



A Comparison of Department of Transportation Progress Scheduling Specifications from Across the Nation

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RESEARCH PROJECT TITLE

Updating Progress Scheduling of the Iowa DOT Standard Specifications for Highway and Bridge Construction

SPONSORS

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PRINCIPAL INVESTIGATOR

Jennifer Shane, Director
Construction Management and
Technology, Iowa State University
jsshane@iastate.edu / 515-294-1703
(orcid.org/0000-0002-2612-4269)

MORE INFORMATION

intrans.iastate.edu

CMAT

Iowa State University
2711 S. Loop Drive, Suite 4700
Ames, IA 50010-8664
515-294-8103

The Construction Management and Technology (CMAT) program is part of the Institute for Transportation (InTrans) at Iowa State University. The mission of the CMAT program is to improve the efficiency and cost-effectiveness of planning, designing, constructing, and operating transportation facilities through innovative construction processes and technologies.

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tech transfer summary

Graduated scheduling specifications represent a cost-effective way for transportation agencies to monitor highly complex schedules without adding unnecessary administrative burden to less complex projects.

Objective

The central objective of this research was to help the Iowa Department of Transportation (DOT) revise its progress scheduling specifications in a way that meets its core mission objectives while improving the practicality and efficiency of project management for contractors.

Background

Through progress scheduling specifications, departments of transportation (DOTs) manage schedule-related risk by requiring contractors to develop and periodically update the schedules for their projects. Each DOT adheres to its own unique specifications for progress scheduling.

The progress scheduling requirements in Section 1110 of the Iowa DOT *Standard Specifications for Highway and Bridge Construction* are written prescriptively to favor high-end scheduling software such as Primavera P6 by Oracle. Additionally, contractors are required to provide a very high level of detail in their schedules for all types of projects and submit meticulous cash flow projections detailing the units and costs for every activity.

Problem Statement

Many contractors and the Iowa DOT do not have expertise in or licenses for high-end scheduling software and must often hire scheduling consultants to develop and review project schedules. At the same time, numerous consultant hours are needed to provide the level of detail required for schedules and cash flow projections, adding time and cost to all types of projects regardless of the benefits provided in terms of risk mitigation or schedule control.

Other states face similar challenges, and several have adopted graduated scheduling specifications in an attempt to balance project control, effective risk management, and value-added project costs.

Research Methods

Progress scheduling specifications from 11 states (Alabama, California, Colorado, Idaho, Iowa, New Jersey, Ohio, Tennessee, Utah, Virginia, and Wisconsin) were reviewed.

Items of interest included software requirements, inclusion of definitions, float ownership, use of graduated scheduling specifications, progress narrative requirements, schedule update frequency, preliminary schedules requirements, preconstruction meeting requirements, review and resubmit timeframes, and as-built schedule requirements.

Follow-up interviews were conducted with four states (New Jersey, Tennessee, Colorado, and Virginia) to discuss their specifications in greater depth and understand the actual implementation and usage of the written specifications.

An in-person discussion was also held for Iowa DOT personnel, contractors, and Institute for Transportation staff to discuss the Iowa DOT's progress scheduling specifications.

Key Findings

Review of Specifications and Follow-Up Interviews

- Of the 11 specifications reviewed, 6 require the use of specific software, mostly Primavera P6.
- The follow-up interviews revealed that, like the Iowa DOT, some DOTs lack the expertise or software licenses to review schedules developed in Primavera P6. Interviewees noted training a few DOT employees to become schedule masters but hiring a consultant to complete reviews and track progress.
- While many of the reviewed specifications state that float is shared, three do not specify float ownership. One state requires the contractor to include an activity for owner-owned float.
- Some states (Alabama, California, New Jersey, Tennessee, Virginia) require different types of schedules or different amounts of information in schedules for different types of projects. Levels are based on project duration, bid amount, construction cost, or project complexity.
- Requirements vary as to when a preliminary schedule is due and the frequency of updates. When specified, the preliminary schedule is often due in relation to either the preconstruction meeting or contract execution. Updates are primarily due monthly to avoid overburdening the contractor and to allow for sufficient review and resubmit timeframes.
- Many states do not require an as-built schedule. This is unexpected given that this schedule provides the production rate data that DOTs use to develop their expected project duration schedules.

In-Person Discussion in Iowa

- Contractors emphasized that a key aspect of a project schedule should be an approved baseline that updates are based on.
- Contractors asked for tablet-friendly scheduling software as well as user-friendly software to allow for easier phasing. Contractors stated that Microsoft Project is user-friendly and can be incorporated into tablet-friendly software like Procore. However, some Iowa DOT employees do not believe that Microsoft Project is sophisticated enough for complex projects.
- The consensus was that there should be three tiers of projects, similar to Tennessee and Virginia. The lowest tier projects should only require a written narrative. The middle and highest tier projects should require a critical path method (CPM) schedule.
- Schedule updates should be monthly for projects in all tiers, and three-week lookahead schedules should be required at each project meeting for middle tier projects. For the highest tier projects, updates should be required to include a recovery schedule or narrative if the project experiences significant delays or falls behind by two weeks.
- Seven days to review and seven days to revise the updated schedule should be the standard review and resubmit timeframes. Some revisions may not require resubmittal for lower tier projects.
- Contractors stated that they preferred draw schedules over cost-loaded schedules.
- The highest tier projects should require written resource requirements for critical path activities, but a full resource-loaded schedule should not be required.

Draft Specification for Progress Scheduling in Iowa

A draft schedule specification for the Iowa DOT was developed based on the results of this research. The specification features the following:

- Definitions
- Shared float ownership
- Three levels of scheduling requirements based on project duration and complexity
- Requirement for the use of scheduling software compatible with Aurigo Masterworks

Implementation Readiness and Benefits

A draft schedule specification with proposed revisions to Section 1110 of the Iowa DOT *Standard Specifications for Highway and Bridge Construction* is available in the final report for this project.

The adoption of graduated scheduling specifications can allow the Iowa DOT to match scheduling requirements to project needs. Graduated scheduling specifications represent a cost-effective way to control highly complex

schedules without adding an unnecessary administrative burden on less complex projects.

The Iowa DOT can also reduce costs on projects with low or moderate complexity by giving contractors the option to use scheduling processes other than those that rely on Primavera P6, including simple narratives, Microsoft Excel bar charts, Microsoft Project CPM schedules, and Aurigo Masterworks project control platforms.