Use this only if a contract requires the use of Primavera software during construction.

1. Baseline CPM Progress Schedule, Item SPV.0060.##; CPM Progress Schedule and Accepted Revisions, Item SPV.0060.##

*Replace standard spec 108.4 with the following:*

108.4 Critical Path Method Progress Schedule

108.4.1 Definitions

The department defines terms used in standard spec 108.4 as follows:

 Activity An administrative or construction task performed during the course of the project with a defined duration, and scheduled (or actual) start and finish dates.

 Critical Path The longest continuous chain of activities through the CPM schedule that establishes the minimum overall project duration.

 Construction Activity Construction activities are discrete work activities performed by the contractor, subcontractors, utilities, or third parties within the project limits.

 CPM Progress Schedule A Critical Path Method (CPM) Progress Schedule is a network of logically related activities. The CPM schedule calculates when activities can be performed and establishes the critical or longest continuous path or paths of activities through the project.

 Float Float, as used herein, is the total float of an activity; i.e., it is the amount of time between the date when an activity can start (the early start), and the date when an activity must start (the late start). In cases where the total float of an activity has a different value when calculated based on the finish dates, the lower (more critical) value will govern.

 Forecast Completion Date The completion date predicted by the latest accepted CPM Update, which may be earlier or later than the contract completion date, depending on progress.

 Fragnet A group of logically-related activities, typically inserted into an existing CPM schedule to model a portion of the project, such as the work associated with a change order.

 Initial Work Plan The initial work plan is a time-scaled CPM schedule showing detailed activities for the first 90 calendar days of work and summary level activities for the remainder of the project.

 Intermediate Milestone Date A contractually required date for the completion of a portion of the work, so that a subsequent portion of the work or stage of traffic phasing may proceed.

 Master Project Schedule The department’s schedule for the contract work, developed during design, and provided to the contractor for informational purposes only.

 Work Breakdown Structure (WBS) A framework for organizing the activities that make up a project by breaking the project into successively greater detail by level. A WBS organizes the project work. It does not address the sequencing and scheduling of project activities.

108.4.2 Department’s Master Schedules

108.4.2.1 Master Project Schedule

The department will supply its Master Project Schedule for the contract work, developed during design. The Master Project Schedule is not a direction on how to perform the work. The Master Project Schedule reflects one possible approach to the work, consistent with the phasing requirements.

108.4.2.2 Use of Department’s Master Schedules

The department’s Master Schedules provide information to assist the contractor in preparing its schedule. The Master Schedules are not contract documents. The logic contained in the Master Schedules is not intended to alter or supplement contract requirements for the phasing of the work, but to reflect those requirements.

108.4.3 Contractor’s Scheduling Responsibilities

Prepare and submit a CPM progress schedule that accurately reflects the plan for the performance of the work, based on the physical requirements of the Work, and Traffic Phasing requirements. The CPM schedule is the contractor’s committed plan to complete all work within the completion deadlines. The contractor assumes full responsibility for the prosecution of the work as shown. The CPM schedule is not part of the contract. Schedule the Work in the manner required to achieve the completion date and intermediate milestone dates specified in the Prosecution and Progress Special Provision.

Use the latest version of Primavera Project Planner (P6), by Primavera Systems, Inc., Bala Cynwyd, PA to prepare the Initial Work Plan, Baseline CPM Progress Schedule, and Monthly CPM Updates.

Designate a Project Scheduler who will be responsible for scheduling the Work and submit for approval a professional resume describing a minimum of three years of scheduling experience on urban, interstate-highway reconstruction work of similar size and complexity, including recent experience with P6.

108.4.4 Submittals

108.4.4.1 Initial Work Plan

Within ten business days after the Initial Work Plan Workshop, as scheduled in section 103.10 as defined in article 4.1 Contract Award and Execution, submit an Initial Work Plan consisting of the following:

1. Develop the Initial Work Plan using the Master Project Schedule as a template.

2. Provide a detailed plan of activities to be performed within the first 90 calendar days of the contract. Provide construction activities with durations not greater than 28 calendar days (20 business days), unless the engineer accepts requested exceptions.

3. Provide activities as necessary to depict administrative work, including submittals, reviews, and procurements that will occur within the first 90 calendar days of the contract. Activities other than construction activities may have durations greater than 28 calendar days (20 business days). Allow 21 calendar days (15 business days) for department review of submittals.

4. Provide summary activities for the balance of the project. Summary activities may have durations greater than 28 calendar days (20 business days).

5. Submit three copies of the Initial Work Plan in a compressed (PRX) format on three separate CDs.

6. The engineer will accept the contractor's Initial Work Plan or provide comments within five business days after receipt of the Initial Work Plan. Address comments and resubmit the Initial Work Plan as necessary. Do not begin work until the engineer accepts the Initial Work Plan. The department will use the initial work plan to monitor the progress of the work until the Baseline CPM Progress Schedule is accepted.

7. Submit an updated version of the Initial Work Plan on a monthly basis until the engineer accepts the Baseline CPM Progress Schedule. With each update, include actual start dates, completion percentages, and remaining durations for activities started but not completed. Include actual finish dates for completed activities.

108.4.4.2 Baseline CPM Progress Schedule

Within 15 business days after the CPM Scheduling Workshop, as scheduled in section 103.10 as defined in article 4.1 Contract Award and Execution, submit a Baseline CPM Progress Schedule and written narrative consisting of the following:

1. Develop the Baseline CPM using the Master Program Schedule as a template. The Baseline CPM is the contractor’s committed plan to complete the Work within the time frames required to achieve the contract completion date and Intermediate milestone dates. The department will use the schedule to monitor the progress of the work. Include the following:

1.1 Provide a detailed plan of activities to be performed during the entire contract duration, including all administrative and construction activities required to complete the work as described in the contract documents. Provide construction activities with durations not greater than 28 calendar days (20 business days), unless the engineer accepts requested exceptions.

1.2 Provide activities as necessary to depict administrative work, including submittals, reviews, procurements, inspections, and all else necessary to complete the work as described in the contract documents. Activities other than construction activities may have durations greater than 28 calendar days (20 business days). Allow 21 calendar days (15 business days) for department review of submittals.

1.3 Provide activities as necessary to depict third party work related to the contract.

1.4 Make allowance for specified work restrictions, non-working days, time constraints, calendars, and weather; and reflect involvement and reviews by the department, and coordination with adjacent contractors, utility owners, and other third parties.

1.5 With the exception of the Project Start Milestone and Project Completion Milestone, all activities must have predecessors and successors. The start of an activity shall have a Start-to-Start or Finish-to-Start relationship with preceding activities. The completion of an activity shall have a Finish-to-Start or Finish-to-Finish relationship with succeeding activities. Do not use Start-to-Finish relationships. Do not use Finish-to-Start relationships with a lag unless the engineer accepts requested exceptions.

1.6 Schedule all intermediate milestones in the proper sequence and input as either a “Start-no-Earlier-Than” or “Finish-no-Later-Than” date. Provide predecessors and successors for each intermediate milestone as necessary to model each Stage of the Work. Unless the engineer accepts a requested exception, the schedule should encompass all the time in the contract period between the starting date and the specified completion date.

1.7 Using the bid quantities and unit prices, develop an anticipated cash-flow curve for the project, based on the Baseline CPM.

2. Provide three hard copies of a hand-drawn or electronically drafted logic diagram depicting the CPM network. Organize the logic diagram by grouping related activities, based on the activity codes in the CPM.

3. Provide a written narrative with the baseline CPM explaining the planned sequence of work, as-planned critical path, critical activities for achieving intermediate milestone dates, traffic phasing, and planned labor and equipment resources. Use the narrative to further explain:

3.1 The basis for activity durations in terms of production rates for each major type of work (number of shifts per day and number of hours per shift), and equipment usage and limitations.

3.2 Use of constraints.

3.3 Use of calendars.

3.4 Estimated number of adverse weather days on a monthly-basis.

3.5 Scheduling of permit and environmental constraints, and coordination of the schedule with other contractors, utilities, and public entities.

4. Submit three copies of the Baseline CPM in a compressed (PRX) format on three separate CDs.

Within ten business days of receiving the Baseline CPM, the engineer will provide comments and schedule a meeting for the contractor to present its Baseline CPM and answer questions raised in the engineer’s review.

At the meeting scheduled by the engineer, provide a presentation of the Baseline CPM. In the presentation, include a discussion of the staging and sequencing of the work, understanding of traffic phasing, and application of labor and equipment resources to the Work. Address comments raised in the engineer’s review.

Within five business days after the meeting, the engineer will accept the contractor's Baseline CPM schedule or provide comments. Address the engineer’s comments and resubmit a revised Baseline CPM within ten business days after the engineer's request. If the engineer requests justification for activity durations, provide information that may include estimated labor, equipment, unit quantities, and production rates used to determine the activity duration.

The engineer accepts the Baseline CPM based solely on whether the schedule is complete as specified in this section. The engineer’s acceptance of the schedule does not modify the contract.

The department will not consider requests for contract time extensions as specified in 108.10 or additional compensation for delay specified in 109.4.7 until the department accepts the Baseline CPM schedule.

108.4.4.3 Monthly CPM Updates

Submit CPM Updates on a monthly basis after acceptance of the Baseline CPM. With each CPM Update, include the following:

1. Actual start dates, completion percentages, and remaining durations for activities started but not completed, and actual finish dates for completed activities.

2. Additional activities as necessary to depict additions to the contract by changes and logic revisions as necessary to reflect changes in the contractor’s plan for prosecuting the work.

3. Include a narrative report that includes a brief description of monthly progress, changes to the critical path from the previous update, sources of delay, potential problems, work planned for the next 30 calendar days, and changes to the CPM schedule. Changes to the logic of the CPM schedule include the addition or deletion of activities and changes to activity descriptions, original durations, relationships, constraints, calendars, or previously recorded actual dates. Justify changes to the CPM schedule in the narrative by describing associated changes in the planned methods or manner of performing the work or changes in the work itself.

4. Submit three copies of each CPM Update in a compressed (PRX) format electronically, as agreed to with the department.

5. If additions or changes were made to the CPM schedule since the previous update, submit an updated hard copy of the revised logic diagram.

6. Within five business days of receiving each CPM Update, the engineer will provide comments and schedule a meeting as necessary to address comments raised in the engineer’s review. Address the engineer’s comments and resubmit a revised CPM Update within five business days after the engineer's request.

108.4.4.4 Three-Week Look-Ahead Schedules

Submit Three-Week Look-Ahead Schedules on a weekly basis after notice to proceed (NTP). The schedule can be hand drawn or generated by computer. With each Three-Week Look-Ahead include:

1. Activities underway and as-built dates for the past week.

2. Planned work for the upcoming two-week period.

3. The activities of the Three-Week Look-Ahead schedule shall include the activities underway and critical RFIs and submittals, based on the CPM schedule. The Three-Week Look-Ahead may also include details on other activities not individually represented in the CPM schedule.

4. On a weekly basis, the department and the contractor shall agree on the as-built dates depicted in the Three-Week Look-Ahead schedule or document any disagreements. Use the as-built dates from the Three-Week Look-Ahead schedules for the month when updating the CPM schedule.

108.4.4.5 Weekly Production Data

Provide estimated and actual weekly production rates for items of work on a weekly basis as follows:

1. Provide data on the following items by area or station:

1.1 Retaining Walls—SF per week

a. MSE Walls

1.2 Bridge Construction

a. Foundation Pile—Each per week

b. Foundation/Substructure Concrete—CY per week

c. Structural Steel Girders—Each per week

d. Prestressed Concrete Girders—Each per week

e. Deck Formwork—SF per week

1.3 Roadway Excavation—CY per week

1.4 Roadway Structural Section

a. Grading/Subgrade Preparation—SY per week

b. Base Material Placement—Ton per week

c. Base Material Subgrade Preparation—SY per week

d. Asphalt Pavement—Ton per week

e. Concrete Pavement – SY per week

2. For each item, indicate the actual daily production for the past week and the anticipated weekly production for the next week.

3. Submit the data in an electronic spreadsheet format at the same time the Three-Week Look-Ahead is submitted. On a weekly basis, the department and the contractor shall agree on the production data or document any disagreements.

108.4.5 Progress Review Meetings

Weekly Progress Review Meetings—After completing the weekly submittal of the Three-Week Look-Ahead and production data, attend a weekly meeting to review the submittals with the department. At the meeting, address comments as necessary, and document agreement or disagreement with the department.

Monthly Update Review Meetings—After submitting the monthly update and receiving the engineer’s comments, attend a job-site meeting, as scheduled by the engineer, to review the progress of the schedule. At that meeting, address comments as necessary, and document agreement or disagreement with the department. The monthly meeting will be coordinated to take place on the same day and immediately before or after a weekly meeting, whenever possible.

108.4.6 CPM Progress Schedule Revisions

Revision by the contractor—If necessary due to changes in the Work or project conditions and authorized by the engineer, the contractor may submit a CPM Progress Schedule Revision, although the next CPM Update is not yet due. Prepare the CPM Revision in the same format as required for CPM Updates, including justification for changes to the schedule. The process for comment and acceptance of a CPM Revision will be the same as for CPM Updates. If the CPM Revision is accepted, prepare the next monthly update based on the revised CPM. If the CPM Revision is rejected, prepare the next monthly update based on the previous month’s update.

Engineer’s Right to Request Revisions - The engineer will monitor the progress of the work and may request revisions to the CPM schedule. Revise the schedule as requested by the engineer, and submit a CPM Progress Schedule Revision within ten business days of the request. The process for comment and acceptance of a CPM Revision will be the same as for CPM Updates. The engineer may request that the contractor revise the CPM schedule for one or more of the following reasons:

1. The forecast completion date is scheduled to occur more than 14 calendar days after the contract completion date.

2. An intermediate milestone is scheduled to occur more than 14 calendar days after the date required by the contract.

3. The engineer determines that the progress of the work differs significantly from the current schedule.

4. A contract change order requires the addition, deletion, or revision of activities that causes a change in the contractor's work sequence or the method and manner of performing the work.

108.4.7 Documentation Required for Time Extension Requests

To request a time extension to an intermediate milestone date or the contract completion date associated with changes to the work, provide a narrative detailing the work added or deleted and the other activities affected, based on the latest accepted CPM Update. For added work, submit a proposed fragnet of activities to be added or revised in the CPM schedule, indicating how the fragnet is to be tied to the CPM schedule.

To request a time extension to an intermediate milestone date or the contract completion date associated with delays to the work, provide a narrative detailing the affected activities and the cause of the delay, based on the latest accepted CPM Update. Requests for time extensions due to delays should meet the following criteria:

1. For requests to extend the contract completion date, include a description of how the delay affected the project’s critical path, based on the latest accepted CPM Update.

2. For requests to extend an intermediate milestone date, include a description of how the delay affected the controlling (longest) path to the milestone, based on the latest accepted CPM Update.

3. The department and the contractor agree that float is not for the exclusive use or financial benefit of either party. Either party has the full use of the float on a first come basis until it is depleted.

108.4.8 Payment for CPM Progress Schedule

The department will pay for measured quantities at the contract unit price for work acceptably completed under the following bid item:

ITEM NUMBER DESCRIPTION UNIT

SPV.0060.## Baseline CPM Progress Schedule EACH

SPV.0060.## CPM Progress Schedule and Accepted Revisions EACH

The department will only make progress payments for the value of materials, as specified in standard spec 109.6.3.2.1, until the contractor has submitted the Baseline CPM schedule. The department will retain ten percent of each estimate until the department accepts the Baseline CPM schedule.

Payment is full compensation for all work required under these bid items including the three week look ahead. The department will pay the contract unit price for the Baseline CPM schedule after the department accepts the schedule. Thereafter, the department will pay the contract unit price for each monthly CPM Update acceptably completed. The department will pay the contract unit price for CPM Revisions, if the department accepts the revision. The department will not pay for proposed revisions that are not accepted.

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