

MICHIGAN  
DEPARTMENT OF TRANSPORTATION  
  
SPECIAL PROVISION  
FOR  
**CRITICAL PATH METHOD SCHEDULE**

CFS:BED

1 of 6

APPR:MRB:JJG:02-26-20  
FHWA:APPR:03-02-20

**a. Description.** This work consists of the development and submittal of a critical path method (CPM) schedule as noted herein for review and approval by the Engineer prior to starting construction activities. Prepare the CPM schedule using Primavera Project Management software. Designate to the Engineer a Project Scheduler responsible for administering the project CPM schedule in Primavera software. Discuss project specific CPM schedule expectations with the Engineer prior to the initial CPM schedule submittal. Approval of the CPM schedule does not modify the contract or give authorization to deviate from contract requirements. Delays related to the approval of the CPM schedule will not be considered for an extension of time. The Engineer may withhold all or part of contract payments for failure to develop an approved CPM schedule within 60 days of contract award or for failure to update the CPM schedule as required.

**b. CPM Schedule Submittal Requirements.**

1. Submit CPM Schedules in accordance with Table 1: Submittal Timeline.

**Table 1: Submittal Timeline**

Schedule Type	Submittal Deadline	MDOT Review	Resubmission Period
Interim Baseline	14 days after award	7 days	7 days
Baseline	28 days after award	14 days	7 days
Revised Baseline	10 days after requirement or request	10 days	7 days
Update	5 days after Data Date	7 days	7 days

A. If the submittal is received after 12:00 p.m., or on a Saturday, Sunday, or Department holiday, the specified time for review or resubmission will begin on the next non-holiday weekday.

B. The submittal will be considered approved if the Contractor meets the submittal deadline and the Engineer does not respond within the MDOT review timeline. Failure to meet the submittal deadline waives the Engineer's obligation to meet the MDOT review timeline.

C. Depending on which portions of the CPM schedule are not in compliance, it may not be possible to perform a complete review of the CPM schedule. If necessary, the Engineer will facilitate a meeting to resolve issues with the Contractor's Project Scheduler within 5 days of the Engineer's response. Correct and resubmit rejected CPM schedule submittals in accordance with Table 1. Make the necessary revisions on the subsequent CPM schedule submittal for schedules that are "approved as noted". The subsequent CPM schedule submittal will be rejected without full review unless the comments from the

previous CPM schedule submittal are addressed.

2. CPM Schedule submittals must contain the following:

A. Primavera XER electronic file that can be directly imported into the Department's version of Primavera without loss or modification of data or need for conversion.

B. Gantt chart in portable document format (PDF) format. The Gantt chart must contain all activities grouped by work breakdown structure (WBS) and sorted by Start date, with the longest path indicated in red. The Gantt chart title block must contain Data Date, Run Date, Contract ID, Project Name/Description, Contractor, and Submission Date. Gantt chart must display columns for Activity ID, Activity Name, Original Duration, Start, Finish, Total Float, Calendar, and Longest Path. In addition, Update schedules must also display columns for Activity Percentage Complete, At Completion Duration, and Actual Duration.

C. Scheduling/Leveling Report (Log) generated for the current schedule submittal.

D. Written narrative as specified herein.

**c. General CPM Schedule Requirements.**

1. Provide a CPM schedule that shows the activities of work in sufficient detail to demonstrate a reasonable work plan to complete the project by the contract dates. Show the order and interdependence of activities so the Engineer can identify the work and measure the progress of each activity.

2. The CPM schedule must reflect the scope of work, the special provision for maintaining traffic, the contract completion dates, and other project milestones established in the contract. Include activities for subcontractors, suppliers, vendors, the Department, permitting agencies, and utilities, as appropriate. Include activities for submittals, working drawings, shop drawing preparation, submittal review and approval, material fabrication, delivery of materials, plant and equipment, and other contract related activities that are critical and/or could significantly affect the schedule. Failure to include an element of work required for performance of the contract will not excuse the Contractor from completing work by the contract completion dates.

3. If the project scope, contractual milestones or work season restrictions prevent a logically defined critical path, it may be necessary to develop project calendars representing non-work periods or to have multiple schedules. This necessity may be driven by, but not limited to: complex project scope, multiple work seasons, or project scope extraneous to, and extending beyond, the contractual completion dates.

4. Work Breakdown Structure (WBS). Divide the work elements into manageable parts corresponding to key deliverables, stages, and/or milestones. Develop a separate WBS for deleted activities, contract modifications, or other impacts as applicable.

5. Project Activities.

A. Activity Type. Do not use Resource Dependent as an activity type.

B. Activity Percent Complete Type. Set Level of Effort activity percent complete type

to “duration”. Set all other activity percent complete types to “physical”.

C. Activity Identification (ID). Use the assigned unique Activity ID for the duration of the project. Once approved, do not remove activities from the schedule.

D. Activity Name. Each activity must have a narrative description consisting of a verb or work function (i.e.; form, pour, excavate) and an object (i.e.; slab, footing, underdrain). Include a location (i.e.; Structure X, Road, Station X+XX) in the name as appropriate or if requested. Indicate Department activities by including “MDOT” in the activity name.

E. Activity Original Duration. Assign task dependent construction activities an original duration in whole days ranging from 1 to 20 days. Summary level activities included in an Interim Baseline may have durations over 20 days. Do not change original activity durations unless justified with a Revised Baseline schedule and an approved explanation in the narrative.

F. Activity Relationships. Open logic activities are not allowed. All task dependent activities, except the first activity and deleted activities, must have an activity logically tied to its start. All task dependent activities, except the final activity and deleted activities, must have an activity logically tied to its finish. Negative lags are prohibited.

6. Project Milestones. Provide milestones in the schedule, including start of the project, the completion of the project, interim contractual dates and additional activities necessary to communicate the planned progress of work. Project milestones must have zero duration and an Activity Type of Start Milestone or Finish Milestone.

7. Constraints. Use only “Finish on or Before” or “Start on or After” constraint types. Use constraints only for contractual dates and timeframes. Use project level calendars representing contractual dates if the use of constraints prevents a continuous critical path from project start to project completion.

8. Calendars. Assign activities a project level calendar. Incorporate non-work periods such as holidays, weekends, seasonal restrictions, or weather contingency (i.e. temperature and/or precipitation) and other non-work days identified in the contract. Activity calendars for non-field work activities, including submittals, reviews, procurement, fabrication, cure times, and utility relocations performed by others, must not show non-work days unless otherwise specified in the contract. Define the “work hour/day” in calendars to match the Primavera Admin Preference “Hours per Time Period”. Activity calendars must have the same shift times.

9. Schedule Calculation Options. Ignore relationships to and from other projects. Do not make open-ended activities critical. Calculate the schedule using “Retained Logic”. Define critical activities as “Longest Path”. Compute total float as finish float.

10. Float. Float available in the CPM schedule, or generated due to efficiencies of either party, is a shared resource available to either the Department or the Contractor. Use of float suppression techniques, such as; preferential sequencing (arranging critical path through activities more susceptible to Department caused delay), lag logic restraints, artificial activity times, or imposing unapproved constraint dates, will be cause for rejection of the CPM schedule. A Baseline CPM Schedule will be rejected if submitted with negative float. Revised Baseline CPM schedules and CPM schedule updates submitted with negative float can be

cause for rejection. Negative float will not be a basis for requesting time extensions.

**d. Baseline Schedules.**

1. Interim Baseline Schedule. An Interim Baseline schedule must be submitted and approved prior to starting construction activities. The Interim Baseline schedule must detail the work activities in the first 60 days of the project and show summary level activities required to complete the remainder of the project. Until the Baseline schedule is approved, submit monthly updates to the Interim Baseline schedule to show the actual work progress.

2. Baseline Schedule. The Baseline schedule must incorporate the approved Interim Baseline schedule and actual progress to date, if applicable. The Baseline schedule will be the fixed CPM schedule by which project performance and progress is measured.

3. Revised Baseline Schedule. When directed by the Engineer or as applicable, submit a Revised Baseline schedule that details the revised plan for completing the remaining contract work. A Revised Baseline schedule will be required when:

- A. A contract revision or change significantly impacts the schedule.
- B. The Contractor plans to substantially alter future work sequences or operations.
- C. There are significant discrepancies between the latest approved schedule and actual work operations and/or progress.
- D. An update schedule shows considerable negative float and/or it is apparent that the work may not be completed within contract time.

4. Baseline Narrative Requirements. Follow the outline detailed below:

A. Milestone Dates. List major milestones with their scheduled and contractual dates as applicable, including the contract completion date, contract interim milestones, major traffic switches, start/finish milestones for each stage of work, and closure periods.

B. Work Sequence. Explain the sequence of work to complete the project, including where the work will begin and how the work will progress through the project.

C. Resources. Describe the general resources to be applied to the project. Include the number of crews, types of crews, and key equipment such as cranes or pavers.

D. Work Schedule. Detail the planned work schedule, including the number of workdays per week, work hours, night or weekend work, and non-work periods. If using multiple crews on differing schedules, provide the information for each crew.

E. Weather. Explain how the schedule accommodates adverse weather days. Describe how weather impacts will be addressed including changes to the work schedule or make-up work days. Describe planned work and explain weather considerations for winter months and seasonal suspension.

F. Critical Path. Briefly describe the critical path of the project. Highlight other critical paths that may exist due to interim contractual dates.

G. Delays. Describe actual or anticipated delays, including identification of the type, the cause, and responsibility. Identify delayed critical activities, activities that may become critical, and note the impact of the delay on project milestones. Detail actions required to mitigate delays or provide a recovery plan to complete within contract time.

H. Third Party Interfaces. State the status of required permits, utility coordination or other third-party interfaces.

I. Lags. Explain the use of lags summarized by each sequence of work.

J. Additional Information. Describe other assumptions, contingency or risk that may help the Engineer understand the overall project schedule.

**e. Update Schedules.** Submit Update schedules every month with consistent Data Dates. Update the actual start and finish dates for completed activities. Update the actual start date, remaining duration, and Activity Percent Complete for activities in progress. Correct out-of-sequence activities from the Scheduling/Leveling Report. The Engineer can request an update at any time if circumstances become known that make the latest approved schedule an ineffective tool to track progress. Submit a final update schedule within 14 days of completion of all activities on the schedule.

1. Update Schedule Narrative Requirements. Follow the outline detailed below:

A. Milestone Dates. List major milestones with their current scheduled completion dates and compare against the completion dates from the latest approved schedule.

B. Work Sequence. Describe the work performed since the latest approved schedule. Note changes to correct out-of-sequence activities or changes to sequencing.

C. Resources. Describe changes in resources.

D. Work Schedule. Describe changes to work schedule (i.e. days, hours, shifts).

E. Weather. List adverse weather dates and the total number of days lost each month due to adverse weather or conditions resulting from adverse weather. Identify the activities affected and impacts to the critical path.

F. Critical Path. Describe changes to the critical path.

G. Delays. Describe actual or anticipated delays, including identification of the type, the cause, and responsibility. Identify delayed critical activities, activities that may become critical, and note the impact of the delay on project milestones. Detail actions required to mitigate delays or provide a recovery plan to complete within the contract time.

H. Third Party Interfaces. State the status of required permits, utility coordination or other third-party interfaces.

I. Activity Changes. List changes to activities, except for status or progress updates, and provide an explanation or reasoning for the change. Include activities that have been added or deleted and include changes in activity relationships.

J. Additional Information. Describe any changes to other assumptions, contingency or risk that may help the Engineer understand the overall project schedule moving forward.

**f. Time Extensions.** Time extensions will not be considered without an approved current schedule. Unless the Engineer approves otherwise, requests for time extensions will only be considered if the analysis detailed herein is provided. The standard specifications provide the excusable delays that the Engineer may grant time extensions for, and the analysis herein will help quantify and determine the appropriate time extension due, if any.

1. Use a Time Impact Analysis (TIA), for evaluating the potential impact of unplanned or extra work (prospective). In general terms, complete the following steps:

- A. Model the impact with a schedule fragnet.
- B. Select the approved current schedule to impact (unimpacted schedule).
- C. Insert the fragnet and calculate the schedule (impacted schedule).
- D. Compare the finish dates of the unimpacted and impacted schedules to determine the duration of the impact. The time extension due, if any, will be based on this duration.

2. Use a contemporaneous/Windows Analysis when evaluating delays that are occurring or have already occurred (retrospective). In general terms, complete the following steps:

- A. Identify the approved schedule prior to the start of the delay being evaluated.
- B. Identify the approved schedule following the conclusion of the delay. If applicable, identify each approved Update schedule in effect during the delay.
- C. Identify and track the critical path each day from immediately before the start of the delay to immediately following the delay.
- D. Determine whether the delay affected the critical path. If the delay did not fall on the critical path, then no time extension is due. If the delay did fall on the critical path, then determine the number of days the critical path was delayed. The time extension due, if any, will be based on the allocation of responsibility for the delay.

**g. Measurement and Payment.** The completed work, as described, will be measured and paid for at the contract price using the following pay item:

Pay Item	Pay Unit
Critical Path Method Schedule .....	Dollar

A budgeted amount of \$15,000 has been established for payment of the work detailed herein. **Critical Path Method Schedule** will be paid upon Baseline schedule approval. No extra compensation will be paid for scheduling costs associated with updates, revisions, or delays to the project.