



U.S. Department  
of Transportation

**Federal Highway  
Administration**

# STRATEGIES FOR REDUCING HIGHWAY PROJECT DELIVERY TIME AND COST

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**FINAL REPORT**

December 2003



Prepared by:

The AASHTO Standing Committee on Quality  
in partnership with  
The Federal Highway Administration

#### NOTICE

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# I. Acknowledgements

The American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Performance Measures and Benchmarking of the Standing Committee on Quality, in partnership with the Federal Highway Administration (FHWA), conducted a benchmarking study to identify successful practices and strategies for reducing highway project delivery time and construction engineering cost. Many individuals at the State Departments of Transportation (DOTs) contributed to the success of this study. The study team would like to extend a special thanks and acknowledgement to the following State DOTs for their willingness to give their time, resources and hospitality to provide the team with a wealth of valuable information:

- Connecticut Department of Transportation
- Florida Department of Transportation
- Kentucky Transportation Cabinet
- Maryland State Highway Administration
- New Jersey Department of Transportation
- Oregon Department of Transportation
- Pennsylvania Department of Transportation
- South Carolina Department of Transportation
- Texas Department of Transportation
- Wisconsin Department of Transportation

## II. Executive Summary

In 2002, the AASHTO Standing Committee on Quality (SCOQ) partnered with the Federal Highway Administration to conduct a benchmarking study on project delivery time and cost management.

The purpose of this study is to find and share successful practices and strategies in reducing project delivery time, specifically, (1) focusing on preconstruction (from project conception to advertisement including environmental process); (2) management of total design cost; (3) construction inspection/engineering cost management; and (4) management of cost overruns/change orders in construction. The reason for selecting these key processes is that SCOQ believes these areas are of particular interest to State Department of Transportation (DOT) top executives as they are faced with the daunting task of delivering highway projects on time and within budget. These four areas are key indicators in measuring a DOT's effectiveness and efficiency and have a major impact on the DOT's customers.

The focus of this study is to document how states reduce their project cost and time without comparing states. While many of the strategies presented in this report appear attractive and practical, one should keep in mind that they may not be applicable for every state and some may have to be tailored to meet individual state needs.

### **Know the True Project Cost and Time**

There are significant differences in the ways the various State DOTs track their costs and schedules. As a result, the total cost to deliver projects is not clear. It should be emphasized that direct state-to-state comparison of any of these processes cannot be made without in-depth analysis. The focus of this study was on what states were doing successfully to reduce their project cost and delivery times, not trying to compare one state versus another.

### Cost Accounting

The most challenging process to benchmark in this study is the cost to deliver projects as cost accounting systems vary from state to state. Very few states are set up to totally account for overhead cost, and other states choose to fund eligible project cost by other funding sources. In addition, the point at which a state starts tracking cost through the planning/design process varies greatly. As a result, the total project through the planning/design process is not clear. However, some successful strategies being employed to establish good project costs are as follows:

- *Flexibility Provided in TEA-21* – States are given more flexibility on what could be billed to a project as eligible indirect cost (overhead). States should work towards a total cost accounting system by project, which takes a project from inception through construction.
- *New Jersey Cost Accounting System* – In conjunction with having a well-defined scope of work and realistic project schedules, one of the ingredients for reducing project delivery cost is having a reliable cost accounting system.

## Project Tracking/Scheduling

Recent studies have shown that a growing segment of the traveling public is dissatisfied with the time it takes DOTs to design and construct highway projects. From the first meeting with the public for a proposed project, there is an expectation that an improvement to the transportation system is imminent. In addition, once a project starts construction there is an expectation that the work will be completed in a timely manner with minimal delays to the traveling public.

While few states interviewed have vigorous processes and systems in place to track project schedules, the following best practices/strategies were found:

- *South Carolina Scheduling Template* – South Carolina implemented a Primavera-based scheduling system to interface with their in-house resources and project pre-construction activities on a district and/or statewide basis.
- *New Jersey Tracking, Scheduling, and Performance Rating Systems* – In New Jersey, once a baseline schedule is set, it cannot be changed. In addition, New Jersey has adopted a rating system where one of the factors is project completion ahead of schedule, which pays the prime contractor up to a 5 percent bonus.

### **Develop a Critical Path Model (CPM) and Invest in CPM Activities**

Once all major activities and durations have been established, an analysis of the delivery network must be made to establish the minimum duration needed for each activity and what activities must be done concurrently without affecting the outcome of other concurrent activities. This will result in a CPM.

The expression, “time is money” is especially true for designing and constructing transportation projects. The greatest factor in reducing cost for projects is reducing the delivery time.

The environmental process, utility relocations process, and right-of-way acquisitions are the three most critical causes of project delay in both the design and construction phases of a project. As many State DOTs search to reduce project delivery time and cost, some progress has been made.

### Environmental Process

The entire environmental process including issuance of environmental permits remains one of the leading causes of project delays in many states. Many highway projects become stalled for years while making their way through environmental clearances required by federal and state law.

- *New Jersey DOT’s Attitude on Environmental Stewardship is Key to Success* – NJDOT has recently stepped up efforts to enhance relationships between NJDOT and the resource agencies. In the past, NJDOT staff believed that their job was to build highways and obtain permits. Today, NJDOT environmental employees operate with the mindset that their job is to be stewards of the environment and be responsible for protecting the environment. As a result, relations with the resource agencies have improved significantly.

- *Maryland's Streamlined Environmental and Regulatory Process* – The Maryland State Highway Administration (MDSHA) has incorporated the streamlining provisions of TEA-21 into its environmental process. By modifying its process, the agency ensures concurrences are obtained by the specific due date, and issues are not revisited unless there is substantive new information that warrants a reevaluation.
- *Kentucky's Checklists Process* – In order to reduce the cycle time for environmental processes, the Kentucky Transportation Cabinet (KYTC), in concert with FHWA, has initiated a method of using Guidance and Accountability Forms (GAF) for key environmental processes. The GAF is basically a checklist that contains what is expected and references to identify the level of effort expected. Also, it is designed to coordinate key stakeholders of the process, which includes accountability for quality features.
- *Partnering or Memorandum of Understanding Agreements with Resource Agencies* – Many State DOTs have established partnering or memorandum of understanding (MOU) agreements with their resource agencies to foster cooperation, establish timeframes for review period, and obtain commitment by top management.
- *Early Coordination with Resource Agencies is Essential* – Most states interviewed indicated that early coordination with their resource agencies is essential. Some resource agencies are now pushing for state DOTs to apply permits early in the process, i.e., during environmental clearance phase.
- *Funding Positions at the Resource Agencies* – To address resource agencies' staffing shortages, some state DOTs fund positions at the federal or state resource agencies to focus on the review and approval of state DOT projects.

### Right-of-Way Acquisition

One common concern shared by almost all the states interviewed is that right-of-way acquisition is a major cause of delay in advancing projects. Where relocation is required, it takes an average of about 1 to 2 years to purchase right-of-way once negotiations begin.

- *Signing Bonuses* – Some states interviewed are offering signing/relocation bonuses to speed up the right-of-way acquisition process. If the owner signs/relocates within a set timeframe, he/she receives a set percent increase in the offer.
- *Raising the Nominal Dollar Thresholds of Low Cost Parcels* – Several states have raised the dollar thresholds for nominal offers (as high as \$20,000) so appraisers/negotiators can make an offer to property owners on the spot. This avoids going through the formal process, thereby reducing time for acquisition of low cost parcels. Some states are reporting that over 80 percent of their parcels are acquired this way.
- *Above Fair Market Value Offers* – Several states allow a negotiator to make an offer above the fair market value based on factors such as cost of the condemnation process or cost of project delays.

- *Advertising/Awarding Projects without Right-of-Way (ROW)* – A number of states as a routine practice will award a project and place ROW availability dates into the contract as not to delay the project.
- *Appraiser Selection by Owner* – Several states allow the property owner to select the appraiser from an approved list, increasing trust between the state agency and the owner. This process reduces the number of parcels that go to condemnation.

### Utility Relocation

Utility accommodation and relocation activity remains one of the leading causes of delays during the design and construction phases of highway projects in almost every state interviewed. One state indicated that as many as 70 percent of their projects are impacted by utility delays in both the design and construction phases. Several of the more successful strategies being employed to reduce utility delays are:

- *Wisconsin Statute Permits Delay Claims Against Utility Companies* – Most state DOTs have in place contract specification that entitled the contractors to time, not monetary, compensation when there is a delay in utility relocation. The Wisconsin State Legislature, however, has recently passed a state law that permits contractors to file construction delay monetary claims for any delay caused by the utility company.
- *Florida Communicates Its Five-Year Work Program* – In an effort to give utility companies adequate time to plan the infrastructure, the Florida DOT (FLDOT) communicates its 5-year program to utility companies and provides quarterly updates as required by law for FLDOT to liaison with utility companies.
- *Sharing an Informative Video: CCC Making the Effort Works* – FHWA, in cooperation with AASHTO, developed a 19-minute video, *CCC Making the Effort Works*, for state DOT and utility engineers encouraging them to coordinate, cooperate, and communicate (CCC) early and often.

### **Other Strategies for Reducing Project Delivery Time and Cost during the Design and Construction**

A number of other strategies and practices to reduce project costs and delays are also included in this report. These strategies address how the agency is organized and staffed, value management, investing in partnerships, and construction engineering. Strategies presented in this report can be adapted to differing state needs and situations, as appropriate.

### III. Introduction

#### A. Background

Delivering highway projects “on schedule and within budget” remains a top priority shared by many top executives at the State Departments of Transportation (DOTs) and the Federal Highway Administration (FHWA). While various provisions in the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) have streamlined and improved efficiency in the administration of Federal-aid highway programs, the public’s growing demand and expectation for mobility has never been greater. Under TEA-21, which includes a 40 percent increase in federal funding, state DOTs are spending an unprecedented amount of tax dollars to build, preserve, operate, and maintain the Nation’s transportation system. To keep pace with the growing demand for a timely, reliable project delivery process, many states have acted by developing strategies to meet that challenge. Others are eager to learn from those willing to share innovative strategies for improving and reducing project delivery time and cost.

One of the objectives of the American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on Quality (SCOQ) is to share successful practices in transportation quality management. In 2002, the AASHTO SCOQ Subcommittee on Performance Measures and Benchmarking partnered with the Federal Highway Administration (FHWA) to conduct a benchmarking study on project delivery time and cost management.

#### B. Purpose

The purpose of this study is to find and share successful practices and strategies in reducing (1) project delivery time, specifically, (1) focusing on preconstruction (from project conception to advertisement including environmental process); (2) management of total design cost; (3) construction inspection/engineering cost management; and (4) management of cost overruns/change orders in construction. The SCOQ believes these areas are of particular interest to State DOT top executives.

#### C. Scope and Methodology

To identify successful practices and strategies for reducing highway project delivery time and cost, the review team needed to conduct state interview.

In November 2000, the SCOQ Subcommittee on Performance Measures and Benchmarking surveyed 50 states, the District of Columbia, and Puerto Rico to gather information on project delivery processes. These processes included project delivery cost and time related to preconstruction, construction inspection/engineering cost, and construction change orders. The survey compared indices and processes used by the various states in delivering their highway program. The purpose was to identify potential benchmark states with results better than the national average in one or more of those areas.

Tabulated results revealed the following:

- The time for preconstruction activities with Environmental Impact Statements (EIS) ranged from 3 to 11 years with an average of 7 years.
- The construction engineering (CE) cost (including inspection cost) varies from 2 to 18 percent with an average of 10 percent.

After tabulating the results, the team contacted ten states with delivery time and delivery cost below the national average (while maintaining a relatively low change order rate) for documentation of their processes. It should be noted that several states responded that they had no formal documentation to support the survey data that was supplied.

The team performed the site visits to the ten states within the four AASHTO regions from April through September 2002. The team met with state DOT upper management and staff using a list of questions provided before the meeting to guide the interviews (see Appendix A and B).

#### Initial Finding – States could not be compared with these survey results

After the first two state site visits, it was clear that some review adjustments was needed because of misleading assumptions. It was impossible to determine whether or not a state has successful strategies in cost and time management without examining the process in depth. In some instances, states with robust financial tracking systems in place ended up with higher design and CE cost because all costs charged to the project were tracked. Also, some states have rightfully chosen to charge some eligible activities to other than the project cost, therefore, resulting in lower design or CE cost. There are also significant differences at what phase states start to track project costs. In most states, planning and environmental cost are not charged to the project. Overhead costs also significantly differ between states depending on the financial tracking systems and which charges the state wishes to include in overhead. Many states have not taken full advantage of overhead cost that can be charged back to the project. Those states that on the surface appear to have higher cost are in reality only doing a better job of project accounting. Project delivery time information was also very problematic. Only one state was found to truly baseline its schedules. Most states operated under a system that allowed projects to be re-baselined when a project got into scheduling trouble. Many states only track schedules in the year or previous year that a project is scheduled to be advertised. Starting points for tracking schedules on projects differed significantly between states and sometimes varied within the state especially if it was decentralized.

Data on construction change order rates also had problems. While this item appeared to be the cleanest to track and to be consistent between states, as noted below, there are significant variances on what is really being tracked:

1. Changes in quantity are not included
2. Changes in scope of work are not included
3. Change order rate equals that % over the programmed contingency for the project

In conclusion, direct comparison of any of these processes cannot be made without in-depth analyses to fully understand what and how the states are tracking these costs. After making this

initial observation, the team decided to modify the original list of review states to include those states that were not necessarily under the national average but have good process documentation. The focus would be to document how states reduce their project cost and delivery time without comparing states.

#### D. Study Team

The study team comprised of the following individuals:

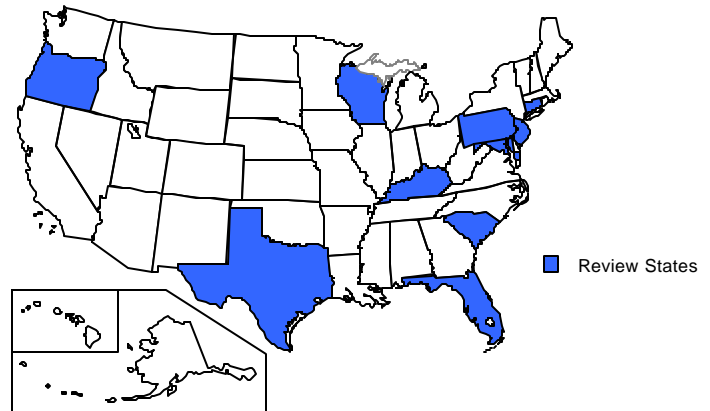
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#### E. Review States

The review states include the following:

Connecticut  
Florida  
Kentucky  
Maryland  
New Jersey  
Oregon  
Pennsylvania  
South Carolina  
Texas  
Wisconsin



## IV. Strategies for Reducing Highway Project Delivery Time and Cost

The review team identified many successful state strategies for reducing highway project delivery time and delivery cost. The key to evaluating cost and project delivery times is good data. Many states currently lack the ability to totally track cost or schedule on a project or program basis. However, issues like handoffs between internal operational units, decentralization, re-baselining of schedules, and internal cost accounting make it very difficult to actually know the true cost and time to deliver projects.

### Know the True Cost and Time to Deliver a Project

The two most important factors to consider are cost accounting and project tracking/scheduling.

#### A. Cost Accounting

The most challenging process to benchmark in this study is the cost to deliver projects because cost accounting systems vary from state to state. Very few states are set up to totally account for overhead cost, and other states choose to fund eligible project cost by other funding sources. In addition, the point at which a state starts tracking cost through the planning/design process varies greatly. As a result, the total cost to deliver projects through the design process is not clear.

Construction inspection/engineering costs are somewhat easier to track. However, what is charged to the project versus what is included with the contractor's bid varies greatly between states. This makes CE cost comparison problematic. Examples of how some charges vary from state to state are shown below:

<u>Item</u>	<u>Differing State Charges</u>
Field office	Included in contract; District office not charged to project; District office included in overhead; separate state account.
Material testing	QC/QA included in contract; Only QC included in contract; QC/QA by state charged to project; Material testing distributed as part of overhead.
Field survey/layout	Included in contract and performed by contractor; Performed by state and charged to project.
Engineering support	Charged to design job #; Charged to construction job #.
Central lab testing	Charged to project; Charged to overhead.
Overhead rate	There are significant differences in what charges are included in the overhead rate between states.

The initial survey results of the 52 DOTs show that the cost of preconstruction (i.e., from project statement to advertisement) ranges from about 3.5 to 30 percent of the original contract cost with an average of about 10 percent. The cost for construction engineering (including inspection cost) varies from 2 to 18 percent with an average of nearly 10 percent.

### COST ACCOUNTING STRATEGIES

- *Flexibility Given in TEA-21* – With the passage of the Transportation Efficiency Act for the 21<sup>st</sup> Century (TEA-21), states were given more flexibility on what could be billed to a project as eligible indirect cost (overhead). In essence, states have the ability to charge eligible indirect cost similar to the way consultants bill DOTs. This type of total cost accounting will give a state a better picture of the true cost to deliver a project. In addition, many states fund eligible indirect project cost with state funds. By charging all eligible indirect cost to a federal project, DOTs may free up state funds to be used for other activities such as maintenance. In any event, states should work towards a total cost accounting system by project, which takes a project from inception through construction. In addition, a system that can track a project by major activity is very useful in establishing a budget for a project, and allows a project manager to know if a project is over or under budget at any given time.
- *New Jersey Cost Accounting System* – Of the states visited, the New Jersey DOT (NJDOT) had the most comprehensive financial management system taking full advantage of charging eligible indirect cost to a project. In conjunction with having a well-defined scope of work and realistic project schedules, one of the ingredients for reducing project delivery cost is having a reliable cost accounting system. The NJDOT has in place a comprehensive financial management system to track all costs associated with the delivery of the highway program by project. In addition, their unit managers closely monitor the schedule, budget, and staff progress and alert management of any potential problems, cost growth, or delays. Project managers are responsible for maintaining both consultant and in-house project budgets.

#### B. Project Tracking/Scheduling

Few states interviewed have vigorous processes and systems in place to track project schedules, especially in the early phases of a project. While some states have baseline design schedules developed, most states interviewed allow the schedule to float and re-baseline them when delays occur. As a result, the review team was not able to get a true picture of how long a state takes to deliver projects during a design phase.

As for construction schedules, the way states track and report substantial completion date, adjusted completion date, and final completion date vary somewhat. As an example, some states do not consider a project delayed if they adjusted the completion date during construction, while others consider the project delayed based on the original date set in the contracted documents.

Before a state can start applying strategies for project tracking and scheduling, it must first benchmark delivery times for individual projects, picking a common starting point for tracking. Recent studies have shown that a growing segment of the traveling public is dissatisfied with the time it takes DOTs to design and construct highway projects. From the first meeting with the public for a proposed project, there is an expectation that an improvement to the transportation system is imminent. In addition, once a project starts construction there is an expectation that the work will be completed in a timely manner with minimal delays to the traveling public. There is nothing worse than traveling through a construction work zone with traffic delays to see no work progressing for weeks or months. The individual projects should be broken down by common activities and time data collected. Once this historical database is established by activity and where they occur in the delivery process, a scheduling system can be set up for any project by linking the activities, the durations, and where the activities occur in the delivery process. With this type of system in place, a project can be reliably scheduled and tracked through the delivery process. Once minimum durations are established for each activity with no float time<sup>1</sup>, a critical path can then be developed for every project. At any given time, management could tell if a project was behind schedule and develop recovery plans to bring the project back on schedule. This is a common practice in the private sector.

Below are two examples of state systems that are well documented in tracking and scheduling of projects.

#### PROJECT TRACKING/SCHEDULING STRATEGIES

- *South Carolina Scheduling Template* – In response to the growing complexity of the preconstruction (from project conception to advertisement) process, in 1987 the South Carolina DOT (SCDOT) implemented a Preconstruction Project Management System (PPMS). The PPMS system is a set of procedures designed to help improve the effectiveness of the preconstruction process in dealing with complex interrelationship of projects, work activities, people, and funding. In December 2002, SCDOT issued a Primavera-based scheduling system, a more flexible and robust system that would interface with their in-house resources and current scheduling software programs for scheduling SCDOT project preconstruction activities on a district and/or statewide basis.
- *New Jersey Tracking, Scheduling, and Performance Rating Systems* – New Jersey (NJDOT) has adopted a Primavera-based system to track the schedule and budget for each design and construction project. In New Jersey, once a baseline schedule is set it cannot be changed. In addition, the state has developed a rating system. One of the rating factors is project completion ahead of schedule, which pays the prime contractor up to a 5 percent bonus. Poor performance, on the other hand, can penalize the contractor with a 6-month suspension. Other rating factors include safety, environmental compliance, pavement smoothness, and air voids. It should be noted that only the prime is rated and held accountable for the quality of the project and for their subcontractors. New Jersey's vigorous project tracking system coupled with its performance rating system has resulted in an overall 90 percent on-time rate.

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<sup>1</sup> Float time is additional time available to complete the activity.

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## Develop a Critical Path Model (CPM) and Invest in CPM Activities

Once all major activities and durations have been established, an analysis of the delivery network must be made to establish the minimum duration needed for each activity and what activities must be done concurrently without affecting the outcome of other concurrent activities. This will result in a Critical Path Model (CPM) based on activities. At that point any project can be scheduled based on the activities needed to complete the project. There will be a number of link activities that will have no float time to establish minimum delivery time or CPM for the project. It is also helpful to establish cost for major activities to assist in setting budgets for projects.

The expression, “Time is Money” is especially true for designing and constructing transportation projects. The greatest factor in reducing cost for projects is reducing the delivery time. This is why a state must invest in its CPM activities. To get a return in reducing the time it takes to complete the critical activity, one must first invest time and resources directed at that CPM activity. Upper management must lead the effort with it involves third-party entities.

The three major critical path activities that most states have identified are environmental process (including obtaining needed permits), right-of-way acquisition, and utility relocations.

Below, the study team has identified several strategies that states have deployed in reducing time and uncertainties for these activities.

### A. The Environmental Process

Despite the efforts demonstrated by many state DOTs to design, build, and maintain their highways in an environmentally responsible manner, the time it takes to complete the environmental process, including timely issuance of environmental permits, remains one of the leading causes of project delays in many states. Many highway projects become stalled for years while making their way through environmental clearances required by federal and state law. Based on the team’s initial survey results of 52 DOTs, the average time to deliver projects with Environmental Impact Statements for preconstruction is from 3 to 11 years with an average of 7 years. For projects with Environmental Assessments, it takes a minimum of 2 years to a maximum of 7.5 years with an average of 4 years. For Categorical Exclusions projects without additional right-of-way acquisition, it fluctuates from 9 months to nearly 4.5 years with an average of about 2 years. For projects with additional right-of-way acquisition, however, delivery time can range from 1.5 to around 6 years with an average of almost 3 years.



Example of excellence in environmental protection

## ENVIRONMENTAL STREAMLINING STRATEGIES

- *Maryland's Streamlined Environmental and Regulatory Process* – The Maryland State Highway Administration (MDSHA) has developed a Maryland's Streamlined Environmental and Regulatory Process to achieve the timely and efficient identification, evaluation, and resolution of environmental and regulatory issues. These procedures have been modified to incorporate the streamlining provisions of TEA-21. The intent of the streamlined process is to ensure that agency concurrences are obtained by the due date before proceeding to the next step. Having concurred at a particular milestone, the resource agencies will not request that MDSHA revisit issues unless there is substantive new information that warrants a reevaluation of a previous concurrence.
- *Kentucky's Checklists Process* – In order to reduce the cycle time for environmental processes, the Kentucky Transportation Cabinet (KYTC), in concert with FHWA, has initiated a method of using Guidance and Accountability Forms (GAF) for key environmental processes. The GAF is basically a checklist that contains what is expected and references to identify the level of effort expected. Also, it is designed to bring key stakeholders of the process into coordination, which includes accountability for quality feature. Kentucky expects to reduce the amount of time it takes for KYTC and FHWA to process documents and get to a final approved environmental document. Since the final approval of documents rests with FHWA, the GAFs are owned by FHWA. Each year, FHWA is required to evaluate the content in the GAF to ensure the references are up to date and that the level of effort is still applicable.
- *New Jersey DOT's Attitude on Environmental Stewardship is Key to Success* – In recent years, New Jersey DOT (NJDOT) stepped up efforts to enhance relationships between NJDOT and the resource agencies by educating and training their environmental staff and the construction industry about environmental stewardship. In the past, NJDOT staff believed that their job was to build highways and obtain permits. Today, NJDOT environmental employees operate with the mindset that their job is not to obtain permits but to be stewards of the environment and be responsible for protecting the environment. With changed mindset and attitude, the relationships between NJDOT and the resource agencies have improved significantly, to the point where environmental permitting is no longer a critical path activity in New Jersey.
- *Partnering or Memorandum of Understanding Agreements with Resource Agencies* – Many State DOTs have established partnering or memorandum of understanding (MOU) agreements with their resource agencies to foster cooperation, establish timeframes for review period, and obtain commitment by top management. For MOUs to be effective, they must be filtered down to the staff level. It is a matter of not only relationship but also documentation. Document, and be clear and specific in the MOU, how much time is provided for review. Issues should be raised during the developmental stage and not the permit stage.

- *Early Coordination with Resource Agencies is Essential* – Most states interviewed indicated that early coordination with their resource agencies is essential. Some resource agencies are now pushing for state DOTs to apply for permits early in the process, i.e., during environmental clearance phase, even though permits are usually not granted until the advertising/award phase of a project.
- *Funding Positions at the Resource Agencies* – Many state DOTs are finding that their resource agencies do not have adequate staff to work with them on environmental issues early in the process. As a result, some state DOTs have created processes and interagency agreements and fund positions at the federal or state resource agencies to focus on the reviewing and approving of state DOT projects. Many are finding it worthwhile.

## B. Right-of-Way Acquisition

While all the states interviewed have procedures in place to compensate property owners for acquisition of private property for highway projects, these processes vary from state to state. However, one common concern shared by almost all the states interviewed is that right-of-way acquisition is a major cause of delay in advancing projects. Where relocation is required, it takes an average of about 1 to 2 years to purchase right-of-way once negotiations begin. Some states interviewed do not use Federal funds for right-of-way acquisition in order to simplify the acquisition process.

### RIGHT-OF-WAY ACQUISITION STRATEGIES

- *Signing Bonuses* – Some states interviewed are offering signing/relocation bonuses to speed up the right-of-way acquisition process. If the owner signs/relocates within a set timeframe, they receive a set percent increase in the offer.
- *Raising the Nominal Dollar Thresholds of Low Cost Parcels* – Several states have raised the dollar thresholds for nominal offers (as high as \$20,000) so that appraisers/negotiators can make an offer to property owners on the spot without going through the formal process, therefore, reducing time for acquisition of low cost parcels. Some states are reporting that over 80 percent of their parcels are acquired this way.
- *Above Fair Market Value Offers* – Many states allow a negotiator to make an offer above the fair market value based on several factors like cost to go through the condemnation process or delays to a critical project.

- *Advertising/Awarding Projects without Right-of-Way (ROW)* – A number of states as a routine practice will award a project and place ROW availability dates into the contract as not to delay the project.
- *Appraiser Selection by Owner* – Several states allow the property owner to select the appraiser from an approved list, increasing trust between the state agency and the owner, thus reducing the number of parcels that go to condemnation.

### C. Utility Relocation

Utility accommodation and relocation activity remains one of the leading causes of delays during the design and construction phases of highway projects in almost every state interviewed. When utilities located on highway rights-of-way are required to relocate to accommodate highway construction, in most states utility companies relocate the facilities at their own expense. On the other hand, if the utility company has prior rights, the state DOT reimburses the utility company for the relocation costs. One state indicated that as many as 70 percent of their projects are impacted by utility delays in both the design and construction phases. Recently, some states interviewed are considering paying for the relocation cost regardless of who has prior rights to provide utility companies incentive to relocate facilities in a timely manner. However, NJDOT, which pays for all utility relocation costs including design is still experiencing substantial delays to their projects. Over 80 percent of their projects in construction are impacted by utility delays.



Utility relocation delay can have cost and safety implications

## UTILITY RELOCATION STRATEGIES

- *Wisconsin Statue Permits Delay Claims Against Utility Companies* – Currently, most state DOTs have in place contract specification that entitled the contractors to time, not monetary, compensation when there is a delay in utility relocation by the utility company. Without state law, the contractor typically does not have the legal ground to recover delay costs from the utility company even if the utility company causes the delay. Recently, a handful of states have solved this issue by taking it to their legislature. For example, in 2000, the Wisconsin State Legislature passed a state law that permits contractors to file construction delay claims against utility companies for any delay caused by the utility company.
- *Florida Five-Year Work Program* – In an effort to give utility companies adequate time to plan the infrastructure, the Florida DOT (FLDOT) communicates its 5-year program to utility companies and provides quarterly updates as required by law for FLDOT to liaison with utility companies. If utility company does not relocate the utilities, FLDOT by state statute can file a 30-day notice citing the interference by the utility company. After 30-days, the FLDOT can then select a consultant to design and relocate the utilities at the utility company's expense.
- *Video: CCC Making the Effort Works* – The FHWA, in cooperation with AASHTO, developed a 19-minute video, *CCC Making the Effort Works*, for state DOT and utility engineers encouraging them to coordinate, cooperate, and communicate (CCC) early and often. Copies of the video are available by contacting FHWA Office of Program Administration at (202) 366-0494.

## Other Strategies for Reducing Project Delivery Time and Cost during the Preconstruction Phase

### 1. Organizational

- A. *Specialized vs. Multi-functional* – From the states visited it was clear that a multi-functional approach versus a specialized approach for internal units is much more efficient. It leads to less down time and better employee satisfaction. Agencies could handle workload issues much more efficiently because employees are trained to perform many functions and have a better general understanding of how the project delivery process works. It also fosters teamwork with a smaller group of people working on delivering a project.
- B. *Centralized vs. Decentralized* – About four of the states visited have a decentralized organizational arrangement where their district offices are staffed with technical experts with a full range of functions. The rest are centralized where most of their subject matter experts are located in the central office. Decentralized states appear to have a slight advantage in both customer satisfaction and delivery times while centralized states have some cost efficiencies and have much better tracking systems. There is no clear advantage noted between being centralized versus decentralized.
- C. *Investment in Training/Employee Development* – It is clear that states that have a well-defined training/employee development program, such as South Carolina, have reaped the benefit of both reduced delivery cost and time.

### 2. Value Management

During the design process there are many activities that occur that do not add value to the final contract documents of any individual project. States should focus on streamlining those non-value added activities to reduce the scope, time, and cost to perform those functions.

- A. *Tailor the Process to Fit the Project* – There are countless of activities that may or may not need to be performed for any given project. During the scoping phase make sure that only the required activities are being performed to the level of analysis required. As an example, a traffic impact report, and the analysis included in the report on a major interstate reconstruction project, should be significantly different than a resurfacing project on a collector road and may not be required for many other types of projects. The delivery system must allow for flexibility to perform only those activities that are necessary for any given project.
- B. *Tailor the Documents to Fit the Process* – Documentation for typical reports like feasibility assessment reports, preliminary design reports, foundation reports, environmental reports, design exception, etc., vary greatly from state to state. Many of these reports restate information located in the project file or in other reports. Many of the documents have standard formats that were set up for the most complicated projects and are not effective

when applied to a smaller, less complicated project. In other cases documents are produced in great detail to justify the obvious. The amount of documentation should be limited to the minimum amount necessary to support the project and the contract documents. One example of minimal documentation is New Jersey's preliminary design package. The conclusions of numerous individual reports have been combined into one document less than 100 pages, allowing the owner to approve the general concept of the project so that it can advance to final design.

### 3. Invest in Partnerships

- A. *Partner with FHWA* – For the most part, the state DOTs valued FHWA's involvement. Most states interviewed indicated they have developed oversight agreements with FHWA. Some would like FHWA to be there to coach them, help them work with other agencies to resolve issues, interpret policies consistently and fairly, and work together with the states to achieve the common goal. One state emphasized that FHWA's presence is important to help the states, but at the same time, allow the states to carry out their work, try new ideas, and learn and grow. An example of this type of partnership is Kentucky and FHWA – Strategic Merger. Today, the Kentucky Transportation Cabinet (KYTC) and the FHWA Kentucky Division have merged their strategic plans and performance measures. Both organizations started out with relatively minor differences in direction, and have agreed on the same “vital few” goals for transportation safety, congestion mitigation, and environmental stewardship with the purpose of delivering products and services to the taxpayers of Kentucky. KYTC Secretary and FHWA Kentucky Division Administrator jointly signed a “Contract for Commitment” for this strategic merger. Both KYTC and FHWA have common objectives to achieve one set of common goals. Several other states have similar partnering agreements.
- B. *Partner with the Designer* – Traditionally, partnering programs have been focused on improving working relationships in the highway industry primarily during the project construction phase. The Maryland State Highway Administration, in cooperation with the consulting industry, is now extending partnering into the planning and engineering phases of project development. One of their objectives is to foster an effective means of reducing total project cost and time while increasing project quality.
- C. *Other Partnerships* – Investing in Partnerships, Memorandums of Agreement or Memorandums of Understanding with the major third-party players in the delivery process can be very beneficial in reducing the time and cost to delivery projects while building trust with those third-party entities. Developing partnerships with major players like permitting agencies, utility companies, and local governments can have far reaching benefits. Collectively, DOTs have many individual success stories. As an example, South Carolina has developed an agreement that allows up to 5 acres of wetland impacts to be covered under a general permit. This type of agreement required a substantial investment in resources from both the DOTs and permitting agency to make this happen.

## Other Strategies for Reducing Project Delivery Time and Cost during the Construction Phase

### 1. Construction Inspection/Construction Engineering

One of the challenges facing many State DOTs is attracting people to career opportunities in construction.

- A. *Staffing* – The number of people assigned to a job and the ratio between technicians and professional staff varied greatly between states for similar types of projects. As an example, the full-time staffing level for a \$30 million new interchange project ranged between 4 and 12+ between states with some states having no professional staff assigned to the job while other states may have as many as 6 professional staff assigned.



A field technician inspecting a truck mounted attenuator

In general, the states with lower construction inspection cost demonstrated the following characteristics:

- High reliance on technical staff vs. professional staff.
  - Upward mobility to allow technical staff to become resident engineer (field manager).
  - Technicians/inspectors trained to do multi-function types of inspection.
  - Higher levels of responsibility assigned to field staff.
- B. *Quality Control/Quality Assurance* – States that have turned over all quality control functions to the contractor have reduced inspection cost and increased contractor awareness of process controls to achieve the specified end product. Several states have turned some of the quality assurance functions over to the contractor or an independent agent but have not resulted in any noticeable cost reduction since cost is merely shifted from one area to another.
- C. *Training* – While some states have specialized field technicians such as construction inspector, material inspector, electrical inspector, etc., states that invest heavily in multifunction training of their field technicians are clearly more efficient. Several states require levels of training (certifications) as a condition for advancement. One state actually has a salary program based on the number of training certificates an employee has obtained.

## 2. Project Delays and Cost Overruns

Based on the team's initial survey of the 52 DOTs, the construction change order rates vary significantly depending on how states tracked them. The change order rates were grouped into three categories: change order cost (pluses and minuses balanced); cost increase (pluses only); and cost increase due to errors. The percentages are broken down as follows:

	<u>Lowest</u>	<u>Highest</u>	<u>Average</u>
Change order cost (pluses and minuses)	- 2%	15%	5.4%
Cost increase (pluses only)	2%	25%	7.9%
Cost increase due to errors	0.2%	17%	2.7%

Due to the way states track these cost, the data is unreliable for comparison. For example, several states do not consider quantity increases as a change order while other states do. In addition, some states only consider the amount over the programmed contingency amount as a cost overrun while other states consider any amount over the bid price as a cost overrun. To further confuse matters, states program between 0% up to 15% for contingencies.

A few common strategies states are using to reduce project delays and reduce cost overruns are listed below:

- A. *Identifying Unknown Conditions* – Many construction projects are delayed and/or incur cost overruns due to unknown conditions that could have been identified with proper screening in the design phase. For example, hazardous materials, unknown or improperly located utilities, unknown or assumed subsurface conditions, etc., could have been defined with additional screening are left out of the original scope of work for the project. A small investment during the design process to define these areas can save millions in construction. For example, states like Virginia that have invested and require “subsurface utility engineering” on all projects have saved millions in construction claims and delays.
- B. *Noting Changed Conditions* – Due to the long design process on complex projects, many of the original physical features may have changed during the course of the design such as added utilities or additional development. An in-depth review of the project site just prior to advertisement can save millions in claims and delays due to changed conditions.
- C. *Addressing Third Party Delays* – Third party delays such as utility relocation delays, environmental permitting delays, or right of way availability delays can add substantial cost and delays to projects during construction. Early and continuous coordination with third party entities can substantially reduce cost and time delay to projects.
- D. *Establishing a Contractor Performance Rating System* – The contractor's performance rating must be tied to a system that provides incentive to finish a project ahead of schedule and within budget. Several examples of such systems are listed below:
  - *Florida Performance Ratings* – Florida DOT (FLDOT) has a Contractor Quality Control program, which allows FLDOT to rate contractors based on 9 rating factors, including timeliness, capacity, cost and time overruns, environmental compliance, disadvantaged

business enterprise, etc. The amount of retainage that is withheld from a contractor is based on his/her rating.

- *New Jersey Contractor Rating System* – New Jersey DOT has implemented a new rating system on a number of trial projects. The contractor is rated on the following areas: progress schedule, safety/traffic control/environmental, contractor project management, and quality/contract compliance. The contractor can receive up to a 5 percent bonus of the total contract amount for outstanding work or, conversely, can have his prequalification suspended for poor performance.

## V. Conclusions

State DOTs are faced with the daunting task of delivering highway projects on time and within budget. Many states are rising to the occasion and are producing some encouraging strategies that merit attention. Since the states visited only represent less than a fifth of the 52 DOTs, the review team recognizes that there are more potential success stories to be shared. Other state strategies and ideas meet the challenge of delivering transportation projects on time and within budget have yet to be captured.

As noted in the report, the most challenging process to benchmark in this study is the cost to deliver projects since cost accounting systems vary from state to state. While construction engineering cost are somewhat easier to track, what is charged to project versus what is included in the contractor's bid varies greatly between states. As a result, the total cost to deliver projects is not clear. It should be emphasized that direct state-to-state comparison of any of these processes cannot be made without in-depth analysis. The focus of this study was on what states were doing successfully to reduce their project cost and delivery times, not trying to compare one state to another.

The three leading causes of delay that most states have identified are the entire environmental process (including obtaining needed permits), right-of-way acquisition, and utility relocations. As an agency effectively reduces the duration of a major critical activity another major activity will then arise and become critical path. As an example, for many years the environmental permitting process was the critical path activity on New Jersey design projects. After a considerable investment in time and resources, a partnering agreement was signed with the major permitting agency, and environmental permitting is no longer the critical path on design projects. New Jersey is now working on the utility accommodation and the right-of-way acquisition processes that have now become critical paths.

It should be noted that many innovative contracting practices (such as A+B bidding, lane rental, and design/build) adopted by state DOTs to combat the challenge of reducing project delivery time and cost are not discussed in this study. Strategies presented in this report can be adapted to differing state needs and situations, as appropriate.

## Appendix A: Interview Guide Summary (Pre-construction)

	A	B	C	D	E	F	G	H	I	J
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### GENERAL

What is your average annual program \$	\$600M	\$3B	\$700M	Not reviewed (N/R)	\$275M	500M	\$770M	\$700M	\$1.5B	\$500M
What is your average annual number of advertised projects?	400	900	250	N/R	150	40	177	750	557	120
Of your average annual program, what is the breakdown of projects in the following classifications?			Not available (N/A)	N/R	N/A					
Percent new construction (paving, grading & structures)	38%	30%				30	53%	20-25%		5%
Percent 3R	14%	39%				20	17%	5-10%	Rdwy 58%	34%
Percent bridge rehabilitation/reconstruction	7%	3%				20	6%	5-10%	16%	21%
Resurfacing	18%	10%				20	12%	30-40%	22%	23%
Other types of projects	23%	18%				10	12%	15-40%	2%	17%
What is your average annual breakdown for projects by cost?			N/A	N/R						
Percent over \$100,000,000	0%	0.1%				2%	30%	0%	0%	0.4%
Percent over \$50,000,000	0%	0.3%				10%	5%	0%	1%	0.8%
Percent over \$25,000,000	0%	1.2%			5 projects	15%	12%	1-2%	1%	3%
Percent over \$10,000,000	2%	4%				15%	16%	2-3%	3%	9%
Percent over \$5,000,000	9%	10%				20%	9%	2-5%	7%	15%
Percent over \$1,000,000	38%	40%				20%	22%	5-10%	88%	59%
Percent under \$1,000,000	62%	45%			Most	18%	6%	80-90%		41%
Of your average annual program, what is the percentage of projects that were classified under the following environmental process?			N/A	N/R						
Percent Environmental Impact Statements (EIS)		1.1%			Low	5%	1.5% (11/733)	<5%	1%	0.5%
Percent Environmental Assessment (EA)		10.7%			Low	15%	1.5% (12/733)	20-25%	1%	2.5%
Categorical Exclusion (CE)		88.2%			99%	80%	97% (710/733)	70-80%	98%	97%

### ORGANIZATIONAL

Are design functions: centralized, regional/district, or both				N/R						
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	A	B	C	D	E	F	G	H	I	J
Centralized			X		X	X				X
Regional/district	X	X							X	
Both							X	X		
How would you classify your states Project Delivery System?				N/R						
Project Management	X	X	X		X	X		X		X
Lead Unit (Bridge, Roadway, District, etc.)									X	
Other – combination							X			

**PROJECT INITIATION/PROBLEM STATEMENT**

Where are Problem Statements initiated?				N/R					Not tracked	
Percent State DOT Management Systems	Input	1%	40%		50%	40%		30%		25%
Percent Operations/Maintenance	Input	10%	28%		30%	10%				25%
Percent Local Government	Input	10%	10%			10%		10%		10%
Percent Metropolitan Planning Organizations	Input	15%	12%			20%		10%		20%
Percent Planning	Input	9%	5%		20%	15%		40%		15%
Other	Districts	55%	5%			5%	Shared	10%		5%
Who approves project initiation?	District	Commiss/ Districts/ MPOs	DOT/ MPO	N/R	Commiss.	committee	Secretary	State Highway Engineer	DOT/MPO	Chief Engineer
Who approves the State Transportation Improvement Program (STIP)	DOT	Commiss.	DOT	N/R	Commiss.	MPO/Legi slators	Secretary	DOT	DOT	Joint process
How long does it take to go from a Problem Statement to an approved project in the “STIP”?	Varies	2-11 years	Within 1 year	N/R	18 months	18 months	Varies	Depends on funding	3-36 months	2-6 months
How many MPOs (if any) does your state have?	11 MPOs	25 MPOs	10 MPOs	N/R	3 MPOs	3MPO’s	5 MPOs	9 MPOs	25 MPOs	3 MPOs
What is the % of the annual program that they cover?	Unknown	68%	11-12%	N/R	75%	100%	59%	25%	63%	42-56%
How much longer does it take for projects that have to go through a MPO approval process?	Few months	30 days	Same	N/R	N/A	N/A	2-12 months	Varies	3-30 months	Same

**MANPOWER**

What percent of your annual program is design by in-house forces based on total # of projects?	50%	90%	72-75%	N/R	70%	20%	>50%	50%	Not tracked	38%
What percent of your annual program is design by consultants based on total # of projects?	50%	10%	25-28%	N/R	30%	80%	<50%	50%	Not tracked	62%
What percent of your annual program is designed by in-house forces based on advertised cost?	N/A	68%	40-60%	N/R	N/A	15%	<50%	30%	21%	29%
What percent of your annual program is designed by consultants based on advertised cost?	N/A	32%	40-60%	N/R	N/A	75%	>50%	70%	79%	71%

	A	B	C	D	E	F	G	H	I	J
How does the DOT decide what projects are designed in-house vs. consultant? Please rank in priority order, with 1 being the most influential reason, 5 being the least.				N/R	Consult to augment in-house				District decides – major to consultant	
Project cost	4	4	2			4	3	4	X	1
Type of project	3	2	3			1	2	3	X	2
Available in-house manpower	1	1	1			3	1	1	X	3
In-house design to accelerate project delivery	5	5	4			5	5	5		4
Consultant design to accelerate project delivery	2	3	5			2	4	2		5
If consultants are used, is there a ceiling on the overhead rates? No or Yes. If yes, what's the rate?	No	No	Yes Audited	N/R	No	NO	Yes 130%	Yes 150%	Yes 168%	Yes 127.7%
If consultants are used, what is the most commonly used agreement?				N/R						
Cost plus fixed fee	X	30%	X			X	X		X	
Lump sum	X	40%	X		X			X		X
Cost per unit of work		20%								
Specific rates of compensation										
Other		10%								
How long does it typically take to select a consultant from the time it is determined that professional services are required to signed agreement	3-6 months	6 months	4-6 months	N/R	3 months	6 months	12-18 months	3 months	6 months	8 months
Is there a significant difference in delivery times for projects that are designed in-house vs. consultant?	Not sure	No	No	N/R	N/A	NO	Unknown	Varies	Not tracked	Unknown
Is there a significant difference in design cost for projects that are designed in-house vs. consultant?	Not sure	Yes	Yes	N/R	N/A	NO	Unknown	Yes	Not tracked	Yes

TRACKING

What type of tracking system is used to evaluate the project delivery schedule?				N/R	6-yr program	PRS				
Designer – internal tracking							X	X		
Project manager		X	X			X	X		X	
Independent tracking/scheduling unit						X			X	X
Other, please list	Mainframe	District Engineer			AMS			Oracle		
At what point do you begin tracking a project?				N/R						
Planning – determining project need		X					X	X		
Scoping – developing a preferred alternative						X			X	X
Design – designing project	X									
Other			Funding is established		STIP					

	A	B	C	D	E	F	G	H	I	J
In determining the cost to deliver a project, please check the following items that are included in the design cost				N/R						
Planning – determine project need			X					X		
Scoping – developing a preferred alternative		X	X			X		X		
Design – designing project	X	X	X		X	X	X	X	X	X
Construction – engineering		X	X			X			X	

#### FUNDING

What is the percent of Design funded by:				N/R						
Federal funds	54%	6%	77%		80%	70%	45%	60%	28%	58%
State funds	37%	93%	20%		20%	28%	55%	40%	52%	37%
Other funds	9%	<1%	3%			2%	Small %		20%	5%
What is the percent of Construction funded by:				N/R						
Federal funds	54%	66%	64%		80%	65%	65%	60%	28%	58%
State funds	28%	33%	9%		20%	30%	35%	40%	52%	37%
Other funds	18%	1%	27%			5%	Small %		10%	5%
What is the procedure for determining funding sources for design projects?	Eligibility	Eligibility	STIP	N/R	N/A	Varies	Varies	Job type, location, \$	Work Program	Varies
Does your state use state funding on certain projects to avoid federal requirements?	Yes	No	No	N/R	Yes	YES	Yes	Yes rarely	No	Yes
Is your state allowed to use federal construction funds if the project was designed with state funds?	Yes	Yes	Yes	N/R	N/A	YES	Yes	Yes	Yes	Yes

#### SCHEDULING

Are baseline schedules developed for all projects?	No	No	Yes	N/R	Yes	YES	Yes	Yes	Yes	Yes
If so, what is the starting and ending points?	N/A	N/A	Planning to letting	N/R	N/A	Problem statement to comp. of const.	Planning to letting	Funding to letting	Proj dev. to letting	Design to constr.
Are schedules developed for both in-house and consultant design projects?	Yes	Yes	Yes	N/R	Yes	yes	Yes	Yes	Yes	Yes
Can baseline schedule be modified?	Yes	N/A	Yes	N/R	Yes	no	Yes	Yes	Yes	Yes
Do you have a flow diagram for your project delivery process?	Yes	Yes	Yes	N/R	Yes	yes	No	Yes	Yes	Yes
What types of projects have a fast track process (please check all that apply)?				N/R	None				None	
Categorical Exclusion Projects		X	X			X	X			
Maintenance and Resurfacing Projects	X	X	X			X	X	X		X
Projects which do not require ROW		X	X			X		X		
Other, please explain			X							

	A	B	C	D	E	F	G	H	I	J
Do you have a unit dedicated to design scheduling?	No	No	No	N/R	No	yes	No	No	District level	No

**CRITICAL PATH**

Do you require a CPM schedule on your projects?				N/R						
Yes on all projects					X	X	X		X	Modified
Yes on some projects		X	X					X		
No										
If you only require a CPM schedule on some projects, what criteria do you use?				N/R						
Cost		X	X							
Duration		X	X		X					
Complexity		X	X					X		X
Other, please explain										
What design elements determine your critical path in the design schedule of the majority of our projects? Please rank in priority order, 1 being most critical, 6 being least critical.				N/R						
Utility – relocation process	2	5	6		3	2	2	2		5
ROW – acquisition process	1	4	5		2	1	3	3		3
Manpower or consultant agreement process		3	1			5	4	5	X	4
Funding		1	4			3		4		1
Environmental/Permitting process	2	2	3		1	4	1	1		2
Other, please list	Railroad		2 plans preparation	N/R						

**QUALITY CONTROL / QUALITY ASSURANCE REVIEWS**

Do you conduct Quality Control/Quality Assurance reviews (check all that apply)?				N/R						
Yes, for in-house designs	X	X	X		X	X	X	X	X	X
Yes, for consultant designs		X	X			X	X		X	X
No										
How are QC/QA reviews done within the Department?				N/R						
Special unit			X			X	X			
Various disciplines individually	X	X	X				X		X	X
Multi-disciplinary teams			X		X			X		
Other		X								
For the following types of projects, how many reviews are conducted and at what phase?				N/R	N/A					
Projects requiring an EIS		2	Varies			3		2	3	3
Projects requiring an EA		2	2-4			2		2	3	3

	A	B	C	D	E	F	G	H	I	J
Projects that are CEs		1	N/A					2	3	3
What is the standard duration of a departmental review?	1-2 weeks	6 weeks	2-3 weeks	N/R	N/A	3 weeks	Varies	1-2 weeks	15 days	2-4 weeks

#### ROW PROCESS

On the average, how long does it take to purchase ROW once negotiations begin?				N/R	N/A					
With no relocations required	1 year	1 year	0.5-1 year			18 months	1 year	0.75 years	1.5-2 years	1 year
With relocations or buildings required	2 years	1.7 years	1-1.5 years			21 months	1.5 years	1 year	1.5-2 years	1.5 years
With court settlement required	2 years	2.3 years	2-3 years			2 years	1.5 years	1.3 years	1.5-2 years	Same
On the average, who negotiates ROW (Please check all that apply.)				N/R	N/A					
State forces	X	X	X			x	X	50%	X	X
Non-state personnel (consultant)	X	X	X					50%	X	
If only state forces, does state law mandate it?	No	No	No	N/R	N/A	yes	No	No	No	No

#### UTILITY PROCESS

Is subsurface utility engineering (SUE) utilized in design?	No	Yes	Yes	N/R	Few	YES	Yes	A little	Yes	Modified
Who prepares utility relocation plans: State DOT, consultant, or utility company?				N/R						
State DOT					X	X			X	
Consultant					X	X	X	X	X	
Utility company	X	X	X		X	FEW	X	X	X	X
On the average, how much time is required from the start of the utility process until a final utility relocation plan is developed?	4 years	1-2 years	10 months	N/R	N/A	1 year	Varies	1.5 years	N/A	3-9 months
Who pays for utility relocations: State DOT, utility company, or both (depends on who has prior rights)				N/R						
State DOT						X		X		
Utility company								X	X	
Both (based on who has prior rights)	X	X	X		X		X			X
What percent of projects does your state use advanced utility relocations?	50%	1%	Low	N/R	Few	5%	15%	None	5%	2%

#### ENVIRONMENTAL PERMITTING

Which permits are part of your critical path for delivering projects?	404	404	404, etc	N/R	N/A	SHPO approval	404, etc	404	None	
Does your Department self-certify any permits	No	No	Yes	N/R	No	YES	No	No	No	
Does your Department utilize any "General" permits?	No	Yes	Yes	N/R	Some	YES	Yes	Yes	Yes	

	A	B	C	D	E	F	G	H	I	J
Has your Department developed a “Partnering or Memorandum of Understanding” agreement with any permitting agency?	Yes	Yes	Yes	N/R	N/A	yes	Yes	Yes	Yes	

FHWA INVOLVEMENT

In what type of projects are FHWA reviews undertaken?				N/R						
Full oversight		X				X	X	X	X	X
Exempt							X			
Other	>\$4M		>\$50M		>\$1M	X		Env. proj.		
In general, how does FHWA involvement impact your project delivery time?				N/R						
Significantly increases delivery time								X		
Minimally increases delivery time			X			X	X			
No impact in delivery time	X	X			X				X	X
Does your state have an oversight agreement with FHWA?	Yes	Yes	Yes	N/R	Yes	YES	Yes	No	Yes	Yes

## Appendix B: Interview Guide Summary (Construction)

	A	B	C	D	E	F	G	H	I	J
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### MANPOWER MANAGEMENT

Does your state have formal manpower management system?	Yes	No	Not ready yet	No – District	Yes	Yes	Yes	No	No	Not reviewed (N/R)
If so, is the system centralized, regional/district, or other		N/A						N/A	N/A	N/R
Centralized						X	X			
Regional/district	X		X	X	X					
Other										
For peak periods of manpower shortages filled by:										N/R
In-house personnel from other areas	X	X		X	X		X	X	X	
Consultants	X		X	X	X	X	X		X	
Other methods	Overtime								Rent a tech	
What is the percentage of construction inspection done by:										N/R
In-house	46%	98%		33%	80%	50%	40%	95%	21%	
Consultant	54%	2%	6 on call	67%	20%	50%	60%	5%	79%	
If consultants are used, are caps put in place for:										N/R
Wage rates	No caps	No		Yes	No	No	State wage		No	
Overhead rates	No caps	No	160%		No	No	130%	150%	110%	
What factors are considered for manpower needs for a selected project?			Historic							N/R
Project cost	X	X	X	X	X	X	X	X	X	
Project duration	X	X	X	X	X	X	X	X	X	
Type of work	X	X	X	X	X	X	X	X	X	
Complexity	X	X		X	X	X	X	X	X	
Accelerated projects		X		X	X	X	X	X	X	
Design-Build projects		X		X	X		X	X	X	
What would be your project staffing level for the following project:		5-7	8	10	N/A	12	10	4-5	N/A	N/R
Project bid price - \$30 M										
Project type – new construction										
Paving grading & structures										
Project duration 2 years (day work) – with no winter shutdown										
What is your typical breakdown between professional and technical personnel on a project?				Varies	N/A	40/60				N/R

	A	B	C	D	E	F	G	H	I	J
Professional		2	2	2		5		2	3	
Technical		3-5	5	8		7	10	2-3	4-6	

**CONTRACTOR PAYMENT SYSTEM**

How are the majority of your projects bid?										N/R
Lump sum			Few						Some	
Lump sum major items				Bridge						
Cost loaded CPM										
Individual bid items	X	X	X	X	X	X	X	X	X	
How often is contractor paid?										N/R
Weekly										
Biweekly	X			X			Some	X		
Monthly		X	X		X	X	X		X	
Is contractor payment based on:										N/R
Percent complete				Lump sum					Lump sum	
Quantity installed	X	X	X	X	X	X	X	X	X	
Other										
Is contractor payment based on:										N/R
Invoiced amount by contractor				Lump sum					Lump sum	
Calculated item amount by DOT	X	X	X	X	X	X	X	X	X	
Other										
Who approves contractor payments?	Project Engineer	Area Engineer	District	District	Project Manager	Field manager	District	Project Engineer	Field Engineer	N/R
Are contractor payments:									N/A	
Regional/District			X			X		X		
Centralized	X	X		X	X		X			
Other										
What is the averaged turnaround time for contractor payments?	7 days	10 <sup>th</sup> day of month	30 days	30 days	30 days		14 days	7 days	5 days	N/R
Is the contractor entitled to interest for late payments by DOT?	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	N/R

**QUALITY CONTROL, QUALITY ASSURANCE, AND INDEPENDENT ASSURANCE**

What percent of the following functions does DOT staff perform?										N/R
Quality control	0%	90%	Low	Low	90%	20%	Concrete	40%	20%	
Quality assurance	60%	95%	High	100%	100%	100%	100%	95%	40%	
Independent Assurance	100%	100%	High	100%	100%		100%	100%	100%	
What percent of the following functions is performed by either the contractor or the consultant?					N/A					N/R
Quality control	100%	10%	High	Most	10%	80%	100%	60%	80%	
Quality assurance	40%	5%	Low	None	0%	0%	None	5%	60%	

	A	B	C	D	E	F	G	H	I	J
Independent assurance	None	None	Low	None	0%	0	None	None	0%	
How are costs tracked for the following functions including overhead?			N/A		N/A					N/R
Quality control	Bid item	Not tracked		Project		Project	Project	Unit cost	Not tracked	
Quality assurance	Project	Function		Project		Project	Project	Unit cost	Not tracked	
Independent assurance	Project	Not tracked		Project			Project	Unit cost	Not tracked	
What percent of material testing is done by:			N/A							N/R
In-house?	High	90%		100%	100%	90%	100%	75%	30%	
Consultant?	Medium	5%				10%	20%	5%	10%	
Contractor?	Unknown	5%					None	20%	60%	
Is material testing done in-house:										N/R
Centralized	Some	X	X	X	X	X	X	X	Some	
Regional/District	X	X	X		X	X	X	X	X	
Other geographic breakdown					X					
On site		X	Few		X				X	
If a material lab is set up on site, is the lab provided by the DOT or the contractor?	Contractor	Contractor /supplier		DOT	N/A	Yes if required	Contractor	Contractor	Never do this	N/R
How are these costs tracked?	Bid item	Incidental		Project	N/A	Project	Incidental	Not tracked	N/A	N/R

CONSTRUCTION INSPECTION COST ACCOUNTING

How are construction inspection costs tracked?										N/R
In-house	CE cost	Project	Project	Project	CE cost	Project	Project	Overhead	FMIS	
Consultant	CE cost	Invoice	Not tracked	Invoice	CE cost	Project	Contract	Invoice	FMIS	
Is overhead included:										N/R
In-house	No	Yes	Some	Yes	Fringe	Yes	Yes	Yes	Yes	
Consultant	No	Yes	Some	Yes	No	Yes	Yes	Yes	Yes	
What is your overhead rate for in-house forces?	N/A	20-25%	N/A	N/A	N/A	1.82%	52% fringe 108% O/H	55%	65%	N/R
How is overhead calculated?	N/A	Historic	N/A	N/A					Don't know	N/R
Plant						x	X			
Fringe and benefits					X	x	X	X		
Training							X			
Do you have a maximum overhead rate for consultant inspection	No	Yes	No	No	No	NO	130%	150%	168%	N/R
Is field layout/surveying done by:										N/R
Contractor					X	X	Stakeout			

	A	B	C	D	E	F	G	H	I	J
In-house							X			
Both	X	X	X	X				X	X	
If by contractor, how are these costs tracked?	Bid item	Incidental	N/A	Bid item	Bid item	Bid item	Bid item	Bid item	Not tracked	N/R
Are construction engineering costs included in your overall construction inspection costs?	Yes	Yes	N/A	No	N/A	YES	No	Some	Yes	N/R

#### FIELD OFFICE

Are field offices located in:										N/R
Regions/districts		X	X	Few	X			X		
Other centralized locations										
Job site	X	Some	Few	X		X	X	Rarely	X	
If field offices are located on-site, what are the determining factors?	Safety security electric phone	Size location type	N/A	Size duration type	N/A		Size utility	Duration complexity staffing	Need	N/R
How are on-site field office paid for:										N/R
Contractor provides	X	X	X	X		X	X	X	X	
State DOT provides		X	X		X					
How are field office costs accounted for?	Bid item	Subsidiary /overhead	Overhead/ state	Bid item	State	Bid item	Bid item	CE cost	Bid item	N/R
Who supplies field office equipment? (please check all that apply)			N/A							N/R
State DOT	X	X			X			X		
Contractor	X			X		X			X	
Consultant	X						X			
How is it paid for and accounted for if provided by contractor?	Bid item	Overhead	N/A	Bid item	State	Bid item	Bid item	N/A	Bid item	N/R

#### TRAINING/CERTIFICATIONS

For in-house staff, is specific training required for both technical and professional staff?	Yes	Some	Yes	Yes	Yes	yes	Yes	Yes	Yes	N/R
If so, please list the required training by title.	Various	Various	Various	Various	Various		Various	Various	Various	N/R
Are certifications required (such as NICET) for various levels of technical and professional staff?	Yes	Yes	Yes	Yes	Some	NO	Yes	Yes	Yes	N/R
Are certifications required for advancement in the various technical and professional levels?	No	Some	Yes	Some	Some	No	No	No	No	N/R
If consultants are used for construction inspection, are the same or different requirements used for the various staffing levels?	Same	Same	Same	Different	Same	Different	Same	Same	Same	N/R
Does your state use consultant contract managers?	Yes	No	Yes	No	No yet	Yes	No	No	Yes	N/R