



# Accelerated Construction: A Path Forward

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## Introduction

The construction zone is the visible and perhaps only connection between the driving public and the delivery of a roadway for public use. The driving public is very aware of and sensitive to the time it spends in delays in work zones. From the driver's point of view, any amount of time delay due to roadway activities is excessive, disruptive, and inconvenient. Significant public support and financial savings result when the speed of construction is increased on roadway construction projects.

Work zones, because they trigger changes in traffic patterns and speeds, present hazards to the traveling public as well as to workers. The length of public exposure to work zone hazards and the degree of confinement in the work zone can both contribute to an increased likelihood of accidents.

Accelerated construction is about minimizing time impacts to the public in work zones. A successful launch of an accelerated construction effort in Texas is particularly critical at this time in its history. Increasing population and roadway congestions among other factors have resulted in an expansion in the funding levels for roadways under Texas Department of Transportation (TxDOT) jurisdiction. Significant construction, rehabilitation, and maintenance projects will be funded on Texas highways over the next decade and beyond. The Sunset Commission staff report presented to and discussed at the last Texas legislative sessions also identifies timely construction and tools to accelerate construction as important to deliver roadway projects to the public.

Typical time required for a project to be delivered (inception to completion) on conventional construction projects is exceeding long and unacceptable. Planning, financing, scoping, development, bidding/letting, and construction typically require 8 to 15 years. If the time required to perform these various functions can be reduced, significant cost saving can result for the agency, user, and adjacent businesses. Direct construction cost to accelerate construction work can easily exceed indirect costs to businesses and the local economy. Eventually all costs are borne by the public.

Construction is a broadly defined concept as used in this document. Construction encompasses new or "green field" projects as well as capacity improvement, reconstruction, rehabilitation, major maintenance, and minor maintenance. Accelerated construction entails all the aspects of delivering a project rapidly including project selection, planning, design, traffic control, contracting methods, construction methods, public information, and contingencies. While acceleration can result in a 10 to 20 percent time savings, ultimately the goal of this effort is to reduce project delivery time by 20 to 50 percent.

## Background

On July 14, 1998, Mr. Wes Heald (then Executive Director of TxDOT) recognized that the public, legislature, and Commission desired reduced construction time and issued a memorandum to implement strategies to address the request. This memorandum was issued in partial response to Senate Bill 370 passed by the 75th Legislative Session. The memorandum indicated that user costs should be considered in determining liquidated damage considerations and incentives should be used with disincentives when user costs are considered.

Mr. Amadeo Saenz (then Assistant Executive Director of Engineering Operations, TxDOT) issued a memorandum in November of 2001 to further extend the use of accelerated construction concept on Texas highways to areas where businesses and traffic flow were significantly impacted. The memo cites the Transportation Working Group Report of August 22, 2001, which established a goal of improved project delivery from conception to ribbon cutting on average by 15 percent within five years. The goal was established to address the cost of disruption to traffic flow.

In 2004 TxDOT issued “Accelerated Construction Strategies Guidelines.” This guide provided both general and specific information for District use when planning an accelerated construction project.

TxDOT, the Associated General Contractors (AGC) of Texas, and the Texas A&M Transportation Institute (TTI) conducted a workshop on Accelerated Construction on July 25–26, 2016. The objectives of the workshop were to identify methodologies to accelerate construction and to identify gaps in information needed to successfully implement an accelerated construction program.

A series of seven workshops were developed and delivered by TxDOT and TTI during the summer and fall of 2017. The purpose of these workshops was to re-introduce the concept of Accelerated Construction to TxDOT and contractors, provide a forum for information sharing among TxDOT and contractor personnel, as well as identify needed “tools and policies” to move Accelerated Construction forward. An economic tool was developed allowing for the determination of both user and adjacent business impacts for a specific project. User costs are determined based on both private and commercial vehicle delay costs. Impacts of adjacent businesses include considerations for loss of revenue due to citizens using alternative purchasing locations as well as losses in local and state taxes. The economic tool calculates a benefit cost ratio based on user (driving public and commercial vehicles) and non-user costs (adjacent businesses) and the additional costs associated with accelerating construction.

Two additional documents were prepared that describe the history of accelerated construction in Texas and the United States. This document describes case histories together with reference for accelerated construction as performed in other states. Guidelines for accelerated construction were also prepared. This document updates and provides additional details on previous guidelines for accelerated construction prepared by TxDOT.

The workshops were held in the Dallas/Ft. Worth area, San Marcos, Houston, Abilene, Lubbock, Tyler, and Corpus Christi. Over seven hundred TxDOT and contractor personnel attended. Workbooks were provided that contained presentations and the documents identified above. Online workshop information is also available.

During and after these workshops some discussion time was devoted to identifying “tools and policies” that needed additional development. These tools and policies will speed the implementation of Accelerated Construction in Texas. The “Path Forward” section of this document, below, summarizes these concepts and ideas identified.

## Path Forward

In order to obtain substantial time savings during construction, a multi-disciplinary approach including all involved parties is required. Public agencies need to be open to new approaches and allowing more innovation by contractors to deliver projects. Contractors need to assume more responsibility in providing input for design and delivering a final product of high quality and durability. Material suppliers need to ensure adequate quantities of materials and timely delivery to the job site. Equipment manufacturers need to develop new methods for delivering, placing, and compacting materials. Workforce specialists need to provide training and incentives for employees who may have to work longer hours and more shifts in compressed time schedules. Financial institutions need to provide adequate funding at all stages of construction and to recognize the potential cost savings of innovations. Public information personnel need to provide effective and timely messages concerning road or lane closures and to encourage motorists to avoid the construction areas. Finally, the public must understand the need for infrastructure improvement and the need to avoid or carefully negotiate work zones.

Work tasks have been identified below that will move the Accelerated Construction initiative forward in Texas. Table 1 contains a summary of the various activities. It is anticipated that a number of meetings will need to be held among TxDOT, contractors, materials suppliers, equipment manufacturers, and others to implement the guidelines and other information identified.

**Table 1: A Path Forward**

Task	Description	Priority	2018				2019				
			1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	
1	General Guides	High	x	x							
2	Economic Models	High	x	x							
3	Contract Methods	High	x	x							
4	Contract Documents	High	x	x	x						
5	Typical Projects	High	x	x							
6	Rehabilitation Alternatives	High		x	x						
7	Equipment Manufacturers	Mod				x	x	x			
8	Work Zone Safety	Mod						x	x		
9	QC/QA	Mod					x	x	x		
10	New Technology	Mod						x	x		
11	Contractor Input	High	x								
12	Workforce	Mod					x	x			
13	Challenge Districts	High	x								
14	Workshops	High				x					x
15	Program Measurement	Mod			x						
16	Lessons Learned/Best Practices	Mod		x							

## **1.0 General Accelerated Construction Guides**

The recently completed Interagency Agreement between TxDOT and TTI has produced a document titled “Accelerated Construction Guidelines.” This document will be the basis for the development of “General Guidelines for Accelerated Construction,” which will include the following key topics.

1. Planning and programming
2. Preliminary design
3. Environmental
4. Right-of-way and utilities
5. Development of plans, specifications, and estimates
6. Bidding and Letting
7. Construction

## **2.0 Economic Models for Determining User and Non-User Costs**

The recently completed Interagency Agreement between TxDOT and TTI has produced a document titled “Project Level Economic Screening Tool.” This is a preliminary economic screening tool to assist in project selection. A more detailed economic model and accompanying software is needed at the specific project level and should be considered to provide an enhanced project level economic impact calculation tool for user and non-user costs. Improved traffic congestion models, improved definition of non-user costs, and the ability to include more variables into the model will be included in the enhanced tool.

## **3.0 Contracting Methods**

A document will be prepared that identifies the various types of contracts and key elements of these contracts that are available for Accelerated Construction. Types of alternative contracting will be identified together with background information that will help select the type of contract.

Contracting elements contained in these contracts include: incentive/disincentives, cost-plus-time (A + B) bidding, interim completion dates, and no-excuse incentives. TxDOT guidelines for contract types and elements will be defined.

## **4.0 Contract Documents**

Example Contract Documents may be prepared. These documents may include the following items: general notes, prosecution and progress, specification provisions, contract time (calendar days/work days), incentives/disincentives, milestones, lane rental, A + B provisions, substantial completion, etc. Considerations for right-of-way, utilities, railroads, environmental, historic preservation, and archaeological items will be identified.

## **5.0 Typical Reconstruction, Rehabilitation, and Maintenance Projects**

TxDOT will perform a number of typical types of jobs over the next decade. These projects will likely include: addition of a lane on a multilane highway (two to three lanes on rural interstate), widening of shoulders (and

perhaps lanes) on an existing roadway (suburban areas and industry impacted areas), rehabilitation of portland cement concrete pavement, rehabilitation of asphalt bound pavement (removal and replacement or overlays), rehabilitation (small and large city areas), rural and urban intersections, etc. An estimate of the number of these types of projects that TxDOT will contract over the next 10 years, together with their dollar value.

## **6.0 Typical Reconstruction, Rehabilitation, and Maintenance Alternatives**

Typical Accelerated Construction designs, materials selection, construction sequencing, traffic control, roadside safety, and construction methods will be identified for the typical project scenarios identified in Task 5.0. Design considerations will include pavements, bridges, and drainage features.

## **7.0 Equipment Manufacturer Input**

A workshop(s) will be conducted with equipment manufacturers, contractors, and TxDOT to discuss the typical types of projects scheduled for construction in Texas, their dollar value, and the need to accelerate the construction. Key construction time “choke” points will be identified and solutions to these key activities will be identified. After the workshops, equipment manufacturers will be visited (one on one) to stimulate the development of new equipment that will reduce construction time. Materials removal and placement will be key items. This effort will concentrate on pavements and bridges.

## **8.0 Work Zone Safety Guides**

Work zone safety guidelines exist for typical construction projects. These guidelines will be reviewed for application to Accelerated Construction projects. The concept of creating additional working space in the construction zone, longer closure times, and directional or roadway shutdown will be considered and guides provided.

## **9.0 Rapid Quality Control and Quality Assurance**

Existing TxDOT quality control/quality assurance (QC/QA) sampling, testing and reporting processes are adequate for conventional construction. Accelerated construction will require that sampling, testing, and reporting be conducted at a faster pace. New sampling, testing, and reporting systems will be needed. New test methods will need development. This task will identify potential new sampling, testing, and reporting methods for use on Accelerated Construction projects. The development and deployment of these methods is not included in the work effort.

## **10.0 New Technology**

New technology is available to speed construction, improve design, reduce risk to the contractor, improve quality, and improve safety. This technology will be identified and summarized for use on Accelerated Construction projects. The use of 3D modeling, machine control, e-construction, and rapid sampling of materials are examples of this technology.

## **11.0 Contractor Input**

Contractor input is critical during the project development phase and design phases of a project. A formal method for obtaining this input will be identified and guides provided. Concepts include the use of AGC of Texas to coordinate contractor input and visits with individual contractors through the “We Build Texas” program.

## **12.0 Workforce Considerations**

The workforce on Accelerated Construction projects will be tasked to work long hours on multiple days. The impact of the work schedules on human behavior, including safety and work-life balance, needs an improved understanding. Issues and solutions to these workforce challenges will be identified and approaches to reduce the impact will be provided.

## **13.0 Challenge Districts**

TxDOT Administration will challenge selected districts to identify candidate projects for Accelerated Construction. These projects will include both urban and rural as well as the typical types of projects identified in Task 5.0. A number of projects will be tracked through the construction phase to measure the effectiveness of accelerated construction methodologies.

## **14.0 Workshops**

Half-day workshops (3 hours) will be conducted in each TxDOT District. TxDOT District-level and Area staff as well as contractors, consultants [design (PS&E) and QC/QA (CEI)], and materials suppliers will attend. The documents developed from Tasks 1 to 12 will be presented in a brief format and will be available in a workbook as well as electronically. Two rounds of workshops are anticipated. The first round will be conducted after several of Tasks 1 to 12 are completed. Round two of the workshops will be conducted after all tasks are completed and several Accelerated Construction projects have been completed or are under construction.

## **15.0 Program Measurement**

Measurements will be developed to determine the success of the Accelerated Construction program. Measurements may include number of projects statewide and in each District, dollar value of projects statewide and in Districts, user and non-user costs savings, costs to accelerate construction, and benefit/cost ratio of each project as well as statewide and by District.

## **16.0 Lessons Learned and Best Practices**

A peer support group will be formed and available to the districts to pursue the selected Accelerated Construction projects identified in Task 13.0. The peer support group will consist of personnel from TxDOT, contractors, materials suppliers, consultants, and the academic community. It is anticipated that the peer review group will meet with district staff several times during the project development, design, and construction. The model of using a peer group is utilized in other states.