



**SPECIAL PROVISIONS  
FOR  
PROGRESS SCHEDULING**

**Pottawattamie County  
IM-029-3(105)48--13-78  
IM-NHS-029-3(102)48--03-78  
IM-NHS-029-3(103)48--03-78  
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NHS-029-3(106)48--11-78**

**Effective Date  
December 16, 2014**

**THE STANDARD SPECIFICATIONS, SERIES 2012, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

**120216.01 GENERAL.**

- A.** The Contractor's planning, scheduling and execution of the work shall be disclosed to Iowa DOT by submission of the Preliminary, Baseline and Contract Schedule information and data specified in this Special Provision. The Work under this Contract shall be planned, scheduled, executed, reported and accomplished using Critical Path Method (CPM) scheduling. The scheduling Work shall be performed by a Qualified Scheduler.
- B.** No contract work shall begin without a Baseline CPM schedule approved by the Engineer.
- C.** Develop and update a computerized CPM Schedule as described herein and as required by the Engineer. When the term "Schedule" is used in the Special Provisions, it shall mean CPM Schedule. All work associated with these requirements is considered incidental for which no direct payment will be made.
- D.** "Primavera Project Management" (P6), version 8.2, or later shall be used to develop and update the schedule. When the term "Primavera" is used in the Special Provisions, it shall mean "Primavera Project Management" (P6), version 8.2, or later.

## **120216.02 DEFINITIONS.**

Activity: A fundamental unit of work in a Project Plan and Schedule establishing the time, cost and resources required for performing or furnishing a part of the Work, or a requisite step. Each activity has defined geographical boundaries, time duration in whole days and a detailed estimate of cost and resources required to construct the task. Each activity is assigned a unique description, activity number, and activity codes.

Baseline Schedule: The initial accepted Schedule representing the Contractor's work plan on the first working day of the project. The Baseline Schedule shall represent the Contractor's best judgment and intended plan for completion of the Work in compliance with specific requirements of the Contract Documents. The Baseline Schedule shall take into account all activities required to accomplish the work as well as interface dates with utility owners/railroads/municipalities/agencies, submittal review and re-submittals, Iowa DOT operations and other activities to a minimum WBS level 5 as defined later in these provisions. The Baseline Schedule shall anticipate all necessary labor equipment, materials and resources to accomplish activities within the duration set forth in the contract documents.

Contract Schedule: The most current version of the Baseline Schedule that has been reviewed and accepted by the Engineer. The accepted baseline schedule shall be updated monthly through the data date designated by the Engineer. Upon acceptance, the updated baseline schedule shall become the Contract Schedule which shall be used for subsequent planning, scheduling and management of the Project. The updated Contract Schedule shall show actual, not calculated, progress. Only accepted logic changes and accepted Contract changes shall be incorporated into the Contract Schedule.

Cost Loading: The allocation of direct and indirect costs to each activity based on Iowa DOT bid items, utilizing the scheduling software's resources and cost accounting unless approved otherwise by the Engineer.

Constraint: A scheduling restriction imposed on the start or finish of an activity. Use of constraints is generally prohibited unless the time element is contractual. The use of constraints requires approval of the Engineer.

CPM Schedule: Computerized resource loaded Schedule which accounts for the Work required by the contract documents, reflects Work remaining and factual historical information regarding how completed Work was performed.

CPM Network: The structure of the computerized Schedule. The CPM network accounts for the work required by the contract documents and defines the construction sequence by using logical predecessor and successor relationships.

Critical Path: The longest continuous chain of activities in the CPM network from start of the project to the finish of the project as defined by the contract documents. In general, a delay to an activity on the critical path could extend the scheduled completion date. The critical path shall be identified as the longest path as determined by the scheduling software when the definition of critical activities is set to "Longest Path."

Critical Path Method (CPM): A network based planning technique using activity durations and the relationships between activities to mathematically calculate a Schedule for the entire project.

Data Date: The day after the date through which a Schedule is current. Everything occurring earlier than the data date is "as-built" and everything on or after the data date is "planned."

Float: The difference between the earliest and latest allowable start or finish times for an activity.

Early Dates: The early start dates and early finish dates, i.e., the dates each Activity will start and finish if each is started at the earliest end of the range of dates that the CPM Schedule indicates the Activities can be performed.

Late Dates: The late start dates and the late finish dates; i.e., the dates each Activity will start and finish if each is started at the latest end of the range of dates that the CPM Schedule indicates the Activities can be performed and still achieve the milestones and Contract Time.

Milestone: An event activity that has zero duration and is typically used to represent a point in time.

Near Critical Path: A chain of activities with total float exceeding that of the critical path but having no more than 10 working days of total float.

Preliminary Baseline Schedule: The preliminary Baseline Schedule shall be submitted to the Engineer at the Pre-construction Scheduling Conference. The Preliminary Baseline Schedule shall include the activities and planned sequence of operations in full Baseline detail for the first 120 working days after Receipt of signed contract, and lesser detail for the remainder of the project.

Predecessor Activity: An activity, which precedes another activity (to which it is logically tied) in the network. Each schedule activity except the project start milestone shall have a logical predecessor.

Qualified Scheduler: An individual who has completed CPM scheduling training, has performed CPM scheduling as a primary responsibility, understands the specification requirements and is able to demonstrate their ability to accomplish the requirements.

Resource Loading: See Cost Loading.

Successor Activity: An activity, which follows another activity (to which it is logically tied) in the network. Each schedule activity except the project completion milestone shall have a logical successor.

Two Week Detail Schedule: The Two Week Detail Schedule is a hand or computer generated bar chart schedule which spans a forward looking, rolling period of at least 14 calendar days. The Two Week Detail Schedule shall be updated and submitted to the Engineer on a bi-weekly basis. The Two Week Detail Schedule shall be based on the accepted Contract Schedule and provide a greater breakdown of the Contract Schedule activities. The Two Week Detail Schedule shall specifically reference the accepted Contract Schedule activity ID numbers and define subsequent specific daily operations for all work activities scheduled to be performed during the 2 week period. The Two Week Detail Schedule shall be submitted at the Quantity Rectification Meeting as described in section 120216.08 part a.

Time Impact Analysis (TIA): A Schedule or schedule fragnet, and narrative report developed specifically to demonstrate what effect a proposed change or delay has on the current scheduled completion date.

Total Float: Number of working days by which a part of the Work in the Progress Schedule may be delayed from its Early Dates without necessarily extending the Contract Time.

Work Breakdown Structure (WBS): "defines the project tasks, or work to be performed, expressed in terms of the product or result of the work, i.e., deliverables, and establishes a relationship between the tasks and the major project objectives. The WBS also establishes the framework for the scheduling and control of the project. It functions to establish a framework for summarizing the Schedule and cost status of the project at progressively higher levels of management." (Cook, 1971).

### **120216.03 GENERAL SCHEDULING REQUIREMENTS.**

- A.** Schedules shall show the order in which the Contractor proposes to carry out the work with logical links between time-scaled work activities, and retained logic calculations made using CPM to

determine the controlling operation or operations. The Contractor is responsible for assuring that all activity sequences are logical and that each Schedule shows a coordinated plan for complete performance of the work within the contracted period of performance.

- B.** Schedules shall comply with the staging, phasing, work constraints, and milestones defined in the contract documents.
- C.** Schedules shall be developed with the intent of expeditious execution of the project and continuous flow of operations from project start to project finish. The schedule shall not include non-work periods for the contractor's convenience, except for holidays recognized by the Iowa DOT.
- D.** The Schedules shall be based on working shifts of at least 8 hours per day and a minimum of a 5 day work week except during periods of weather limitations. See M. Project Calendars and Weather Contingency Days.
- E.** Schedules shall clearly define and identify significant interaction points and action responsibilities between the Contractor, subcontractor(s), Vendor(s), Iowa DOT and other entities (such as utilities, local governments, railroads, special service districts, adjacent projects or contractors, etc.).
- F.** Primavera Schedule Option settings:
  - Set Method of Scheduling to Retained logic.
  - Calculate start –to-start lag from Early Start.
  - Define critical activities as Longest Path.
  - Compute total float as finish float = late finish – early finish.
  - Set Calendar for scheduling relationship lag to predecessor calendar, unless directed otherwise by the Engineer.
- G.** Primavera Project Level settings:
  - All Calendars shall be Project level Calendars; not Global or Resource Calendars.
  - All Activity Codes shall be Project level; not Global or EPS level Activity Codes.
  - The schedule shall not utilize User Defined fields unless approved by the Engineer.
  - The Drive activity dates by default box shall be unchecked
- H.** Schedules shall have a sufficient number of activities to assure adequate planning of the project, to permit monitoring and evaluation of progress, earned value analysis and to perform analysis of potential impacts to cost and time. Additional activities shall be added to the schedules upon request by Iowa DOT.
- I.** Schedule activities shall be described in detail so that all of the contracted Work is readily identifiable and the progress on each activity can be readily measured. The schedule shall include activities to establish a level of detail acceptable to Iowa DOT. As a minimum, the following attributes shall be uniquely assigned to each activity within the schedule unless otherwise acceptable to, or required by Iowa DOT:
  - 1.** A unique alphanumeric Activity ID shall be assigned to each activity. The proposed activity ID format shall be submitted to the Engineer for approval prior to implementation.
  - 2.** An Activity Description which clearly describes the Work represented by the activity. Each activity description shall indicate its associated scope and or location of work by including such terms as, type or description of work, bridge number, station to station location, side of highway (such as, eastbound or southbound), shoulder, ramp name, pipe number, etc. Activity Descriptions shall utilize a similar and consistent format.
  - 3.** Each activity shall be additionally described by assigning the following activity codes:

I.	Discipline	BA	=	Barrier
		CI	=	Concrete Items
		DR	=	Drainage
		EA	=	Earthwork
		EN	=	Environmental
		FE	=	Fence
		GEN	=	General
		GEO	=	Geotech
		LA	=	Landscaping/Aes.
		LI	=	Lighting
		NW	=	Noise Wall
		RR	=	Railroad
		REC	=	Reconstruct/Relocate
		REM	=	Removal
		RW	=	Retaining Wall
		RP	=	Roadway Paving
		SI	=	Signal/ITS
		SS	=	Signing / Striping
		ST	=	Structure
		TC	=	Traffic Control
		UT	=	Utility

II.	Stage:	S1	=	Stage 1
	(and, or Phase)	S2	=	Stage 2
		S3	=	Stage 3

III.	FSta:	####+##		( From Station)
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IV.	TSta:	####+##		(To Station)
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V.	Resp:	Iowa DOT	=	Iowa DOT
	(Responsibility)	Contractor	=	Contractor Name
		Subcontractor	=	Subcontractor Name
		Third Party	=	Third Party Name
		Utility	=	Utility Company Name
		Vendor	=	Vendor Name

VI.	CC	CO No.	=	Change Order Description
	(Contract Change)			

The Contractor shall fully utilize the activity code structure shown above and make every effort to enhance this structure. Proposed modifications to the activity code structure shall be submitted in the above format to the Engineer for acceptance before implementation. Activity coding shall be assigned consistently and uniformly among all similar activity types. The Engineer may require project specific adjustments to the activity code template.

4. The duration of each activity shall include the necessary work days to actually complete the work defined by the activity and shall be based on the quantity of work divided by a reasonable production rate(s):
  - a. A duration in whole days of not less than 1 working day, except for milestone type activities, and
  - b. Not more than 20 working days, except for non-work type activities such as mobilization, settlement durations, or submittal preparation, unless otherwise authorized by the Engineer.
  - c. The duration of activities assigned multiple resources shall be evaluated by based on the production rate of each resource assignment.

- d. Activity durations shall not include time for weather contingency.
  - 5. Early start and early finish dates.
  - 6. Late start and late finish dates.
  - 7. Activity Total Float.
  - 8. At least one predecessor and one successor activity, except for project start and finish milestones.
- J. The Contractor shall use submittal review and revised submittal review periods required by Section 1105 of the Standard Specifications. A review period of 30 calendar days shall be used for all review periods not specifically identified in the specifications.
- K. In addition to the Work required by the contract documents, other cost, time or milestone type activities shall be included in the schedule within the WBS. These types of activities include, but not limited to:
- Mobilization
  - Project Milestones and Project highlights i.e. traffic switches, completion of structures, major roadway elements and phases.
  - Submittal, review, and acceptance activities when applicable, including time periods for the Department's acceptance as specified in the Contract.
  - Fabrication, delivery, installation, testing, and similar activities for materials, plants, and equipment.
  - Settlement, surcharge and cure periods.
  - Coordination, notification and relocation of Utilities and other third party work.
  - Notifications to the Iowa DOT for significant events, such as 20 working day notification to the Iowa DOT for impacts to the Iowa DOT ITS system.
  - Installation, erection and removal, and similar activities related to temporary systems or structures such as temporary electrical systems or shoring.
  - Permits
  - Additional information as required by the Engineer.
- L. All activities included in the schedule shall be categorized within a WBS acceptable to the Engineer. The following table represents levels 1 through 4 of the WBS structure, the minimum levels of the WBS that all resource and Schedule information shall rollup to, however, the Contractor shall provide further detail, to at least level 5, to ensure a clear understanding of the Contract and construction requirements, and to ensure all work is accounted for by location; structure number, Highway/road/street number and direction, and or area of work as defined in the contract documents.

<u>Level 1</u>	<u>Level 2</u>	<u>Level 3</u>	<u>Level 4</u>	<u>Level 5</u>
1.00 Project Name				
	1 .01 Administration and Milestones			
	1.02 Project Management and Mobilization			
	1.03 Procurement and Submittals			
	1.04 Permits			
	1.05 Construction			
		1 .05.01 Stage/Phase		
			1.05.01.01 Maintenance of Traffic	
			1.05.01.02 Roadway	
			1.05.01.03 Ground Improvements	
			1.05.01.03 Structures	
			1.05.01.04 Utilities	

1.05.01.05 Landscaping  
 1.05.01.06 Signing/Striping/Signals and ITS

1.07 Contract Changes

The Contractor shall fully utilize the WBS structure shown above and make every effort to enhance this structure. Proposed modifications to the WBS structure shall be submitted in the above format to the Engineer for acceptance before implementation. The WBS structure shall be assigned consistently and uniformly among all similar activity types. The Engineer may require project specific adjustments to the WBS template.

**M. Project Calendars and Weather Contingency Days.**

1. Each activity shall be assigned a Project specific calendar. Each calendar, except for the seven day calendar, shall include the minimum number of non-work days related to normal weather events that prevent work from occurring as shown in the chart below; weather contingency days shall be shown as non-workdays on the appropriate calendar(s) and shall be documented and justified in the Preliminary and Baseline narrative. Saturdays cannot be used as a weather contingency work day if a 5 day work week is planned, and Sundays cannot be used as a weather contingency work day if a 6 day work week is planned. The estimated number of weather contingency days shall not be the basis for additional time compensation in the event the number of weather contingency days is exceeded. The number of weather contingency days is subject to the Engineers approval.

Calendar Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Earthwork, Grade, Subgrade, Paving Removals, lighting, Electrical, Landscaping, Utility etc	*	*	*	5	6	6	4	5	4	3	*	*
Substructure, Ground Improvement	*	*	*	3	4	3	2	3	2	2	*	*
Superstructure	*	*	*	1	2	2	1	2	1	1	*	*

\* number of days based on temperature restrictions of materials placed or type of work i.e. concrete, backfill, subgrade, paving, structures, and landscaping.

2. Calendars shall be updated monthly in the scheduling software with actual days worked and days not worked prior to submittal of an updated Schedule. The calendar shall be updated to reflect that work occurred on a day identified as a weather contingency day by making it a standard work day. If an activity on the longest path is affected by weather, the calendar shall be updated to reflect the non- work day. The actual days work and not worked shall reflect the actual work and non-work days as identified by the Engineer.
3. The number of work related calendars shall be minimized to prevent the distortion of total float, However, calendars specific to a particular type work, such as earthwork, structures, paving and landscaping shall be utilized to address seasonal weather limitations based on the type of work. Calendars shall be assigned consistently and uniformly among all similar activities.

**N.** Schedule submittals shall utilize Project ID and Project Naming conventions acceptable to the Engineer.

**O.** Schedules shall not include or utilize negative lag durations, open ended activities, float suppression techniques or time or date constraints which are not contractual. The Schedule shall not include positive lag durations, unspecified milestones, logic ties and/or sequences that are deemed unreasonable by Iowa DOT. Sequestering of total float through the manipulation of calendars, extending activity durations, logic ties or sequences is prohibited. Multiple relationships with the same predecessor or successor and reverse logic conditions are prohibited. Redundant logic shall be removed from the schedule.

- P. The "Level Resources," "Apply Actual," "Update Progress," "Auto Compute Actuals" or similar functions shall not be used to automatically update the schedule. The schedule shall be updated manually with actual information.
- Q. The Engineer may require additional information or scheduling related functions to be performed in an effort to achieve the intended results of the specifications whether or not specifically identified within specification.
- R. The Contractor shall illustrate, through submittal of a time impact analysis, the effects resulting from any claimed delays or Change Orders which are being negotiated between the Engineer and the Contractor. The Contractor shall prepare a time impact analysis to determine the effect of the change in conformance with the provisions in "Time Impact Analysis" specified herein, and shall include the impacts acceptable to the Engineer in the next Schedule update. Changes that do not affect the controlling operation on the longest path will not be considered as the basis for a time adjustment. Changes that affect the controlling operation on the longest path may be considered by the Engineer for decreasing time or granting an extension of time for completion of the Contract. Time extensions will only be granted if the total float is absorbed and the scheduled completion date is delayed one or more working days because of the ordered change on contract date, calendar day or working day contracts.

**S. Use of Float.**

- 1. Total Float and Contract Float are not for the exclusive benefit of the Contractor or IOWA DOT, but is an expiring resource available to the Project, to accommodate changes in the Work, however originated, or to mitigate the effect of events which may delay performance or completion of all or part of the Work within the Contract Time. Contract time extensions for Contract performance will be granted only to the extent that delays or disruptions to affected work paths in the Contract Schedule in effect at the time of delay or disruption exceed total float along those paths causing a delay to the project completion date beyond the contract time after the Engineer enacts schedule corrections to ensure the schedule represents true and accurate as-built or planned conditions or does not include float suppression. Delays and disruptions which cause the end date of Work to exceed current Contract completion date must be beyond control and without fault or negligence of the Contractor or any Subcontractor at any tier. In the event that the delays or disruptions impact an already negative float path, the Contractor will not receive a time extension unless and until the activity with the highest negative float is driven even further negative. Delays or disruptions will not be considered a basis for time extension to this Contract unless and until such delays or disruptions are resolved as set forth in the Contract Documents.
- 2. Pursuant to the float sharing requirements of this Section, the use of float suppression techniques such as preferential or logic sequencing (crew movement, equipment use, etc.), special lag/lead restraints, and extended activity times or duration, imposed dates, scheduling of work not required for the Project as required work, and others, are expressly prohibited. Use of float time disclosed or implied by use of alternate float suppression techniques shall be shared to the benefit of both IOWA DOT and the Contractor. Use of any network techniques solely for the purpose of suppressing float will be cause for rejection of Schedule submittal. The Contractor shall adjust or remove any float suppression techniques as a prerequisite to a request.

**T. Schedule Recovery.**

- 1. Unless otherwise directed in writing by the Engineer, whenever the schedule includes negative float, critical items of construction fall behind the planned Schedule or when items which were not critical become critical the Contractor shall promptly notify the Engineer and undertake appropriate action at no additional cost to Iowa DOT to recover schedule.



2. The Contractor shall submit, following recognition of the problem, a written recovery statement to the Engineer describing the cause for the slippage and the actions planned by the Contractor to recover Schedule within the shortest reasonable time whenever the Contractor fails to complete Activities within the Late Dates in the Contract Schedule.
  3. The Contractor's refusal, failure or neglect to take appropriate recovery action or to submit a written recovery statement shall constitute reasonable evidence that the Contractor is not prosecuting the Work, or separable part, with the diligence that will insure its completion within the applicable Contract Time and shall constitute sufficient basis for the Engineer to recommend to withhold any payment otherwise due, or identify and order alternate recovery actions on the basis of the information in the Contract Schedule.
- U. Errors or omissions on Schedules shall not relieve the Contractor from finishing all work within the time limit specified for substantial completion of the Contract. If, after a Schedule has been accepted by the Engineer, either the Contractor or the Engineer discovers that any aspect of the Schedule has an error or omission, it shall be corrected by the Contractor as required by the Engineer.
- V. Mobilization activities and payment amounts shall be created using the Basis of Payment described in Section 2533.05 of the Standard Specifications. The partial payment schedule outlines payments at the following intervals:
- Within 30 days of receipt of signed contract
  - 5% of original project sum earned
  - 10% of original contract sum earned
  - 25% of the original contract sum earned.

Each of these mobilization payment occurrences shall have a unique activity, date, and amount in the schedule.

#### **120216.04 COST LOADING.**

- A. Baseline Schedule shall be cost loaded. Activity level cost loading shall be based on Iowa DOT bid items. One or more resources shall be assigned to each activity representing the value of the work identified by the activity.
- B. One resource shall be defined for each bid item where the resource ID equals the Bid Item Number and resource name equals the Bid Item Description. A prefix may be required to be added to the resource ID and resource name. The resource structure within the scheduling software shall match the bid tab structure to facilitate comparison of cost and resource loading to the bid tab using the scheduling software.
- C. The cost loading shall match in quantity, units, unit price and total value of each bid item and the total bid tabulation.
- D. Activity percent complete shall be set to "Physical".
- E. Activity Duration type shall be set to "Fixed Durations & Units."
- F. Set "Resource Type" to "Material."
- G. Select "Calculate costs from Units."
- H. Resources shall not drive schedule dates. All resources shall be assigned to a 7 day calendar.

- I. Under Project Calculations ensure "Recalculate actual units and cost when duration % complete changes" is unchecked.
- J. The baseline schedule Planned Dates will be set to match the current Start and Finish Dates; use global change once Baseline schedule is approved.
- K. Financial periods shall be defined in Primavera to match pay periods.
- L. Actual cost shall be updated in each schedule submittal by updating a level of effort (LOE) activity pertaining to each project contract number. Actual cost corresponding to pay voucher totals shall be inserted into applicable LOE payment activity as actual cost.
- M. Create a resource per LOE payment activity representing voucher payments. Payment resource to have an assigned price of \$1/unit.
- N. Actual cost data paid from Iowa DOT pay vouchers shall be saved to the corresponding pay period within the financial period using Primavera's "Store Period Performance" function.
- O. Update cost and resource loaded activities in the schedule based on "Physical % Complete" only, actual cost information is placed in LOE activities.

#### **120216.05 PRECONSTRUCTION SCHEDULING CONFERENCE.**

- A. The Contractor shall schedule and the Engineer will conduct a pre-construction scheduling conference with the Contractor's project manager and, qualified scheduler within 15 calendar days of Receipt of signed contract. At this meeting the Engineer will review the requirements of this section of the special provisions with the Contractor.
- B. Items to be submitted by the Contractor, 2 working days before the scheduling conference, include, but are not limited to:
  - The Contractor shall submit a Preliminary Baseline Schedule displaying the activities and sequence of planned operations in full Baseline detail for the first 120 working days after Receipt of signed contract, and lesser detail for the remainder of the project and shall be prepared to discuss the proposed work plan and Schedule methodology that comply with the requirements of these special provisions. The schedule shall be submitted electronically in pdf and xer formats.
  - List of Activity Codes.
  - WBS Structure.
  - Narrative report index.
  - Graphical reports (time-scaled resource bar charts).
  - Proposed Qualified Scheduler's resume, references, certifications of training and list of relevant projects.
  - Two Week Detail Schedule.
- C. Items to be reviewed include, but are not limited to:
  - Review the qualifications of the proposed Qualified Scheduler.
  - Review of Narrative and report formats.
  - Review utility, railroad and other third party requirements and schedules.
  - Review submittal requirements and procedures.
  - Review time required to review submittals and resubmittals.
  - Review requirements for tests and inspections.
  - Review and finalize a list of construction activities to be included in the Schedule.
  - Review of cost loading.
  - Review Activity Codes and WBS structure.
  - Review procedures for updating the Schedule.

- Review proposed modifications to the activity ID, activity code and work breakdown structure.
- Review other requirements of the specifications regarding Scheduling that are not specifically listed above.

The Engineer will review the Preliminary Baseline Schedule, proposed modifications, sample reports and other submittals and provide comments or required Baseline Schedule changes to the Contractor for implementation.

## **120216.06 SUBMITTAL OF A CPM SCHEDULE.**

### **A. Baseline Schedule Submittals.**

1. Beginning the week following the Pre-construction Scheduling Conference, the Contractor and the Contractor's Qualified Scheduler shall meet with the Engineer to review Baseline Schedule development and resolve issues identified by the Engineer's review of the submittals provided at the Pre-construction Scheduling Conference. The Baseline Schedule review meetings will continue to be held every 14 calendar days, unless determined otherwise by the Engineer, until the Baseline Schedule is accepted by the Engineer. The contractor shall submit a revised Baseline schedule 2 working days prior to the Baseline schedule review meetings.
2. The Contractor shall submit to the Engineer an acceptable Baseline Schedule submittal prior to the start of construction activities, but no later than 45 calendar days of receipt of signed contract. Failure to provide an acceptable baseline schedule within 45 calendar days of Receipt of signed contract will result in enforcement of Non-Compliance provisions within this specification.
3. The Baseline Schedule shall include the entire scope of work and how the Contractor plans to complete all Work contracted. The Baseline Schedule shall clearly show the activities that define the critical path. Multiple critical paths and near-critical paths shall be minimized by minimizing the number of predecessors and successor relationships between activities, illogical or redundant logic. A total of not more than 30% of the Baseline Schedule activities shall be critical or near critical, unless otherwise authorized by the Engineer.
4. The Baseline Schedule shall start and finish all work within the contract time(s) established in the contract documents, including but not limited to project start, project finish, intermediate contract periods and milestones, closure limitations, etc. Unless directed otherwise by the Engineer, the Baseline Schedule shall use a data date set to the projects late start date and shall not include progress or as-built updates. The Baseline Schedule shall not include negative float or utilize any other prohibited scheduling technique.

### **B. Contract Schedule Update Submittals.**

1. Schedule updates shall be submitted each calendar month with a data date matching the progress through date of the first, or last, pay request of each month unless directed otherwise by the Engineer. The first schedule update shall be submitted as prescribed the first month following acceptance of the baseline schedule. Each monthly update shall be submitted within 5 working days of the schedule's data date. Progress meetings shall be scheduled by the contractor which correspond with the schedule submittals to review progress with the Engineer.
2. Contract Schedule updates shall include all elements defined for the Baseline Schedule except that a Contract Schedule shall include progress, as-built updates and updated actual units and cost for each activity, etc.
3. Each Contract Schedule shall show the status of work actually completed up to the data date and the work remaining to be performed as planned. The Contractor shall ensure that the CPM Schedule diagram accurately reflects "as-built" information for each activity shown on previous

schedules, including, but not limited to, actual start dates (discounting early starts not representative of true as-built conditions), remaining days of work, percent complete, and actual finish dates (when the activities were completed so that dependent work could proceed) and actual resource utilization. Schedule calendars shall be updated to show actual days worked and days not worked.

4. Contract Schedule updates shall accurately represent all planning changes, adjustments, or updates in the sequencing and timing of work remaining made or required to be made to ensure that the Contract Schedule stays current with the Contractor's revised plan for performing and furnishing work remaining, or to recover schedule. If the Contract Schedule submittal indicates slippage or delayed progress caused by delays failing to meet the requirements for extensions in Contract Time, the Contractor shall include a schedule recovery statement. Any revisions made due to the issues covered under this paragraph shall be considered revisions made for the Contractor's convenience, and shall be excluded when reconciling an extension to a Milestone or Contract Time until the timing and sequences purported by those revisions actually take place.
5. The Contractor may propose modifications by adding or deleting activities or changing activity descriptions, durations or logic that do not (1) alter the critical path(s) or near critical path(s) or (2) extend the scheduled completion date compared to that shown on the current accepted Contract Schedule and (3) do not disrupt the integrity or comparative relationship between the Baseline and Contract Schedules. The Contractor shall minimize the number of changes and state in writing within the update narrative the reason and justification for any changes to Contract Schedule or planned work. The Engineer shall review the justification for changes and either accept or reject the proposed modifications.
6. If any proposed changes to the schedule or planned work will result in (1), (2) or (3) above, then the Contractor shall submit a time impact analysis as described herein.
7. The Contractor shall incorporate planning revisions, which have been agreed upon in Contract Changes ordered since the last revision. Those revisions shall conform to the sequencing and time of performance requirements of the applicable instrument. These types of revisions shall be included in the Contract Schedule when reconciling extensions in Contract Time.
8. If work is performed out of sequence, the Contractor shall implement logic changes to allow the out of sequence work to proceed. The use of negative lag shall not be permitted.
9. Monthly Update schedule shall include actual cost updates as required to facilitate earned value analysis.

**C. Two Week Detail Schedule.**

1. The Contractor shall prepare and submit a detailed 2 week schedule to the Engineer each bi-weekly until all work is completed. The Two Week Detail Schedule consist of the following:
2. Hand or computer generated bar chart schedule which spans a forward looking, rolling period of at least 14 calendar days from the date of submittal.
3. Updated and submitted to the Engineer on a be-weekly basis on the date at a time specified by the Engineer.
4. Based on the accepted Contract Schedule and provide a greater breakdown of the Contract Schedule activities; activities for excavation, forming, placing rebar, pouring, stripping backfilling, etc., for example.

5. Specifically reference the accepted Contract Schedule activity ID numbers and define subsequent specific daily operations at each specific location for all work activities scheduled to be performed during the 2 week period.
6. Developed to a level of detail acceptable to the Engineer.

**D. Time Impact Analysis.**

1. The Contractor shall submit a written TIA to the Engineer with each request for adjustment of Contract time, when the Contractor or Engineer consider that an accepted or anticipated change may impact the critical path or Contract progress or when directed by the Engineer. The Contractor shall take all steps necessary to mitigate the effects to cost and, or time resulting from impacts caused by delay regardless of who is found responsible for the delay.
2. The TIA shall illustrate the impacts of each change or delay on the current scheduled completion date or internal milestone, as appropriate. The analysis shall use the accepted Contract Schedule that has the closest data date prior to the event. If the Engineer determines that the accepted Contract Schedule used does not appropriately represent the conditions prior to the event, the accepted Contract Schedule shall be updated to the day before the event being analyzed. The TIA shall include an impact schedule developed from incorporating the event into the accepted Contract Schedule by adding or deleting activities, or by changing durations or logic of existing activities. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the accepted Contract Schedule, the difference between scheduled completion dates of the two schedules may be considered for an adjustment of Contract time. The Engineer may construct and utilize an appropriate project schedule or other recognized method to determine adjustments in Contract time until the Contractor provides the TIA.
3. The Contractor shall submit a TIA in duplicate within 15 calendar days of receiving a request for a TIA from the Engineer. The Contractor shall allow the Engineer 15 calendar days after receipt to accepted or reject the submitted TIA. All accepted TIA schedule changes shall be shown on the next updated Contract Schedule.
4. If a TIA submitted by the Contractor is rejected by the Engineer, the Contractor shall meet with the Engineer to discuss and resolve issues related to the TIA. The Contractor shall only show actual as-built work, not unaccepted changes related to the TIA, in subsequent updated Contract Schedules. If agreement is reached at a later date, accepted TIA schedule changes shall be shown on the next update Contract Schedule.
5. A time impact analysis shall consist of one or all of the steps listed below:
  - a. Step 1. Establish the status of the project before the impact using the most recent approved Contract Schedule prior to the impact occurrence.
  - b. Step 2. Predict the effect of the impact on the most Contract Schedule prior to the impact occurrence. This requires estimating the duration of the impact and inserting the impact into the schedule update. The Contractor shall demonstrate how the impact was inserted into the schedule using a fragment. This is the presentation of a fragmentary portion of the schedule network showing the added or modified activities and the added or modified relationships. Any other changes made to the schedule including modifications to the calendars or constraints shall be noted.
  - c. Step 3. Track the effects of the impact on the schedule during its occurrence. Note any changes in sequencing, and mitigation efforts.
  - d. Step 4. Compare the status of the work prior to the impact (Step 1) to the prediction of the effect of the impact (Step 2), and to the status of the work during and after the effects of the impact are over (Step 3).

## **E. Submittal Requirements.**

1. The Contractor shall provide the following items with each schedule submittal; preliminary, baseline, update, time impact, or revised schedule submittal in electronic format:
  - a. Schedule plot which includes all activities organized by WBS in PDF format.
  - b. Schedule plot of the longest path in PDF format.
  - c. An export of all schedule data in XER format compatible with Primavera Project Manager Version P8.2
  - d. Narrative Report
2. Schedule plots shall conform to the following:
  - a. Include the following columns in the following order: Activity ID, Activity Name, Original Durations, Remaining Duration, Early Start, Early Finish, Total Float, Budgeted Cost, Actual Cost This Period, Actual Cost to Date.
  - b. Include a title block, schedule name, run date, data date and a timeline on each page.
  - c. Sorted by Early Start.
3. The narrative report shall include a description of, and thorough justification, for all changes made to the current Schedule submittal, and the effects resulting from such changes, when compared to the previous schedule submittal. The narrative report shall be prepared in a consistent and professional manner which facilitates ease of use. The narrative report shall include a table of contents with page numbers. All pages, lists, charts and attachments shall be numbered and titled. The narrative report shall be organized and tabbed in the following sequence and include all applicable and appropriate supporting documentation including, but not limited to:
  - a. Contractor's transmittal letter.
  - b. Narrative description of the construction philosophy supporting the approach to the Work outlined in the Contract Schedule. Address reasons for the sequencing of Work and describe any problem areas and identification of unusual conditions or restrictions regarding labor, equipment or material, such as multiple shifts, specified overtime or work at times other than regular days, potential conflicts, and other salient items that may affect the schedule and how they may be resolved.
  - c. Narrative description of the general status of the Project including Work completed during the period, Work planned to be completed during the next reporting period, current total float and validity of the calculated percent complete.
  - d. Narrative description of the difference between previously planned Work and the actual Work performed including an explanation for the deviations.
  - e. The working days per week, number of shifts per day, number of hours per shift, the holidays to be observed, and how the schedule accommodates adverse weather days for each month or activity.
  - f. Planned Production rates with justification of rates above or below typical.
  - g. A listing of activity durations exceeding the 20 working days with justification thereof.
  - h. A list of activity relationships with lags with justification for use of the lag.
  - i. A list of constrained activities with a justification for use of the constraint.
  - j. Activities requiring coordination with the Department and/or 3rd parties (i.e. Utilities, adjacent contractors, etc)
  - k. Schedule changes - A listing of all changes, and a narrative description of the reason or justification for the changes and the resulting affects or impact of the changes:
    - Added, deleted or modified activities and activity descriptions.
    - Added, deleted or modified date constraints.
    - Added, deleted or modified lags.
    - Added, deleted or modified logic.
    - Added, deleted or modified calendars.
    - Modified activity durations.
    - Significant changes in float.

- l. Narrative description of the current longest path.
- m. Comparative analysis of changes to the longest path with the previous schedule submittal, including identification of and justification for the cause of the changes.
- n. Changes to the scheduled completion date since the last Contract Schedule submittal including identification of and justification for the cause of the change.
- o. Current and anticipated delays:
  - Cause of delay.
  - Impact of delay on other activities, milestones and completion dates.
  - Corrective action and schedule adjustments to correct the delay.
- p. Pending items and status thereof:
  - Permits
  - Contract changes
  - Time adjustments
  - Time Impact Analysis
- q. Cost information:
  - Include a listing and justification for adjustments to cost loading.
  - Comparison of schedule cost loading, updated cost actual information and current pay application.
- r. Additional Information as request by the Engineer.
- s. A statement certifying the schedule submittal is based on factual, accurate information which represents true planned and as-built conditions accompanied with the signature of the Project Manager and Scheduler.

Schedule submittals will be considered complete when all documents and data have been provided as described above to the satisfaction of the Engineer.

#### **120216.07 SCHEDULE REVIEWS.**

- A. The Engineer's review will be for conformance with the Contract Time and those sequences of Work indicated in or required by the Contract Documents, to record Early and Late Dates for Milestones, to identify the Contractor's use of Float, to compare as-built data, and for conformance with the requirements of this Section and other information given in the Contract Documents which may have a bearing on the Contract Schedule. The Engineer's review may extend to the accuracy of other matters dealt with by the Contract Schedule, including, but not limited to, whether work is omitted, activity durations are reasonable, the level of labor, materials and equipment, the Contractor's means, methods, techniques, procedures, or sequences of construction, or whether the sequences and timing for work remaining are practicable, the correctness of all which shall remain the sole responsibility of the Contractor. The Engineers review may also extend to the technical acceptability of the Contract Schedule submittal.
- B. The Contractor shall allow 7 working days for the Engineer's review after each Contract Schedule update and all support data are submitted, except that the review period shall not start until the previous month's Contract Schedule update submittal is accepted. Contract Schedules that are not accepted or rejected within the review period will be considered not accepted by the Engineer.
- C. The Engineer's review and acceptance of Schedules shall not waive any Contract requirements and shall not relieve the Contractor of any obligation or responsibility for submitting complete and accurate information. Schedules that are not approved, rejected, or returned revise and resubmit shall be corrected by the Contractor and resubmitted to the Engineer within five (5) working days of notification.
- D. When reviewed by the Engineer, one copy of each Contract Schedule submittal will be returned to the Contractor as either "Revise and Resubmit" or "Acceptable". Submittals found "Acceptable" will represent the most-current Contract Schedule as of the date of the submittal. Neither the Engineer's review of a schedule, nor the Engineer's statement of "Acceptable", will relieve the

Contractor from responsibility for complying with the Contract Specifications, Contract Time requirements and completing all work required by the Contract Documents. Failure by the Contractor to include any element of the Work required by the Contract does not relieve the Contractor from its responsibility to complete the work, or to complete the omitted Work within the Contract Time(s). "Acceptance" of the Contract Schedule submittals by the Engineer does not attest to the validity of assumptions, production rates, activities, relationships, sequences, resource allocations or any other aspect of the Contract Schedule submittal. Contract Schedule submittals determined to be "Acceptable" by the Engineer may be reviewed again for "Acceptability" at a later date, if deemed necessary by the Engineer. The Contractor remains obligated to correct schedule issues identified during future reviews by the Engineer.

- E.** The Contractor shall make appropriate adjustments or corrections in a Contract Schedule submittal returned to him as "Revise and Resubmit", and shall respond with the required copies of a full, revised Contract Schedule revision submittal within 5 working days of receipt of the Engineer's comments. Once the Contractor's Contract Schedule submittal, or resubmittal, is returned to the Contractor as "Acceptable", it shall represent the most current approved Contract Schedule for the Work as of the date of the submittal, and it shall be the basis for the monitoring of the Contractor's performance and progress.
- F.** The most-current Contract Schedule will be the basis for (a) the monitoring of the Contractor's progress against Milestone and Contract Times, and (b) the evaluation and reconciliation of extensions in Contract Time, if and when a Contract Time is indeed extended.
- G.** All schedules shall be in accordance with the Contract Time requirements of the Contract. Nothing contained in this Section shall relieve the Contractor from compliance with the Contract Time.
- H.** The Engineer's acceptance does not warrant or imply accuracy or Iowa DOT agreement with production rates or other factors used to prepare the Schedule.
- I.** The Engineer may monitor the Contractor's production rates, project personnel and equipment usage for comparison with the Contract Schedule at his/her discretion.
- J.** Should the Contractor submit a claim with reference to the Contract Schedule as part of the claim rationale, Iowa DOT's prior acceptance of the Schedule will not be considered as acceptance of the assumed production rates and other factors used in the development of the Schedule.
- K.** If the Contractor deviates from the current approved CPM progress schedule by not following the logical sequence of the critical path, payment will be withheld for the pay items for the affected activities until the Contractor submits a revised CPM progress schedule and this schedule is approved by the Engineer.
- L.** A revised CPM progress schedule will be required if the controlling operation falls 10 working days behind schedule, the Engineer then may take steps specified in Articles 1108.02, I and K of the Standard Specifications, to insure satisfactory completion of the project. If the controlling operation falls 20 working days behind schedule and it appears that the completion of the project in the specified time is in jeopardy, the Contracting Authority may take action described in Articles 1102.03 and 1103.01 of the Standard Specifications and may take further action described in Articles 1108.10 and 1108.11 of the Standard Specifications.
- M.** If the Engineer elects to review an early-completion Schedule, where the time between the scheduled completion date of the Work and the completion date associated with the Contract Time is Float. If the Contractor intends to or does complete the Work, or any portion of the Work, earlier than the Milestones, the Project benefits from the resulting increased Float in the Schedule.
- N.** The review of a portion of the Contract Schedule or an incomplete Contract Schedule submittal shall not indicate acceptance of the entire Contract Schedule.



**120216.08 PROJECT MANAGEMENT**

When the Supplemental Specifications for Project Management are applied, the following requirements shall be active:

- A. **Communication with the Engineer:** The Project Manager shall schedule and participate in a bi-weekly schedule and quantity rectification meeting with the Engineer. This meeting will occur at the beginning of each week of voucher issuance.
- B. **Documentation of Item Progress:** Schedule Activity ID shall be included for all item quantity records and measurement.

**120216.09 NONCOMPLIANCE.**

- A. **Level 1 Non-Compliance** – Iowa DOT will remedy the nonconformance by retaining an amount equal to 100% of the total estimated value of the work performed during each period in which the Contractor fails, refuses or neglects to satisfy the requirements of this specification, or the Contract Schedule submittals precludes a proper evaluation by the Engineer, or the Contract Schedule submittals preclude an “Acceptable” determination, or if the Contractor fails to conform said submittals within the submittal time requirements herein. Retention due to this non-conformance shall be in addition to all other retentions provided for under the Contract. The retention withheld for Level 1 Non-Compliance will be released for payment on the next pay estimate for partial payment following the date the Engineer determines compliance has been achieved and, or the submittal(s) are found Acceptable.
- B. **Level 2 Non-Compliance** – If the Engineer determines that Level 1 Non-Compliance still exists and, or the submittals cannot be found Acceptable within 15 calendar days of implementation of Level 1 Non-Compliance, the Contractor shall be assessed a non-recoverable sum of \$1,000.00 per calendar day, with said monies to be deducted from monies due on the next pay estimate, until the date the Engineer determines compliance has been achieved and, or the submittal(s) are found Acceptable. Level 2 Non-Compliance penalties shall be in addition to the Level 1 Non-Compliance retention. A negative Change order may be executed unilaterally (without the Contractor’s consent) to adjust the contract prices to accommodate Level 2 Non-compliance assessment.
- C. **Level 3 Non-Compliance** - If Level 1 and 2 Non-compliance measures have not promoted compliance with the schedule requirements the Engineer may consider such as a condition to suspend Contractor's bidder qualification according to Article 1102.03, A of the Standard Specifications.
- D. **Level 4 Non-Compliance** - If Level 1, 2 and 3 Non-compliance measures have not promoted compliance with the schedule requirements the Engineer may pursue declaring the contract in default according to Article 1108.10 of the Standard Specifications.
- E. These remedies for the Contractor's failure, neglect or refusal to comply with the requirements of this Section are in addition to, and not in limitation of, those provided under the Contract.

**120216.010 METHOD OF MEASUREMENT AND BASIS OF PAYMENT.**

All costs for complying with this special provision shall be considered incidental to the project. No separate payment will be made.