

SECTION 01321

NETWORK ANALYSIS SCHEDULES

06/02

PART 1 GENERAL

1.1 DESCRIPTION

Provide a computerized critical path method (CPM) schedule that includes proposed design, procurement, construction, testing and acceptance activities. The schedule shall cover the time from Contract Award to the Contract completion date, including both design and construction phases of the Contract. The schedule shall incorporate engineering design activities and submittals, construction activities (including major material/equipment deliveries), resource loading/allocation, and cost information and quality control. Additional detail regarding required content is found later in this Section. The principles and definitions of the terms used herein shall be as set forth in Contract Clause "FAR 52.236-15, Schedules for Construction Contracts". However, the provisions of this Section shall govern.

1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

Preconstruction Submittals:

Preliminary Network Analysis Schedule;

Baseline Network Analysis Schedule; and

Network Analysis Schedule Updates.

1.3 SCHEDULE ACCEPTANCE

The Network Analysis Schedule will be submitted and accepted in two stages: The Preliminary Network Analysis Schedule shall be presented at the Post Award Kickoff (PAK) Meeting and the Baseline Network Analysis Schedule shall be included with the 100% Design Submittal Package. Oversight comments made by the Government on the Contractor's Network Analysis Schedule submittals will not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for scheduling, sequencing, and prosecuting the work to comply with the requirements of the Contract.

1.3.1 Schedule Acceptance Prior to Start of Work

The Contractor shall not start construction work on any definable feature of work until the Network Analysis Schedule, detailing that portion of work has been accepted by the Government.

1.3.2 Use of the Network Analysis Schedule

The Network Analysis Schedule shall be used by the Contractor for planning, organizing, and directing the work; reporting progress; quality control management and requesting payment for work accomplished. The schedule shall be updated monthly by the Contractor and Government representative, and submitted monthly with the progress pay request to reflect the current status of the work. This requirement applies to both the Preliminary and Baseline schedules. The submittal and acceptance of the Network Analysis Schedule and accurate updated schedules accompanying the pay requests are both conditions precedent to processing pay requests. Submittal of the Network, and subsequent, Schedule Analysis Updates, will be understood to be the Contractor's representation that the submitted schedule meets all of the requirements of the Contract Documents, accurately reflects the work accomplished and to be accomplished, and that work will be executed in the sequence indicated on the submitted schedule.

1.4 SOFTWARE

The Contractor shall use the current version of the SureTrak Software, by Primavera Systems, Inc, that shall be capable of operating in a Windows environment. If the Contractor chooses to use an equally capable program, the Contractor shall convert all data into Primavera Machine Readable Format (Lotus, D-Base, Excel, etc.) prior to submission of all schedule inputs, including, but not limited to, the Preliminary Schedule, Baseline Schedule, Network Analysis Updates, and changes to the schedule. Submit all required network analysis submissions and updates on 90mm (3-1/2 inch) double sided, high-density disks or CD-ROM, and/or via electronic mail, at the discretion of the Contracting Officer. The electronic submittal requirements shall be in addition to any hard copy submittal required.

1.5 NETWORK SYSTEM FORMAT

The system shall consist of CPM (Critical Path Method) time scaled network logic diagrams and accompanying reports. Facilities or phases with separate and distinct start and/or completion dates shall be identified by separate networks.

The Network Analysis Schedule shall be formatted and submitted in two stages separated by the milestone of Final Design Acceptance. The first stage of the Schedule is the Preliminary Network Analysis Schedule and the second stage of the Schedule is the Baseline Network Analysis.

1.5.1 Preliminary Network Analysis Schedule Submittal Format

The Preliminary Network Analysis submittal shall include Detailed Schedule Diagrams and Detailed Schedule Data as described below for all design activities, Government oversight and preliminary construction activities planned for execution during design development. Also provide Outline Schedule Diagrams and Outline Schedule Data as described below for the time from acceptance of the Final Design to the Contract Completion Date.

1.5.2 Baseline Network Analysis Schedule Format

The Baseline Network Analysis submittal shall include Detailed Schedule Diagrams and Detailed Schedule Data as described below for all remaining construction activities through the Contract Completion Date. The Baseline Network Analysis shall be a complete contract schedule incorporating the detailed activities from the Preliminary schedule and providing full detail for all construction activities as described in this Section.

1.5.3 Outline Schedule Diagrams

Show the sequence, order, and interdependence of major construction milestones and activities. Include ordering and procurement of major materials and equipment, long-lead items, and key milestones identified by the Contract.

1.5.4 Outline Schedule Data

Use a standard calendar of 5 workdays per week, Monday through Friday, with contractor defined holidays and Federal holidays shown as non-workdays. Provide a description of each major construction activity or key milestone. Include any construction phasing required by the contract.

1.5.5 Detailed Schedule Diagrams

Show activity number, description, early dates, float, and all relationships (i.e. logic ties), resources and costs. Show the sequence, order, and interdependence of activities in which the work is to be accomplished. The basic concept of a network analysis diagram will be followed to show how the start of a given activity is dependent on the physical completion of preceding activities and how its physical completion restricts or restrains the start of following activities. Include allowance for Government oversight, acceptance and return of submittals, samples and shop drawings where Government acceptance is specifically required.

In addition to construction activities, detailed network activities shall include the submittals, procurement, and Government activities impacting progress:

- a. Submittal activities shall include oversight and acceptance of submittals. If the Government's action on any submittal is "Not Accepted" or "Revise and Resubmit", a new series of submittal preparation activities shall be inserted into the schedule. Predecessor for the new submittal preparation activity will be the original acceptance activity and the successor of the new acceptance activity will be the fabrication/delivery activity for the equipment or material.

- b. Procurement activities shall include all materials and equipment, receipt of materials with estimated procurement costs of major items for which payment of materials will be requested in advance of installation, fabrication of special material and equipment, and their installation and testing.

c. Show activities of the Government that affect progress and contract-required dates for completion of all or parts of the work. Show activities indicating Government furnished materials and equipment utilizing delivery dates indicated in the clause titled "Government Furnished Property (Fixed-Price Contract)" of the Contract Clauses.

1.5.6 Detailed Schedule Data

The schedule data shall conform to the following criteria:

a. All activities shall use a standard calendar of 5 workdays per week, Monday through Friday. Show Contractor defined holidays and Federal holidays as non-workdays. Activities using any other calendar shall be highlighted for the Contracting Officer's approval.

b. Each schedule activity shall be cost and resource loaded to include each type of trade or labor, e.g., carpenters, plumbers, electricians, etc. Activity duration shall be in workdays. All activities shall indicate the average number of workers per day planned during execution of the activity.

c. At a minimum, each schedule activity shall contain codes by:

1. Responsibility: including, but not be limited to, Government Furnished Materials, Contractor/Subcontractor, Supplier/Vendor, Consultant, etc.

2. Location: such as building specific, phases of construction and/or areas within a building.

3. Contract Specification Section: i.e. Construction Specification Institute (CSI) Division.

4. Request of the Contracting Officer: additional codes may be required such as phases, buildings, and areas within a building.

d. Key milestones as identified by contract or furnished by the Contracting Officer.

e. All non-procurement activities must be less than or equal to 20 workdays unless approved to be greater by the Contracting Officer.

f. Detailed description of each activity (e.g., "install plumbing and bath fixtures" versus "install fixtures"; "install conduit", "install wiring, etc," versus "electrical"). In each activity, give quantity and unit of measure so that the amount of work the activity involves is clearly communicated.

g. Only two (2) open-ended activities (the first and the last) are allowed.

- h. Three phases of control (Preparatory, Initial, and Follow-up) must be included in the schedule for each activity identified as a Definable Feature of Work by the Contracting Officer (See Quality Control Plan).
- i. The use of imposed constraints is discouraged. Constraints cannot override logic. Constraints shall only be used for "Project Start," "Project Completion," "Project Milestones" and "Government equipment/material delivery." The rationale for the use of a constraint, other than for the items noted, should be recorded in the activity's log field. Mandatory constraints (start and finish) violate network logic and shall not be used. If absolutely necessary, use early or late constraints instead. Any imposed constraints must be specifically highlighted for Contracting Officer's approval.
- j. Out of sequence progress, if applicable, shall be handled through Retained Logic, not the Default Option of Progress Override.
- k. Progress shall be calculated based on percent complete.
- l. All changes to activities shall be recorded with a note in the activity log field. The log shall include, as a minimum, the date and reason for the change, as well as the government representative granting acceptance of the change.
- m. The use of resource leveling, either manual or automatic, is discouraged. Any resource leveling must be specifically highlighted for the Contracting Officer's approval.

1.5.7 [Schedule Requirements for HVAC TAB

The fieldwork for HVAC Testing/Adjusting/Balancing shall be broken down in the Earned Value Report by separate line items that reflect measurable deliverables. Specific payment percentages for each line item shall be determined on a case-by-case basis for each contract. The line items shall be as follows:

- a. Approval of Design Review Report: The TABS Agency is required to conduct a review of the project plans and specifications to identify any feature, or the lack thereof, that would preclude successful testing and balancing of the project HVAC systems. The resulting findings shall be submitted to the Design-Build Contractor's Designer of Record to allow correction of the design. The progress payment shall be issued after review and approval of the report.
- b. Approval of the pre-field engineering report: The TABS Agency submits a report that outlines the scope of fieldwork. The report shall contain details of what systems will be tested, procedures to be used, sample report forms for reporting test results and a quality control checklist of work items that must be completed before TABS field work commences.

c. Season I field work: Incremental payments are issued as the TABS field work progresses. The TABS Agency mobilizes to the project site and executes the fieldwork as outlined in the pre-field engineering report. The HVAC water and air systems are balanced and operational data shall be collected for one seasonal condition (either summer or winter depending on project timing).

d. Acceptance of Season I report: On completion of the Season I field work, the data is compiled into a report and submitted to the Government. The report is reviewed, and accepted, after ensuring compliance with the pre-field engineering report scope of work.

e. Completion of Season I field QA check: Contract QC and Government representatives meet the TABS Agency at the job site to retest portions of the systems reported in the Season I report. The purpose of these tests is to validate the accuracy and completeness of the previously submitted Season I report.

f. Acceptance of Season II report: The TABS Agency completes all Season II field work, which is normally comprised mainly of taking heat transfer temperature readings, in the season opposite of that under which Season I performance data was compiled. This data shall be compiled into a report and submitted to the Government. On completion of submittal review to ensure compliance with the pre-field engineering report scope, progress payment is issued. Progress payment is less than that issued for the Season I report since most of the water and air balancing work effort is completed under Season I.]

1.6 SUBMISSION AND ACCEPTANCE

At the Post Award Kickoff (PAK) Meeting as described in Section 00911 of the RFP, the Contractor shall participate in a meeting to present and discuss the proposed Preliminary Network Analysis Schedule and requirements of this section. Within [7] calendar days after the PAK Meeting, the contractor shall submit the Preliminary Network Analysis Schedule corrected to incorporate the comments and discussions of the PAK Meeting. Submit the Baseline Network Analysis with the 100% Design Submittal. Upon submission, the Government will schedule a mandatory one-day Baseline Schedule Finalization Session (BSFS) together with the contractor to provide oversight, edit and finalize the Baseline Network Analysis. Revisions necessary as a result of this oversight shall be resubmitted for acceptance by the Contracting Officer within five (5) working days of the BSFS. Once the completed network has been approved by the Contracting Officer, the Contractor shall within 7 calendar days furnish the approved schedule on one 90 mm diskette or CD-ROM as described in paragraph entitled "Software". The original approved Baseline Network Analysis Schedule shall be used as the working schedule for construction and will be the baseline against which all payments and changes will be analyzed. It shall be used by the Contractor for planning, organizing, and directing the work, reporting progress, and requesting payment for work accomplished.

1.6.1 Deliverables:

- a. Submit CPM time-scaled logic diagrams on 610 by 914 mm (24 x 36 inches) sheets with the required schedule reports and one 90 mm diskette or CD-ROM, showing all activities in the contract.
- b. Submit a tabular schedule report sorted by predecessor and successor.
- c. Submit a graphical schedule report sorted by Total Float, Early Start.
- d. Submit a schedule report listing Government responsibility activities sorted by Early Start.
- e. Submit an Earned Value Report listing all activities having a budget amount and cost sorted first by resource then by activity.
- f. Early project completion: In the event the project schedule proposes completion of the project prior to the contract completion date, the Contractor shall identify those activities that have been accelerated and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. If early completion is accepted by the Contracting Officer, each of the accelerated activities will be addressed at each regular schedule update. A contract modification is required if the completion date is changed.

1.6.2 Changes to the Network Analysis System

If changes in the Contractor's means and methods are necessary, apart from contract modifications (sequencing/logic, duration, further refining of schedule activities and logic, etc.), the Contracting Officer shall be notified in writing stating the reasons for the change. The Network Analysis Schedule shall be revised and submitted without additional cost to the Government on a 90 mm diskette or CD-ROM showing impact of the change.

1.6.3 Biweekly Work Schedule

To provide a more detailed day-to-day planning of upcoming work, the Contractor shall prepare and issue detailed work plans that coordinate with and supplement the above defined network analysis. The work plans shall be keyed to the CPM activity numbers and shall be submitted each week and shall show the projects activities that will occur during the following two-week interval. Additionally, the critical path activities are to be identified on the Biweekly Work Plan. The detail work plans are to be bar chart type schedules prepared by the Contractor in sufficient detail to define the work to be accomplished, the crews, construction tools and equipment to be used during the current and next two-week interval. The bar charts shall be formatted to allow reproduction on 8 1/2 by 11 sheets. Three copies of the bar chart schedules shall be delivered to the

Contracting Officer not less than 3 work hours prior to the start of the biweekly coordination meeting.

1.6.4 Biweekly Coordination Meeting

In conjunction with the receipt of the Biweekly Work Schedule, a coordination meeting shall be held each week at a location determined by the Contracting Officer to discuss the work schedule. The Contractor shall make a presentation of the previously submitted and current Biweekly Work Schedule to the Contracting Officer so as to provide an overview of the project's schedule and provide an opportunity to discuss items of coordination. Consideration of materials, crews, and equipment shall be addressed to ascertain their respective availability. The meeting shall identify actions necessary to provide adherence to the Biweekly Work Schedule and the overall network for the project defined above. The Contractor shall take meeting minutes. All meeting minute entries shall be keyed to the schedule activity number(s) being addressed. Within one day of the meeting, the Contractor shall provide a draft copy of the meeting minutes to the Contracting Officer for review and comment. Final copies of the minutes containing the comments provided by the Contracting Officer shall be issued within 3 days of the meeting.

1.6.5 Monthly Schedule Update/Progress Meetings

Progress meetings to discuss progress and payment shall include a monthly onsite meeting or other regular intervals mutually agreed during the PAK Meeting. During each Update/Progress meeting the Contractor shall describe proposed revisions and adjustments required reflecting the current status of the project for the Contracting Officer's approval.

1.6.6 Monthly Schedule Updates

Not more than 4 working days after the monthly update meetings, the Contractor shall submit a 90-mm diskette or CD-ROM containing an updated schedule of actual construction progress by updating started and completed activities and remaining durations. Unilateral and conformed modifications shall be included in the schedule update. Initially, and monthly thereafter, provide the following reports in addition to the 90 mm diskette or CD-ROM:

- a. A time-scaled logic diagram of the network showing the critical path and progress reflecting the current completion date on 610 by 914 mm(24 by 36-inch) sheets. Updated diagrams shall show the date of the latest revision.
- b. A cost summary report and an Earned Value Report listing all activities having a budget amount.
- c. A 30 calendar day look-ahead report.
- d. A schedule report grouped by total float and sorted by Early Start containing all uncompleted schedule activities.

e. A written narrative report describing current status and identifying potential delays. The report should include as a minimum the following entries:

1. State whether the contract is on schedule, ahead or behind schedule (stated in the number of calendar days) based on the approved contract schedule. If the schedule indicates that any contract milestone dates will not be met, the Contractor shall also submit either a detailed recovery plan that shall put the project back on schedule, or a request for time extension with justification as set forth in paragraph titled "Time Extensions."

2. Comment on the project's current critical path. Indicate if it remained the same as the previous 30 calendar days, or if it shifted. Comment on activities and progress that could change the critical path. Discuss current and anticipated scheduling problems.

3. Comment on any anticipated problems in attaining late start or late finish of activities.

4. List all changes made since the previous period and relate each change to document the approved schedule changes.

5. Comment on Government responsibility activities utilizing the Responsibility Code.

1.6.6.1 Mechanism for Monthly Schedule Updates

Default Progress Data Disallowed: Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in the CPM scheduling software system. Actual Start and Actual Finish dates on the CPM schedule shall match the dates provided from Contractor Quality Control and Production Reports. These reports will be the sole basis for updating the schedule. Work activities will be updated by actual work progression rather than being cash flow driven. Actual labor and equipment hours used on activities will be derived from the daily reports.

1.7 USE OF NETWORK ANALYSIS SCHEDULE FOR PROGRESS PAYMENTS

The Approved Project Schedule shall be used to measure the progress of the work and provide the basis of all progress payments. Monthly progress payments shall be based upon information developed at the monthly Schedule Update. The computer-produced Cost Report shall be utilized for verification of the progress payment. The Contracting Officer shall have the right to withhold any and all progress payments until receipt of an updated schedule.

1.8 CONTRACT MODIFICATION

When a contract modification to the work is required, submit the proposed revisions to the network with a fragnet and a cost proposal for each proposed change. All modifications shall be incorporated into the network analysis system as separately identifiable activities broken down and inserted appropriately on the first update following

issuance of a directive to proceed with the change. All revisions to the baseline schedule activities that are necessary to further refine the schedule so that the changed work activities can be logically tied to the schedule shall be made. Financial data shall not be incorporated into the schedule until the contract modification is signed by the Contracting Officer.

1.9 FLOAT

Use of float suppression techniques, such as preferential sequencing (arranging critical path through activities more susceptible to government caused delay), special lead/lag logic restraints, zero total or free float constraints, extended activity times, or imposing constraint dates other than as required by the contract, shall be cause for rejection of the project schedule or its updates. The use of Resource Leveling (or similar software features) used for the purpose of artificially adjusting activity durations to consume float and influence the critical path is expressly prohibited.

1.9.1 Definitions of Float or Slack

Free Float is the length of time the start of an activity can be delayed without delaying the start of a successor activity. Total Float is the length of time along a given network path that the actual start and finish of activity(s) can be delayed without delaying the project completion date.

1.9.2 Ownership of Float

Float available in the schedule at any time shall not be considered for the exclusive use of either the Government or the Contractor. During the course of contract execution, any float generated due to the efficiencies of either party is not for the sole use of the party generating the float; rather it is a shared commodity to be reasonably used by either party.

1.9.3 Negative Float

Negative float shall not be a basis for requesting time extensions. Any extension of time shall be addressed in accordance with the Paragraph "Time Extensions". Scheduled completion date(s) that extend beyond the contract [or phase] completion date(s) (evidenced by negative float) may be used in computations for assessment of payment withholdings. The use of this computation is not to be construed as a means of acceleration.

1.10 TIME EXTENSIONS

Extension of time for performance required under the contract clauses titled, "Changes", "Differing Site Conditions", "Default (Fixed-Price Construction)" or "Suspension of Work" shall be granted only to the extent that equitable time adjustments for the activity or activities affected exceed the total float along the network paths involved. As a minimum, time extension requests shall contain:

- a. A descriptive summary of the changes

- b. An analysis of project impact
- c. A fragnet that shows the impacted activities before the change
- d. A fragnet that shows the impacted activities after the change

Time extensions shall not be considered for contract modification proposals that do not include full documentation for the schedule change. Once a change has been approved by the Contracting Officer, the specific activities and the overall schedule must be updated.

1.11 CORRESPONDENCE AND TEST REPORTS

All correspondence (e.g., letters, Requests for Information (RFIs), electronic mail transmissions, meeting minutes, Production and QC Daily Reports, material delivery tickets, photographs, etc.) shall reference the Schedule Activity Number(s) that is (are) being addressed. All test reports (e.g., concrete, soil compaction, weld, pressure, etc.) shall reference the Schedule Activity Number(s) that is (are) being addressed.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

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