, content and format for reports.
 2. Verify availability of qualified personnel needed to develop and update schedule.
 3. Discuss constraints, including phasing, work stages, area separations, interim milestones, and partial Government occupancy/substantial completions.
 4. Review delivery dates for Government-furnished products.
 5. Review schedule for work of separate Government contracts.
 6. Review time required for review of submittals and re-submittals.
 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
 8. Review time required for completion and startup procedures.
 9. Review time required for obtaining and activating permits.
 10. Review and finalize list of construction activities to be included in schedule.
 11. Review baseline schedule comments, resolve issues and progress on incorporating them.
 12. Review procedures for updating schedule.
 13. Discuss reporting requirements and establish protocol for naming and transmitting electronic schedules.
- B. Contractor's Schedule Representative: Before the preconstruction conference, designate an authorized representative to be responsible for preparing and maintaining the Construction Schedule. Submit resume outlining qualifications of Scheduler to Contracting Officer for acceptance. Scheduler shall have prepared and maintained at least five previous schedules of similar size and complexity similar to this Contract, demonstrating proficiency of using scheduling software. Authorized representative will be responsible for preparing the Baseline Schedule, required updates, revisions, Time Impact Analyses, and reports.

1.5 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate Contractors.

- B. Coordinate Construction Baseline Schedule with Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. In developing Construction Baseline Schedule, ensure Subcontractor's work at all tiers, and prime Contractor's work, is included and coordinated.
 - 2. Secure time commitments for performing critical elements of work from parties involved.
 - 3. Coordinate each construction activity in network with other activities and schedule in proper sequence.

PART 2 PRODUCTS

2.1 SCHEDULE OF VALUES

- A. Breakdown each lump-sum item into component work activities used in the schedule for which progress payments may be requested. Work activities broken out within schedule of values shall be integrated into and made a logical part of the construction baseline schedule. Total costs for the component work activities shall equal Contract Price for that lump-sum item. Contracting Officer may request data to verify accuracy of dollar values. Include mobilization, general condition costs, overhead and profit in the total dollar value of unit price items and in the component work activities for each lump-sum item. Do not include mobilization, general condition costs, overhead or profit as a separate item.
- B. Do not break down unit price items. Use only the Contract Price for unit price items.
- C. Total cost of all items shall equal the Contract Price. The Schedule of Values will form the basis for progress payments and the Construction Schedule.

2.2 CONSTRUCTION SCHEDULE REQUIREMENTS

- A. Construction Baseline Schedule: Prepare Construction Baseline Schedule using a computerized, cost and resource-based, time-scaled Critical Path Method network analysis diagram for the Work.
 - 1. Develop and finalize Construction Baseline Schedule so it can be accepted for use no later than 30 days after date established for the Notice of Award.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing work within applicable completion dates, regardless of Governments acceptance of schedule.
 - 2. Establish procedures for monitoring and updating Construction Baseline Schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

- B. Construction Baseline Schedule Preparation: Prepare a list of all activities required to complete the Work. Using preliminary Critical Path Method network diagram, prepare a skeleton network to identify probable critical paths.
1. Schedule Narrative: Submit a schedule narrative with the baseline schedule submission.
 2. Activities: Indicate estimated duration, sequence requirements, and relationship of each activity in relation to other activities.
 3. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 4. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the Critical Path Method schedule within the limitations of the Contract Time.
 5. Show sequence and interdependence of activities required for completion of work. Ensure work sequences are logical and Construction Baseline Schedule shows a coordinated plan of the work.
 6. Resource loading of each activity shall include personnel by labor category and equipment type and capacity proposed to complete the activity in duration shown.
 7. Consider seasonal weather conditions in planning and scheduling work influenced by high and low ambient temperatures, wind, or precipitation to ensure completion of work within Contract Time.
 8. Time Frame: Proposed duration assigned to each activity shall be Contractor's best estimate of time required to complete activity considering the scope and resources planned for activity.
 - a. An early finish date may be shown but the late finish date shall be same date as last day of Contract Period. An early completion schedule shall contain:
 - 1) Insert an activity titled "Project Float" as a successor to last activity in early Project completion schedule network.
 - 2) Add a milestone titled "Contract End Date" as a successor to the activity "Project Float."
 - 3) Add duration to the activity "Project Float" as required so the milestone "Contract End Date" equals the last day of Contract Period.
 - b. Contract completion date shall not be changed by submission of a schedule that shows an early completion date.
 - c. Contractor shall limit use of lead or lag duration's between schedule activities.

d. Project Calendars:

1) Develop and incorporate the following calendars:

- a) Administrative Calendar: Include calendar based on a 7-day week to be used on activities based on calendar days. Apply this calendar to administrative tasks or other tasks not affected by non-working days (federal holidays, weather, etc.).
- b) Project Calendar: Include calendar based on planned work week for the Project. Include federal holidays, weekends, and non-workdays indicated in Contract Documents. Apply this calendar to activities not anticipated to be affected by weather. Be clear when identifying number of work days in work week.
- c) Weather Calendar: Utilize Project Calendar and show anticipated normal downtime related to weather as non-working time. Weather days shall be based on data for local area from a reliable source like the National Oceanic and Atmospheric Administration (NOAA), National Park Service records, or source acceptable to Contracting Officer. Apply this calendar to activities anticipated to be affected by weather.

e. Activity Duration: Define so no activity is longer than 14 days, except for non-construction activities including mobilization, Shop Drawings and submittals, fabrication and delivery of materials and equipment.

f. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 calendar days, as separate activities in the schedule. Procurement cycle activities can include submittals, approvals, purchasing, fabrication, and delivery.

- 1) Influent coarse and fine screens.
- 2) Septage receiving equipment.
- 3) Grit equipment and grit washing dewatering.
- 4) Aeration blowers.
- 5) Membrane equipment.
- 6) UV equipment.
- 7) Reclaimed water pumps.
- 8) Reclaimed water tank.
- 9) RAS pumps.
- 10) Digester mixers.
- 11) Digester decanters.
- 12) Digester blowers.
- 13) Odor control system.
- 14) Motor Control Centers (MCCs).

- 15) Programmable Logic Controllers (PLCs).
 - 16) Generator.
 - 17) Network servers.
- g. Submittal Review Time: Include review and re-submittal times indicated. Coordinate submittal review times in Construction Baseline Schedule.
 - h. Startup and Testing Time: As specified in Section 01 91 14, Equipment Testing and Facilities Startup.
 - i. Substantial Completion: Allow time for Government administrative procedures necessary for certification of Substantial Completion. (For more information, refer to Section 01 77 00, Closeout Procedures.)
9. Constraints: Include constraints and work restrictions indicated in Contract Documents and as follows in schedule and show how the sequence of Work is affected.
- a. Phasing: Arrange list of activities on schedule by phase.
 - b. Work under More Than One Contract: Include a separate activity for each contract.
 - c. Work Restrictions:
 - 1) Show effect of the following on the schedule:
 - a) Coordination with existing construction.
 - b) Limitations of continued occupancies.
 - c) Uninterruptible services.
 - d) Partial occupancy before Substantial Completion.
 - e) Use of premises restrictions.
 - f) Provisions for future construction.
 - g) Seasonal variations.
 - h) Environmental control.
 - i) Permit provisions.
 - d. Other Constraints: Migratory bird nesting season, refer to Section 01 35 00, Environmental Protection and Special Controls, for detailed constraints and mitigation requirements.
 - e. Work Stages: Indicate important stages of construction for each major portion of the Work.
 - 1) Subcontract awards.
 - 2) Submittals.
 - 3) Purchases.
 - 4) Mockups.
 - 5) Fabrication.
 - 6) Sample testing.
 - 7) Deliveries.
 - 8) Installation.

- 9) Tests and inspections.
- 10) Adjusting.
- 11) Curing.
- 12) Building flush-out.
- 13) Building commissioning activities.
- 14) Equipment and process startup activities.

10. Milestones:

- a. Include milestones indicated in Contract Documents in schedule, including, but not limited to, Notice to Proceed, Substantial Completion, and the following interim milestones:
 - 1) Beneficial Occupancy of the Administration Building.
 - 2) Beneficial Occupancy of the Maintenance Building.
 - 3) Startup of the wastewater liquid and solids treatment process.
 - 4) Completion of Demonstration Testing and Beneficial Occupancy of liquid and solids treatment facilities – transition from existing WWTP to new facilities for treatment of 100 percent of wastewater.

C. Joint Review, Revision, and Acceptance:

1. Within 7 calendar days of receipt of the Contractor's proposed Construction Baseline Schedule, the Contracting Officer and Contractor shall meet for joint review, correction, or adjustment of the initial Construction Baseline Schedule. Any areas which, in the opinion of the Contracting Officer, conflict with timely completion of the Project shall be subject to revision by the Contractor.
2. Within 7 calendar days after the joint review between the Contractor and Contracting Officer, the Contractor shall revise and resubmit the Construction Baseline Schedule in accordance with agreements reached during the joint review.
3. In the event the Contractor fails to define any element of work, activity, or logic, and the Contracting Officer review does not detect this omission or error, such omission or error, when discovered by Contractor or Contracting Officer, shall be corrected by Contractor within 7 calendar days and shall not affect Contract Period.
4. Upon acceptance of the Construction Baseline Schedule, Contracting Officer saves schedule as a baseline and updates on a monthly basis. Construction schedule update will be used to evaluate Contractor's monthly applications for payment based upon information developed at monthly Construction Schedule update meeting.

- D. Cost Correlation: In the heading of the schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of Work performed as of dates used to prepare payment requests.
1. Contractor shall assign cost to construction activities on Construction Baseline Schedule. Costs shall not be assigned to submittal activities unless specified otherwise but may, with Contracting Officer's approval, be assigned to fabrication and delivery activities. Costs shall be included for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training (if applicable).
 2. Each activity cost shall reflect an accurate value based on the Contract Price Schedule.
 3. Total cost assigned to activities shall equal total Contract Price.
- E. Recovery Schedule: When periodic schedule update indicates Work is 14 or more calendar days behind current accepted schedule, a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule shall also be submitted. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery shall be accomplished.
- F. Computer Software: Prepare schedules using a program developed specifically to manage construction schedules.
1. Manufacturers:
 - a. Primavera.
 - b. Or equal.
 2. Physical Characteristics: None.
 3. Functional Characteristics:
 - a. Ability to prepare a Gantt Chart Layout with critical path report.
 - b. Ability to track project costs or Earned Value Management and prepare an Earned Value Report.
 - c. Ability to generate a 3-month look ahead.
 - d. Ability to prepare a functional group summary report to see planned activities for a certain group.
 - e. Compatible with Windows 11 or newer.
 4. Performance Characteristics: None.

PART 3 EXECUTION

3.1 CONSTRUCTION SCHEDULE UPDATES

- A. Progress Meeting Updates: Provide a 2-week look-ahead schedule, derived from the currently accepted schedule, before each weekly progress meeting. Utilize look-ahead schedule to facilitate and take notes on discussions held during progress meeting.

B. Monthly Schedule Updates:

1. General: Update Construction Schedule on monthly basis to reflect construction progress and activities throughout entire Contract Period and until Project Substantial Completion. The status date of each schedule update shall be the 7th day preceding the progress payment request date.
2. Procedure: Contractor shall meet with Contracting Officer each month at Construction Schedule update meeting to review progress made through the status date of the Construction Schedule update, including dates activities were started or completed and percentage of work completed on each activity started or completed.
3. Reports:
 - a. Concurrent schedule revisions, prepare tabulated reports showing:
 - 1) Identification of activities that have changed.
 - 2) Changes in early and late start dates.
 - 3) Changes in early and late finish dates.
 - 4) Changes in activity durations in workdays.
 - 5) Changes in the critical path.
 - 6) Changes in total float or slack time.
 - 7) Changes in the Contract Time.
4. Narrative: Report shall include a brief description of actual progress made during update period; actual and potential delaying activities; impediments to progress; issues related to inclement weather; progress toward established milestones and Project float. Report shall include a brief description of work anticipated to be performed in the next month. Any minor revisions to the schedule should be identified for evaluation and acceptance or rejection.
5. As Work progresses, indicate Actual Completion percentage for each activity.
6. If schedule update shows a late finish date after Contract completion date, at a minimum include:
 - a. Known delays.
 - b. Actions to get back on schedule.
 - c. Pending modifications.
 - d. Impediments or constraints affecting progress.
7. Progress Payments: Monthly updating of the currently accepted Construction Schedule shall be an integral part of the process upon which progress payments will be made. If Contractor fails to provide schedule updates or revisions, a portion of the monthly payment may be retained until corrections have been made.

C. Distribution: Distribute copies of accepted schedule to Contracting Officer, Construction Management Representative, Subcontractors, testing and inspecting

agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to same parties and post in same locations. Delete parties from distribution when they have completed their assigned portion of the Work.

D. Construction Schedule Revisions:

1. Required Revisions: If, as a result of the monthly schedule update, it appears the currently accepted Construction Schedule no longer represents actual prosecution and progress of the work, Contracting Officer will request, and Contractor shall submit, a revision to the Construction Schedule. Contractor may also request reasonable revisions to currently accepted Construction Schedule in event the Contractor's planning for the work is revised. If Contractor desires to make changes, Contractor shall notify Contracting Officer in writing, stating reason for proposed revision. Accepted revisions shall be incorporated into currently accepted Construction Schedule for next monthly schedule update.
2. Procedure: If revision to currently accepted Construction Schedule is contemplated, Contractor or Contracting Officer shall advise the other in writing at least 7 calendar days prior to next monthly schedule update meeting, describing revision and reasons for the revision. Government-requested revisions will be presented in writing to the Contractor, who shall respond in writing within 7 calendar days.
3. Reports:
 - a. Concurrent with making revisions to schedule, prepare tabulated reports showing:
 - 1) Identification of activities changed.
 - 2) Changes in early and late start dates.
 - 3) Changes in early and late finish dates.
 - 4) Changes in activity durations in workdays.
 - 5) Changes in critical path.
 - 6) Changes in total float or slack time.

3.2 TIME IMPACT ANALYSIS FOR CONTRACT MODIFICATIONS CHANGES DELAYS AND CONTRACTOR REQUESTS

1. Requirements: When contract modifications or changes are initiated, delays experienced, or Contractor desires to revise currently accepted Construction Schedule, Contractor shall submit to Contracting Officer a written time impact analysis illustrating the influence of modification, change, delay, or Contractor request on Contract Time.

2. Time Extensions: Activity delays, which result in a late completion date projection, shall not automatically mean an extension of contract time is warranted or due to Contractor. It is possible a modification, change, or delay will not affect existing critical path activities or cause non-critical activities to become critical. A modification, change, or delay may result in absorbing a part of available total float that may exist within an activity chain of the Schedule, not causing any effect on Contract Time. Time extensions will be granted in accordance with terms of Contract.
3. Extension of Contract Time will be granted only to the extent the equitable time adjustments to activity or activities affected by modification, change, or delay exceeds total (positive or zero) float available on a particular activity.
4. Procedure: Each time impact analysis shall be submitted within time period stated in a request for proposal, or time period designated under the clauses entitled Changes or Default. In cases where Contractor does not submit a written request for extension of time and a time impact analysis within the designated time, it is mutually agreed that the particular modification, change, delay, or Contractor request does not require an extension of the Contract Time. Upon acceptance, time impact analysis shall be incorporated into currently accepted Construction Schedule at next monthly schedule update.
5. Contract Modifications: Prepare time-impact analysis using fragnets to demonstrate effect of proposed change on overall Construction Schedule for each proposed Contract modification concurrent with submission.

END OF SECTION