

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01315 - CPM SCHEDULES AND REPORTS

I. GENERAL

A. STIPULATIONS:

The "Special Requirements" and "General Conditions" to the contract form a part of this section by this reference thereto and shall have the same force and effect as if printed herewith in full.

B. RELATED DOCUMENTS

The Contract Drawings and the Standard Form of Agreement apply to this Section.

C. SUMMARY:

1. This Section specifies administrative and procedural requirements for Project Schedules and updates.
2. Where applicable, each Prime Contractor shall participate in scheduling activities specified herein, even though certain areas of responsibility are assigned to a specific Prime Contractor, and even though the Contractor for General Construction may be assigned general responsibility for overall scheduling purposes.
3. Requirements for the Schedule of Values are specified in Section 01027 "Applications for Payment".
4. Requirements for administrative and supervisory personnel and for the General Construction Contractor's Project Coordinator are included in Section 01040 "Project Coordination".
 - a. Designation of the Lead Contractor is also included in Section 01040.
5. Requirements for the Pre-Construction Conference and Coordination Meetings are specified in Section 01200 "Project Meetings".
6. Requirements for Submittal Schedules are specified in Section 01300.

D. QUALITY ASSURANCE:

1. The General Construction Contractor shall engage a Scheduling Consultant, experienced in CPM scheduling and knowledgeable in construction methods, including methods used in mechanical and electrical construction. The CPM Scheduling Consultant shall have ready access to computer equipment and shall be capable of producing schedules, reports and updates on a timely basis throughout the construction period. To the extent possible, the task of Schedule updating shall be assigned to the same individual.
 - a. The CPM Scheduling Consultant shall inform key Project personnel,

including subcontractors' personnel, in the proper methods of providing data and utilizing the Project Schedule information.

- b. Except as otherwise specified herein, comply with CPM in Construction - A Manual for General Contractors, published by The Associated General Contractors of America, Inc.

E. SUBMITTALS:

1. The General Construction Contractor shall submit to the University and the Architect reproducible copies of the following:
 - a. 60-Day Preliminary Schedule specified in Article 1.05 of this Section. Obtain approval by the University.
 - b. Preliminary bar-chart type schedule specified in Paragraph 1.06.2.1 of this Section.
 - c. Initial CPM Project Schedule and Final CPM Project Schedule (if required), both as specified in Article 1.07 of this Section. Obtain approval by the University.
 - d. Updates of CPM Project Schedule. Obtain approval by the University.
2. Each Prime Contractor shall submit to the University and the Architect reproducible copies of the following:
 - a. Preliminary bar-chart type schedule, including dollar value assigned to each activity, as specified in Paragraph 1.06.2.2 of this Section.

F. 60-DAY PRELIMINARY SCHEDULE:

1. The General Construction Contractor shall prepare, submit, and obtain University's approval of a 60-Day Preliminary Schedule, providing a suitable breakdown of activities scheduled for the first 60 days of Work, and including mobilization, submittals, procurement, and construction for that period.
 - a. The 60-Day Preliminary Schedule shall be distributed by the General Construction Contractor for review at the Pre-Construction Conference, to be held prior to the commencement of Work at the site, but not later than ten (10) calendar days after Notice to Proceed.
2. No Contract Work may be pursued at the site prior to the University's approval of the 60-Day Preliminary Schedule.

G. PRELIMINARY BAR-CHART SCHEDULES:

1. Preliminary Schedule Conference: Within seven (7) days after Notice to Proceed, the General Construction Contractor shall schedule and conduct a meeting to identify critical construction activities and to secure time

commitments from each Prime Contractor for performing critical elements of the Work. The date of issuance of Notice to Proceed shall be the start date for the Work of the Contract.

- a. Attendees: The General Construction Contractor's Project Coordinator, CPM Scheduling Consultant, all Prime Contractors, major subcontractors and other concerned parties, each represented at the conference by persons familiar with and authorized to conclude matters relating to scheduling the Work of their respective Contracts.
- b. All Contractors and Subcontractors shall cooperate with the Scheduling Consultant to create the Project Schedule.

2. Preliminary Bar-Chart Schedules:

- a. Within fourteen (14) calendar days after Notice to Proceed, the General Construction Contractors shall furnish to each separate Prime Contractor and to the University a horizontal bar-chart schedule for Work of all Prime Contracts, reflecting the decisions of the Contractors established during the Preliminary Schedule Conference, and indicating the manner in which the Work would meet the completion date.
- b. Within twenty-one (21) calendar days after Notice to Proceed, each separate Prime Contractor shall furnish to the General Construction Contractor a fully detailed bar-chart schedule showing, to the satisfaction of the General Construction Contractor, the prosecution of the Work of the respective Prime Contract as required to meet the completion date.
 - (1) The Prime Contractor's bar-chart schedule shall also identify the trade or subcontractor performing each activity, the duration of the activity in workdays, the manpower involved by trade, the major equipment involved, the location of the Work, and a dollar value of the activity.
 - (a) The dollar value assigned to each activity is to be reasonable and based on the amount of labor, materials, and equipment involved. When added together the dollar value of all activities shall equal the Contract Sum of the Prime Contract.
- c. The Prime Contractor shall coordinate the bar-chart schedule with the Submittal Schedule required in Section 01300 and shall provide all information needed by the Scheduling Consultant to prepare the General Construction Contractor's CPM Project Schedule.
- d. In the event the completion date indicated by the Prime Contractor's bar-chart schedule exceeds the contractual date, or in the event there appears to be a defect in the construction sequence or

duration, the bar-chart schedule shall be reviewed, and logic and time estimates shall be adjusted by the Scheduling Consultant and the Prime Contractor to meet the Contract completion date.

H. GENERAL CONSTRUCTION CONTRACTOR'S CPM PROJECT SCHEDULE:

1. Preparation of Initial CPM Project Schedule: Within thirty (30) calendar days after Notice to Proceed, the General Construction Contractor shall submit for the University's approval a detailed initial CPM Project Schedule, approved and signed by authorized representatives of all Prime Contractors and showing, to the satisfaction of the University, the proposed coordinated dates for the performance of each phase of the Work under each contract.
 - a. Construction of the Project shall be planned and recorded by the CPM Project Schedule. The Project Schedule shall be used for coordination and monitoring of Contract Work. All costs incurred by each Contractor in preparing and updating the Schedules are included in the Work of the Contract.
 - b. The Construction Time for the entire Project, or any milestone, shall not exceed the specified Contract Time. In the event that any milestone date or Contract completion date is exceeded in the Schedule, logic and time estimates shall be revised.
 - c. Failure to provide full cooperation with the General Construction Contractor's Scheduling Consultant will be sufficient reason for declaring a Prime Contractor in default.
 - d. Each Contractor expressly acknowledges that it has the duty to cooperate fully with the General Construction Contractor's Scheduling Consultant so that the Scheduling Consultant is able to deliver to the University a CPM Project Schedule, setting forth in detail the Work to be performed by the Contractors.
 - e. No Contractor shall assert any claim whatsoever for any delay or additional cost incurred in connection with the development of the CPM Schedule and updates. The University may withhold progress payments and other payments from Contractors which do not comply with the requirements of this Section.
2. The General Construction Contractor's Project Schedule shall be a time-scaled summary network diagram based on a fully-developed computer-generated Critical Path Method (CPM) Network scheduling method which individually indicates all significant portions of the Work. The CPM Schedule shall indicate for each task the description, duration, early and late start dates, early and late finish dates, float time, task completion and convergence nodes, cumulative workdays, work/calendar day conversion, and critical path for completion. The CPM Schedule shall be submitted in a form acceptable to the University as supporting detail for the General Construction Contractor's Project Schedule.

3. In addition to the computer-generated network, provide a legible hand-drawn diagram which clearly and graphically indicates the sequence proposed to accomplish each Work activity or operation, and appropriate interdependencies between the various activities. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values" submitted with each payment request.
 - a. For the initial CPM Project Schedule and all updates, provide computerized sorts by:
 - I-J
 - Total float
 - Prime Contract
 - Early start
 - Area, where applicable
 - Trade responsibility
 - b. Show network "dummies" on the diagram.
 - c. Show 60-day look ahead bar-charts by early start.
4. Within each time bar indicate estimated completion percentage in 10 percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.
5. The activities are to be described so that the Work is readily identifiable and the progress of each activity can be readily measured.
 - a. Identify workdays per week, holidays, and number of shifts per day.
 - b. Identify the trade or subcontractor performing the Work, the duration of the activity in workdays, the manpower involved by trade, the major equipment involved, the location of the Work, and a dollar value of the activity.
 - (1) The dollar value assigned to each activity is to be reasonable and based on the amount of labor, materials, and equipment involved. When added together, the dollar value of all activities shall equal the Contract Sum.
 - c. No activity duration shall be longer than 15 workdays without approval by the University.
 - d. The University reserves the right to limit the number of activities on the Schedule.
6. Prepare the diagram on separate 24 x 36 or 30 x 42 sheets, of stable transparency, or other reproducible media, to show data for the entire construction period.

7. Coordinate the Project Schedule with the Schedule of Values, List of Subcontracts, Submittal Schedule, Progress Reports, Payment Requests and other schedules.
 - a. In addition to construction activities, include dates for the submittal and approval of shop drawings and material samples, shop fabrication, delivery and testing.
8. Phasing: Provide notations on the diagram to show occupancy of substantially complete Project buildings by the University prior to overall Substantial Completion of the Project.
9. Work Stages: Indicate important stages of construction for each major portion of the Work, including testing and installation.
10. Area Separations: Provide a separate time bar to identify each major construction area for each major portion of the Work. Indicate where each element in an area must be sequenced or integrated with other activities.
11. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the Schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.
12. The General Construction Contractor shall secure time commitments for performing critical elements of the Work from each Prime Contractor involved. Coordinate each element on the Schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the Work.
 - a. Provide signature boxes on the General Construction Contractor's Project Schedule for signatures by representatives of all Prime Contractors, certifying acceptance of the Schedule.
 - b. Acceptance of the Project Schedule does not relieve the Contractors of the responsibility for the accuracy of the Schedule and for the Contractors' obligations to meet the contractual completion date. Acceptance does not constitute approval or warranty of the Contractors' means and methods of construction.
 - c. In the event of disagreement involving the designated Lead Contractor and one or more other Prime Contractor, regarding construction sequences, durations and the like, the determinations of the Lead Contractor will control.
13. Finalization of CPM Project Schedule: Following review by the University, if revisions to the Proposed Schedule are required, the General Construction Contractor shall do so promptly. The Schedule must be finalized, approved and signed by all Prime Contractors, not more than sixty (60) calendar days after date of Notice to Proceed. Failure to finalize the Schedule by that date

will result in the withholding of all Contract payments until the Schedule is finalized.

14. Distribution: Following response to the initial submittal, the General Construction Contractor shall print and distribute copies of the finalized Schedule to the University, Architect, all Prime Contractors, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.
 - a. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
 - b. Prime Contractors, subcontractors, suppliers, and other recipients shall report promptly to the General Construction Contractor in writing, any problems anticipated by the projections shown on Schedules and updates.

I. CPM SCHEDULE UPDATING:

1. The General Construction Contractor's Scheduling Consultant shall meet with superintendents of each Prime Contractor, major subcontractors, materials suppliers, and representatives of the University, to update the CPM Schedule at monthly intervals. Each Prime Contractor shall provide information to the Scheduling Consultant which will enable the CPM Schedule to be updated.
 - a. Show actual start date and finish date for each activity performed or underway.
 - b. Provide a written narrative report explaining Project progress to date, and identifying the following:
 - (1) A description of the critical path and critical Work required in the succeeding update period.
 - (2) Problem areas, anticipated delays, and impact on the Schedule.
 - (3) Corrective action recommended, and its effect.
 - c. Within five (5) working days after each meeting, the Scheduling Consultant shall distribute new diagrams of the Project Schedule and written narratives to all Prime Contractors, the University, and the Architect.
2. If the latest completion time for any significant activity does not come within milestone or completion dates, including all extensions of time, the sequence and time of activities shall be revised by the Contractors through concurrent operations, increase of shifts, manpower, or other means until

the schedule produced indicates that all critical dates will be met.

- a. In adjusting their activities, including but not limited to changes in durations and sequences, the Contractors shall respect the existing duty of the designated Lead Contractor to coordinate the Work and shall follow its directions.
 - b. If the Lead Contractor and one or more other Prime Contractors shall disagree on the reasonableness of the CPM Schedule, the use of resources adequate to meet the Project Schedule, the sequence of construction or other coordination issue, such dispute shall be submitted to the Lead Contractor for determination. Disputes between two or more Prime Contractors pertaining to coordination issues shall be submitted promptly to the Lead Contractor for determination.
 - (1) The final construction decision of the Lead Contractor shall be accepted by all Prime Contractors, subject only to the commencement of an arbitration proceeding pursuant to provisions of the Contract Documents.
3. When changes are authorized by the University that result in Contract Time extensions, the General Construction Contractor's Scheduling Consultant shall submit a modified hand-drawn diagram for acceptance by the University.
- a. As determined by CPM analysis, only delays in activities which affect critical path dates or Contract completion dates will be considered for a time extension.
 - b. In no event will the granting of an extension of time to one Prime Contractor entitle any other Prime Contractor to an extension of time.
 - c. If a Contractor requests a time extension of any milestone date or Contract completion date, the Contractor shall provide documentation as required by the University to enable University to determine whether a time extension is appropriate under the terms of the Contract. The Contract completion date will be adjusted only for causes specified in the Contract Documents.
4. Each Contractor shall prosecute its Work to maintain its progress in accordance with the Progress Schedule, so that no delays are caused to other Contractors engaged in the Work. Should any Contractor fail to maintain progress according to the Schedule or cause delay to another Contractor, it shall furnish such additional manpower, equipment, additional shifts, or other measures that are necessary or that are directed by the Lead Contractor, to bring its operations up to schedule without any additional expenses to the University. Disputes between the Contractors regarding adherence to the Schedule and the furnishing of additional resources both relate to means and methods of construction and are to be resolved in accordance with the Contract Documents.

5. It is understood by the University and each Contractor that float is a shared commodity, and is not for the exclusive use of either the University or any Contractor.

J. SHORT INTERVAL SCHEDULES:

1. As part of the agenda for Coordination Meetings specified in Section 01200, the General Construction Contractor's Project Coordinator shall meet with the CPM Scheduling Consultant, Prime Contractors and major subcontractors working onsite, or scheduled to work onsite in the following four-week period. The purpose of this meeting is to establish a detailed schedule of the Work for that period, review delivery dates, manpower and construction difficulties. All Contractors shall assist in the development of short interval schedules and the resolution of scheduling conflicts and construction difficulties.
2. Reporting: The General Construction Contractor shall keep the University and Architect informed of the status of the short interval schedules by means specified in Section 01200.

II. PRODUCTS (Not applicable)

III. EXECUTION (Not applicable)