

Identification of Cross-Cutting Issues Related to the Development, Management, and Delivery of Transportation Projects and Programs

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Prepared by:

Thomas R. Warne, PE
Tom Warne and Associates, LLC

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EXECUTIVE SUMMARY

State departments of transportation (DOTs) face many challenges today. Acquiring adequate staffing, managing critical assets, dealing with political issues at federal, state and local levels, and serving a public with ever higher expectations are just a few. It has never been more difficult to take a project from concept, through development and construction, and provide a completed road or highway. The process can take more than a decade under the best of circumstances. State DOTs seek a better understanding of what the impediments are and how they might be addressed. This study, entitled “Identification of Cross-Cutting Issues Related to the Development, Management, and Delivery of Transportation Projects and Programs” is intended to assist these agencies to more effectively deliver on their capital improvement programs.

The information gathered for this report comes from the Chief Executive Officers (CEOs) of state DOTs who also serve in key leadership positions in the American Association of State Highway and Transportation Officials (AASHTO). Other, individuals who represent a wide variety of functional areas and who are active in their respective AASHTO committees also contributed. This extensive input provided a detailed view of cross-cutting issues states face and how they most effectively deal with them.

The issues described in this report are known to those in the industry; however, the prioritized order may be surprising. These issues are listed, based on their impact to project and program delivery: Environmental Impacts, Funding, Utilities, Organizational Issues, Public Involvement, and Design Criteria. Many others were noted and a sampling of those is provided. Not surprisingly, Environmental Impacts is first on their list. Funding, emerged as a close second based on the turmoil in the federal and state financial systems. Director of the Oregon Department of Transportation Matthew Garrett, said that “funding blocks out the sun” in its implications to the future capital programs in each state. Utilities also surfaced as an important issue as almost every project is impacted by one or more utility conflicts and study participants expressed great concern about the disruptions these conflicts cause to the state’s work.

The good news is that the states are aggressively implementing strategies to overcome barriers to efficient project and program delivery. They recognize that most will not go away or become any easier over time. With this in mind, they have adopted creative and thoughtful approaches to mitigating the effects of these challenges. For example, states are frustrated by the lack of responsiveness from federal and state resource agencies as projects

make their way through the environmental studies performed on DOT projects. In response, state DOTs are placing their own staff in these agencies, paying for additional federal staff or, in some cases, actually paying for a certain level of performance in order to bring stability and predictability to this phase of the project development process.

Strategies to deal with funding concerns included: more caution in developing financial plans for Statewide Transportation Improvement Programs (STIP), more discipline in estimating the costs of projects, and greater accountability at all levels in their agencies in delivering the program within the specified programmed amount.

Many participants lamented the fact that state DOTs are still organized much as they were when the interstate was being constructed; that this “silo” approach is not conducive to the kind of collaboration and communication essential in today’s project development world. Some states have now adopted a Project Management approach while others have reorganized to achieve more effective program or project delivery outcomes. All told, the list of strategies currently in use by states to address the negative impact of cross-cutting project delivery issues is impressive and worth serious consideration.

Another area of this study relates to Context Sensitive Solutions (CSS). CSS was first adopted about ten years ago as a means for improving stakeholder involvement and creating project solutions that address both the transportation issues at hand and consider a community’s cultural, historical and environmental assets. The research for this report focused on how best to continue the art and science of CSS in state DOTs and where it should fall within the AASHTO committee structure. Based on this study, it is recommended that CSS not be organized into its own unit within the AASHTO committee structure. However, this research confirms broad endorsement of its principles and that they should be considered by all committees as they advance their efforts in each functional area.

An additional recommendation speaks to the desire of study participants to have the project delivery process better addressed across the functional committees of AASHTO. A few years ago, AASHTO created the Councils on Project Delivery and Operations to foster greater collaboration and exchange between relevant committees and subcommittees. However, most study participants believe that the councils have not achieved the desired objective and it is recommended that AASHTO take a critical look at the committee structure and find ways to address the void in the interactions between the committees on cross-cutting issues.

The challenges of project delivery have never been greater but the resolve of the state DOTs has never been stronger. The strategies in this report offer an effective collection of ideas state DOTs can adopt to responsibly address major impediments to their work.

CHAPTER ONE

INTRODUCTION

Transportation agencies face many challenges including funding, managing substantial roadway and physical assets, increasing customer expectations for service, recruiting and retaining a qualified workforce, and many others. One of the most difficult challenges to address is the effective and efficient delivery of programs and projects. In many cases, the public gauges the success of a state department of transportation by how well it achieves this objective.

Project delivery is not a singular task or a uniform activity as many would suppose. Some believe it constitutes the actual construction of a project without consideration for the preliminary phases leading up to building the desired roads and bridges. Many of the efforts to “streamline” the project delivery process focus on the period of construction readily viewed by the traveling public. Reinforcing this thought process is the growing application of alternative delivery methods including design-build (DB), construction manager/general contractor (CMGC), and other approaches that accelerate the construction process. Experience shows that these approaches have a tendency to improve the construction timeframe for many projects. While they differ in their elements and how they approach the design and construction process, they are all offered as substitutes for the traditional design-bid-build (DBB) that is sometimes blamed for slow project delivery.

Taking a project from concept to completed infrastructure element involves many phases. While the process and nomenclature may differ slightly, the basic phases are all the same. A generalized summary of these phases is offered below:

1. Initiation-A project concept or idea is identified either through public input, technical analysis or political process.
2. Concept-The state highway agency will often conduct a high-level concept study of the proposed project to broadly define its scope and potential cost.
3. Environmental-Some projects are eventually incorporated into the state’s Statewide Transportation Improvement Program (STIP) where further detailed environmental studies are completed. With very few exceptions, all projects must be included in the STIP in order to progress to construction.
4. Design-Projects progress from year to year in the STIP and eventually go through a design phase.

5. Construction-Assuming that a project successfully completes all previous phases including environmental studies and design, and that sufficient money exists to fund construction, it is advertised and a contractor is selected to complete the work.
6. Maintenance and Operations-Often forgotten in the project delivery process is the maintenance and operations phase, which extends for many years beyond the completion of the actual construction.

As noted earlier, alternative contracting methods such as design-build focus on the later phases of the project delivery process and do not address many of the obstacles that often impede or delay the schedule. For example, a project may take eight to ten years to traverse the initiation, concept, environmental and design phases of the process before even going to construction. If the design-build approach is used and the design and construction timeframes are reduced from three to two years, the timing has only improved from thirteen to twelve years. The misconception of how these alternative contracting methods can improve the project delivery process is pervasive and few recognize that a design-build or any other alternative delivery approach does nothing to shorten the environmental study or other phases of the work.

The state DOTs evolved over the years into organizational structures that successfully delivered projects. The structure served agencies well in a much less complex world of project delivery 20 or 30 years ago. While names may differ slightly from one agency to another, each DOT established sections or units for construction, design, environment, planning, structures, traffic, hydraulics, geotechnical, and others. More recently some agencies added a community relations or public involvement element. In reality it was and is a very “silo” oriented organizational structure which was adequate for the mission of the interstate construction era, but is less effective in the current climate of project delivery.

The American Association of State Highway and Transportation Officials (AASHTO) was established in 1914 and evolved over the years to a committee structure that essentially mirrors how the states are organized; there is a Standing Committee on Highways, a Subcommittee on Design, a Subcommittee on Construction, and similar units for bridges and structures, traffic etc. In all, AASHTO is organized into many committees, subcommittees, task forces, and other special units designed to address the varied needs of its member states.

More recently, the state DOTs and AASHTO have come realize that project delivery is more effectively addressed by modifying the “silo” approach and adopting a more cross-cutting organizational delivery method. In the agencies this change has been most widely expressed with the Project Management approach to project delivery.

In essence, Project Management follows the private sector model where a single individual is identified as the project manager and is assigned to lead the project from inception through construction. It falls to this individual to coordinate all activities and phases required to deliver the project, bringing continuity to the effort. While still not wholly adopted by every state DOT, the Project Management approach is growing in its application and its success is evident and continued use ensured.

AASHTO recognized that individual silos are not the most effective way to address project delivery and changed its organizational structure. Councils have been established which bring together various committees and subcommittees into a common forum to share issues, concerns and strategies. Two councils established for this purpose are the Council on Project Delivery and the Council on Operations.

In 1998 AASHTO, the Federal Highway Administration and other industry partners gathered in Maryland for the “Thinking Beyond the Pavement” conference. It was at this event that the current Context Sensitive Solutions (CSS) initiative had its genesis. The movement towards using CSS on projects across the country has had a profound influence on many aspects of the project delivery process. For many years AASHTO utilized the Context Sensitive Solutions Task Force to advance, educate and otherwise provide a forum for users of this approach to project delivery. AASHTO is now considering how best to continue supporting the CSS initiative in its current environment.

RESEARCH OBJECTIVE

The primary objective of this research is to identify and prioritize cross-cutting issues related to development, management, and delivery of projects and programs, summarize where possible the state of the practice in addressing these issues and develop an organizational plan for integrating this knowledge into the AASHTO organizational structure. In addition, this study assessed the sentiment of participants concerning the application of Context Sensitive Solutions (CSS) in the project delivery process.

APPROACH

The research approach was designed to assess the project delivery practices within transportation agencies and the cross-cutting issues they face in successful completion of infrastructure initiatives. The following tasks were accomplished:

1. Conduct literature review-A literature review was conducted relating to the topic area. In addition to a search of available literature through traditional transportation sources, two on-going reports were

considered as well. They were NCHRP 20-69, “Guidance for Transportation Project Management,” and NCHRP 20-73, “Accelerating Transportation Program and Project Delivery: Conception to Completion.”

2. Conduct key leader interviews-Personal interviews were conducted with the following leaders from within the AASHTO organization:
 - a. Amadeo Saenz (Texas DOT), Chair, Standing Committee on Highways (SCOH)
 - b. Carolann D. Wicks (Delaware DOT), Chair, Subcommittee on Design
 - c. Neil J. Pedersen (Maryland SHA), Past-Chair, CSS Task Force
 - d. Will Kempton (California DOT), Chair, Standing Committee on Finance and Administration
 - e. Matthew Garrett (Oregon DOT), Chair, Standing Committee on the Environment (SCOE)
 - f. Debra L. Miller (Kansas DOT), Chair, Standing Committee on Planning (SCOP)
 - g. Allen D. Biehler, (Pennsylvania DOT), Vice President of AASHTO, Past-Chair, Standing Committee on Highways

Interviews were conducted via teleconference with questions and discussions focused on cross-cutting project delivery issues and the role of CSS in the project development and delivery process.

3. Summarize and submit key issues-A summary of the major cross-cutting project delivery issues from Tasks 1 and 2 was prepared and submitted to the panel for approval prior to performing the work described in Task 4. The Key Issues Summary, represented the research to that point in the study and is included in Appendix A.
4. Facilitate a project delivery workshop-A workshop was facilitated with representatives from variety of committees and subcommittees within AASHTO during a special session held in Branson, Missouri during the 2008 AASHTO Spring meeting. Participants provided insightful perspectives to the project delivery process and contributed additional issues and strategies that are included in this report.
5. Develop the proposed AASHTO Committee-It was originally thought that a recommendation for a new committee or subcommittee in AASHTO would be the likely outcome from this research. However, early in the study, the project panel clearly indicated that such was not a forgone conclusion and directed the consultant to approach this task with no pre-conceived ideas for addressing the project delivery issues identified. The panel asked the consultant to develop alternatives for addressing the project delivery issues noted in the research and recommend a course of action for AASHTO.

6. Develop draft report-A report based on the information developed during Tasks 1 through 5 was developed.
7. Present findings to AASHTO Committees-The findings of this project, as contained in the draft report were presented to the Standing Committee on Highways (SCOH), Standing Committee on Planning (SCOP), and the Standing Committee on the Environment (SCOE) for input. This was done by an electronic distribution to the committees due to various logistical and timing issues.
8. Prepare and submit a final report-This final report was prepared based on the product of Task 6 with modifications based on the input received in Task 7 and input from the project panel.

ORGANIZATION

CHAPTER 1-Introduction This chapter contains a brief summary of the current state of project delivery among the state DOTs. Specific mention is made of the functional and organizational issues facing these agencies as well as how AASHTO is organized to serve its members needs. It also includes a statement of the project's objective, research methods, as well as information regarding the organization and content of the report.

CHAPTER 2-Literature Review A summary of the literature review is provided with common themes and observations presented. This chapter focuses on the issues and practices that seem to be most pervasive the project delivery arena.

CHAPTER 3-Cross-Cutting Issues Overview From the other input received during this research, a summary of cross-cutting issues is offered with discussion as appropriate.

CHAPTER 4-Addressing Project Delivery Issues The many participants in this study have offered a wide variety of mitigating strategies to address the issues raised in Chapter 3. These activities are summarized in the same format as they are presented in that chapter.

CHAPTER 5-Context Sensitive Solutions CSS was one of the focal points of this research. This chapter summarizes the very thoughtful analysis provided by study participants and offers insights into the most effective way for AASHTO to deal with CSS principles and programs within its organizational structure.

CHAPTER 6-Conclusions and Recommendations This chapter contains a series of conclusions and final recommendations for consideration in addressing the cross-cutting issues in project delivery and the disposition of CSS in the AASHTO committee structure.

REFERENCES

APPENDIX A Key Issues Summary

CHAPTER 2

LITERATURE REVIEW

Project delivery is a crucial mission for state DOTs and their local government counterparts. It involves the initial planning and scoping of projects, completing environmental studies, doing the engineering design and then performing the actual construction work. It is a continuum of activities that can span more than a decade. Often, stakeholders focus on a specific step in the process and are unaware of the many other contributing work elements that see a project to fruition. This study is focused on the “Identification of Cross-Cutting Issues related to the Development, Management, and Delivery of Transportation Projects and Programs.” Many elements combine to make the process challenging on even the most straightforward projects. With funding growing ever more scarce, stakeholder expectations at an all time high and many other influences impacting how, when and what is delivered by the DOT, it is imperative that the process be as effective and efficient as possible. The literature available on the topic of project delivery focuses on a variety of the cross-cutting issues and will be summarized in this chapter.

As state DOTs focus on project completion, delays are becoming more and more common. A project that would take 7 – 8 years in the past now could take double that time. In the AASHTO report, “*Transportation – Invest in Our Future: Accelerate Project Delivery*”, figuring from a traditional planning and delivery concept of project management a major project can take 2-3 years in planning, 4-6 years to meet National Environmental Policy Act (NEPA) requirements, 2-3 years for a detailed design, 1-2 years for right-of-way acquisition and utilities and 2-3 years for construction, easily taking 10 to 15 years from start to finish. This is assuming any of the other issues that regularly slow down a project don’t occur. These issues can extend the timeline further. Construction on the Inter-County Connector (ICC) in Maryland started in 2007 after over 30 years of planning and environmental analysis and preliminary engineering (AASHTO/2007). The Safe, Accountable, Flexible, Efficient Transportation Equity Act-A Legacy for Users (SAFETEA-LU) included key elements for accelerating projects to completion. Projects still bog down because of both traditional and non-traditional issues.

State efforts to expedite projects sometimes results in decisions to skip or circumvent some of the planning activities normally performed. Inadequate scoping can lead to increased construction costs or even projects that do not get built for a variety of reasons (Hendrickson/2000). Rushing processes, including less than thorough environmental studies ultimately results in otherwise avoidable delays.

Risk in project delivery also occurs when conflicts exist among participants or stakeholders. Risks may come in one or more of the following three areas: socioeconomic factors, organizational relationships and technological problems. Most risks are overcome through coordination and communication. Recently the concept of “risk sharing/risk assignment” has gained acceptance and is being used more frequently to address a variety of project delivery issues (Hendrickson/2000).

An article from the Washington State Department of Transportation (WSDOT) discusses various project delivery mechanisms. The type of delivery method will determine the nature of the relationship a procuring agency forms with the private sector to meet specific project goals. (Yarema/2002). Recently, states have tried to address cross-cutting project development issues by adopting or trying alternative project delivery methods. The increasing use of design-build is an example of this. Some states have begun exploring other delivery methods including the Construction Manager/General Contractor (CMGC) approach, all with the intent of overcoming the inefficiencies and uncertainties in the project delivery process. Some success has been achieved by doing this but none has fully addressed the serious problems facing state DOTs as they seek to construct badly needed projects in a timely manner. Some of these tools address only specific areas of the project delivery process. For example, design-build may accelerate the design and construction elements of the work but will do nothing to speed the ten years of planning and environmental analysis that was required prior to soliciting design-build proposals.

Frequently, state DOTs cite environmental delays as the major reason projects are not delivered on time. In response, states have attempted to accelerate the environmental process and also other stages of the project development process to overcome this key issue. The Texas Department of Transportation (TxDOT), with the participation of the Federal Highway Administration (FHWA), sponsored a workshop dedicated to streamlining project development. Participants included environmental coordinators and planners who created a list of obstacles to streamlining environmental issues. The list included lack of communication, trust and flexibility; staffing issues, including turnover and new participants, a lack of experience and knowledge, or a lack of overall dedicated FTEs (full time equivalents), participants or stakeholders with different goals or agendas, lack of clearly defined objectives, and lack of participation by key agencies. Overall, a recurring theme was poor communication and lack of early involvement by key personnel and agencies. (Overman/2003)

Some stakeholder groups and resource agency personnel become the “watchdog” (obstacle) to a project’s progression. Two such instances were discussed at The International Conference on Ecology and Transportation

(ICOET) sponsored by the New York State Department of Transportation (NYSDOT). The first case was a project in Montana, a fifty-six mile corridor of I-93 through the Flathead Indian Reservation. While all parties agreed that the highway needed the planned repairs and upgrades, the tribe was concerned that the development would destroy the ecological and cultural landscape of the area. To reach consensus, the Montana Department of Transportation (MDOT), the FHWA and a team of consultants set up monthly meetings with the specific purpose of creating a partnership among the parties. Eventually, they arrived at a “Spirit of Place” theme defining the value of the land and the road as a visitor.

The second case detailed the work of the Defenders of Wildlife group. Many times conflicts have been addressed at the eleventh hour rather than through meaningful communications during the life of the project. Defenders encourage:

- **“Early, continued and substantive involvement.** Many projects are delayed because they are planned and designed before regulatory agencies are ever consulted. If they are involved from the beginning, they can steer DOTs clear of problems early.
- **Focus on comprehensive planning.** Regional and state transportation plans that consider needs and requirements of other sectors are less likely to be delayed.
- **An integrated process, with public participation.** Projects conceived and designed in the mind and spirit of NEPA will meet the needs of the American people, hence are less likely to be delayed.” (Garrett/2001)

Both these cases indicate success in adopting the initiatives outlined to counter significant project delivery concerns.

As states work to plan for project concerns, streamlining efforts do not necessarily solve the problem of environmentally focused delays. Reports from the Federal Highway Administration (FHWA) and the American Association of State Highway and Transportation Officials (AASHTO) contend that states cannot ignore or try to circumvent environmental laws to solve their transportation delays. Rather it is in the planning process where issues are identified and where attempts to streamline should be focused. “The most effective strategy to speed project delivery is one of the fundamental principles of the very environmental regulations under attack – involving stakeholders early, often and substantively” (STPP/2002).

Environmental concerns are only part of what causes the public to become involved in projects. Public opposition to projects has become an increasingly troubling problem for state DOTs. Gary Toth in “Rediscovering our roots can solve 21st Century traffic woes” describes a mentality of fixing transportation problems with a “wider,

straighter, faster” philosophy. Mr. Toth quotes Thomas H. MacDonald, chief of the federal Bureau of Public Roads and his aide, Herbert S. Fairbank, who warned if more planning was not implemented these roads “will become more and more of an encumbrance to the city’s functions and an all too durable reminder of planning that was bad.” It is this disconnect in the planning and environmental stages of a project that led to the implementation of a new philosophy known as Context Sensitive Solutions (CSS) or Context Sensitive Design (CSD). CSS focuses on working with citizens, politicians and other public officials, project managers to reach a successful completion of a project with the buy in of all involved. (Toth/2008)

From its beginnings at the “Thinking Beyond the Pavement” conference in Maryland in 1998, the Context Sensitive Solutions initiative has changed the way many state DOTs approach project delivery. Over the years, The Federal Highway Administration and AASHTO have both been strong supporters of CSS and its related project delivery strategies.

At the Joint AASHTO/FHWA Strategic Planning Process in March 2007 the following definition of CSS was affirmed:

"Context sensitive solutions (CSS) is a collaborative, interdisciplinary approach that involves all stakeholders in providing a transportation facility that fits its setting. It is an approach that leads to preserving and enhancing scenic, aesthetic, historic, community, and environmental resources, while improving or maintaining safety, mobility, and infrastructure conditions."

At that workshop they adopted four strategic goals for enhancing the implementation of CSS principles in the project delivery process. They were:

- Strategic Goal #1-Making the case for CSS.
- Strategic Goal #2-Building CSS knowledge and skills
- Strategic Goal #3-Promote flexibility in standards application to facilitate CSS through revision of standards and/or better understanding and utilization of inherent flexibility.
- Strategic Goal #4-Support leadership and coalition building (CTE/2007)

In September 2006 the AASHTO/FHWA Peer Exchange on Context Sensitive Solutions was held with over 260 participants from 46 states and from throughout the transportation industry. It was an opportunity to assess progress in the implementation of CSS, determine what barriers or challenges still existed to full use of CSS principles and the lessons learned from practitioners from across the country. AASHTO and FHWA planned to take

the information shared at this meeting to further refine and apply CSS in the project delivery process. The summary report from the peer exchange offers insights into how CSS was applied on specific projects, elements of stakeholder involvement, means for mainstreaming CSS in public agencies, and use of CSS on urban and rural projects. (CTE/2006) Common to all documentation from each of these meetings is the affirmation of the principles of CSS and their application in the project delivery process.

On the Context Sensitive Solution website, CSS is defined by seven “Qualities that characterize excellence in transportation design,” and by eight “Characteristics of the process that yield excellence”. These qualities and characteristics also represent goals on projects, and then as benchmarks for success on completion of the project (CSS/2008). Some states, including Colorado Department of Transportation (CDOT/2008) and Illinois Department of Transportation, have created CSS manuals or guides instructing project managers how to work within this philosophy. CSS is not without problems. The Illinois DOT states that, while stakeholders help IDOT understand their needs, it still has final decision responsibility and, “safety, the integrity of the transportation system and good stewardship of the public’s transportation dollars all remain IDOT’s primary responsibilities.” Cost is sometimes cited as an issue with CSS. While projects are difficult to estimate in the development stage, it is critical for accurate projections to be made so that planning for future funding can be done to avoid delays due to lack of money. Illinois stresses that, while continued involvement with stakeholders is encouraged, this interaction does not mean the state has offered a “blank check” for all interests. (IDOT/2008)

Cost increases are a problem of growing concern with many state agencies. The ability to predict costs between the initiation of the project through to end of construction becomes even more difficult due to length of time to overall project completion as well as the many other factors that affect costs. The National Cooperative Highway Research Program (NCHRP) Project 8-49 developed a Guidebook for cost estimating practices and cost estimate management. The Guidebook “presents a systematic approach to addressing project cost escalation”. The Guidebook outlines that cost growth must have participation and buy in from all levels of an organization. MNDOT has implemented the 4 primary tools and strategies as outlined in the Guidebook. They are: 1) assessment, 2) planning, 3) assigning responsibility, and 4) measuring performance. (Shane/2008)

Lack of manpower often is a red light for projects. It is a public and private sector problem facing almost every sector of the industry. In a Florida Department of Transportation Contractor’s Meeting, Bob Burleson, President of the Florida Transportation Builders Association (FTBA) reported manpower as one of the biggest

problems in the industry. (FDOT/2005) Much effort has been expended to address the whole issue of recruitment and retention of state DOT employees and the use of private sector consultants to augment staffing needs where DOTs are unable to fill key project delivery positions. (Warne/2003)

While it is critical for costs to be well planned in any project, funding is also becoming an issue at all levels of transportation, making project specific financing a real concern. In Missouri, while the state has seen an increase in funding in recent years, the Transportation Research Group (TRIP) reported the state will face an \$18 billion deficit covering the next 29 years. This will seriously impact the future of all projects within the state. (TRIP/2007) The Truck Safety Coalition's January 2008 newsletter details concerns with the state of Maine that appeared to defer its 2006 – 2007 road improvement program due to lack of funds. (Truck Safety Coalition/2008)

A new issue facing states is the lack of competition for some of their key projects. This absence of multiple bidders is not just concentrated in one area of the country; several instances confirm this is a problem that is widespread. For example, in Connecticut, the state DOT received no bids for the \$400 million Quinnipiac Bridge project. Also known as the Q-Bridge, the project was to replace the aging and inadequate Pearl Harbor Memorial Bridge. In an effort to move the Q-Bridge forward the Connecticut Department of Transportation is planning to repackage the project and work with individual contractors to reissue the plans in such a way to attract appropriate bids. Construction was to have started in October, 2007 but was delayed in order to change the way the project would be bid. (CDOT/2008)

In addition, the Louisiana Department of Transportation and Development (LADOTD) reported only receiving one bid for the third phase of the Huey P. Long Bridge (HPL) widening project, with that bid coming in 50 percent over the engineer's estimate. (Newsome/16) In situations where the state receives only one bid the DOT can accept that bid as is, repackage the project in some way to create more competition, or not move forward with the project at all. Typically, the third option is not palatable due to other commitments or issues such as in the case of the Huey P. Long Bridge where Phase I and II had already been completed. The second option is often selected as the state re-scopes the project or postpones it with hopes that material or labor costs may be decreased or new circumstances will improve the bidding environment. (Newsome/2007.)

The Woodrow Wilson Bridge project in Maryland is another example of a project that received only one bid. That bid was 75 percent over the engineer's estimate. Initially, the engineers reported they could either redesign the bridge or repeat the bid process, but either choice would put the overall project behind schedule.

(Nicholson/2007) Ultimately, the bridge was repackaged, rebid and stands as a successful example of this strategy. The North Carolina Department of Transportation (NCDOT) has taken the bold step of rejecting bids from its largest paving contractor, claiming the company bid an estimated \$30 million over what the package of seven projects were projected to cost. The NCDOT estimated that when only one bid is tendered on a project, the cost will be 6.5 percent over the estimated price. (Lowry/2004)

As community stakeholders are brought into a project through Context Sensitive Solution initiatives, the FHWA also suggests it is just as important to bring contractors into a project early in the process. By using contractor outreach meetings state DOTs are able to ensure that critical inputs are received from contractors. Contractors can contribute to the development of the scope of work, the planning and design processes and constructability issues. (FHWA/2007)

Some states are implementing performance ratings as part of the pre-qualification to bidding. The purpose here is to avoid problems that might occur during construction because contractors who are not qualified to do the work or who do not have the skills or abilities to build a project are not invited to bid. The state of Ohio is adopting a system based on performance; the evaluation will be based on quality, timeliness and contract administration ratings from prior ODOT projects. (Kerness/2001)

Managing traffic through a construction site has become a major issue in the overall landscape of project delivery. The Springfield Interchange/Capital Beltway Project in Washington D.C. has become a case study in overcoming large traffic volumes on major projects. The area is described as “an interchange where motorists swerve, brake and white-knuckle their way through a tangle of overpasses and underpasses”. To ensure success of the project best practices were a part of meeting deadlines and costs. (HNTB/2008) State DOTs are going to exceptional lengths to design for and implement traffic management strategies that will both accommodate the traveling public in a safe manner but also facilitate timely construction of the work. One strategy in overcoming traffic concerns is to use nighttime construction. While this is an effective plan, noise management then becomes a second issue, especially with major projects in metropolitan areas. The T-Rex project in Denver Colorado has become an innovative example of noise mitigation solutions. The foundation for the success of the plan was the use of mobile sound trailers, a 24-hour noise hotline, and noise monitoring. A balance was achieved between accelerated construction, traffic congestion and noise impact. (Meyer/2008)

Concern with bridge stability has become a hot topic for the public in many states. It is estimated that nearly “28% of the 590,000 bridges in the United States need to be replaced or rehabilitated in the near future” in a time when the economy is at a critical juncture for these states. The FHWA has sustained the idea of accelerated construction of bridges, and it has been used successfully on several highly visible projects. Never the less, it has not become the standard procedure. As with most projects funding becomes the primary factor in the decision of how a project will proceed, but to achieve success in an accelerated climate, a holistic decision making system brings the best results for cost, traffic and safety, etc. (Salem/2007)

A 2006 construction survey conducted by the Wisconsin Department of Transportation (WisDOT) for the AASHTO/FHWA Subcommittee on Right of Way and Utilities conference included a survey of 287 contracts including interviews with their project managers. The survey indicated 23 contracts or 8 percent where the highway contract did not adequately represent the utility work plan and there was no utility coordination with the project design. (Peterson/2006)

In looking for solutions to large projects, most states look to private engineering firms to assist with the management of the program. General Engineering Consultants (GEC) firms work side by side with the state employees on the project from design and planning to final delivery. The practice of implementing the GEC expertise into a program has an ongoing record of success through the industry and is most recognizable by the private engineer’s management of funding and timely delivery. (Warne/2008)

In 2008, the Project Delivery Subcommittee of AASHTO’s Standing Committee on Quality conducted a survey of state DOTs to determine how they organized their project management functions. The results offer many relevant insights into the subject of this research. Their report revealed the following:

- 67% of the responding states have a separate functional unit concerned with project management as a function
- Where that function is located within the organizational structure of the DOT varies widely from state to state
- Responsibilities of project managers vary significantly from state to state
- More than half of the states responding do not have certification requirements for their project managers

- The states identified more training, better policies and procedures, clearer lines of authority and a separate classification system as ways to improve the overall effectiveness of the project management functions in their agency (AASHTO/2008)

Many examples exist where states are working to find solutions for the challenges they face in delivering their programs and projects. The problems seem to be well understood but the solutions more difficult to effect.

CHAPTER THREE

CROSS-CUTTING ISSUES

This project focuses on the totality of the project delivery process. Development encompasses the planning, preliminary assessments, environmental and other studies, and preliminary and final design. Delivery broadly covers the phase of the work beginning after design through the maintenance phase of a project. It includes how the work is financed and contracted. Management covers the whole spectrum of activities performed by a state DOT in both the development and delivery phases of the work. Thus, the scope of this project and the identification of cross-cutting issues cover the full spectrum of activities required to bring a project to fruition

One source of information for this report was the literature review contained in Chapter 2. From these published works came a variety of ideas and issues that set the stage for the further discussions on this topic.

The second source of information on the cross-cutting issues came from interviews with key state representatives in the AASHTO organization who are daily engaged in the delivery of projects. These individuals offered significant insights from their positions as Chief Executive Officers (CEOs). All are seasoned professionals with substantial experience in the project delivery process. Their insights will be inserted as appropriate throughout the report.

Finally, the facilitated session in Branson, Missouri during the AASHTO Spring Meeting in May of 2008 offered another opportunity to solicit additional cross-cutting issues and further amplify those already identified. Taken together, these three sources netted a valuable collection of issues and their impacts, and mitigating strategies in the project and program delivery processes.

The remainder of this chapter will briefly describe these issues. No empirical process was employed to prioritize the list—rather the order reflects a general consensus from those who participated in this research.

ENVIRONMENTAL IMPACTS

No other issue rises to the level of attention and resultant frustration in the state DOTs than the environmental process. It is clearly seen as the major impediment to efficient and effective project and program delivery. Since the National Environmental Policy Act (NEPA) was signed into law on January 1, 1970 it has evolved and expanded to include a variety of requirements. Environmental law necessitates the inclusion and approval of resource agencies and others before projects can proceed out of the planning/environmental processes into final design and construction.

In some states, the federal requirements are further amplified by provisions of state statute that add other related steps to the environmental process. In California, this takes the form of the California Environmental Quality Act (CEQA). Oregon also has duplicative environmental requirements adding further effort to clear this important hurdle in the project delivery process.

It is important to note that those who participated in this study did not say that NEPA, or its state equivalents, were bad or should be eliminated. Rather, participants expressed concern and frustration that the environmental process is unpredictable and inconsistent as it impedes the delivery of projects. Some notable observations from these individuals are listed below:

- States can set themselves up for failure by not anticipating environmental issues during the initial scoping, planning and project development phases of the work. This is further exacerbated by the “silo” organizational structure of most state DOTs and less than effective communication and coordination between individual agency units.
- Disconnect exists at the federal level creating issues of: which agencies are going to be involved, who will address the issues and even which office will do the work. Federal agencies commonly have disagreeing requirements. While, in theory, methods can be employed to resolve these jurisdictional or procedural differences, the practice is ineffective.
- Staffing is a major problem with resource agencies. Resource agencies are understaffed and have little or no prospect for changing this variable in the future. Sometimes sufficient staff is in place but they are uncooperative or even have a specific agenda that is not conducive to advancing a transportation project. In other cases, resource agency staff provides valuable and timely assistance on permits and other matters make their way through their process. People make a difference, as do relationships, when it comes to DOTs working with resource agencies on federal environmental requirements.
- State and federal efforts to hold resource agencies accountable for their role in the NEPA process have met with mixed results.

FUNDING

Funding trumps everything. The lack of funding or even the uncertainty of future funding was cited time and time again as an impediment to project and program delivery. Director Matthew Garrett of the Oregon DOT summed it up when he said that funding “blocks out the sun” when it comes to all other issues in project delivery. He went on

to say that without new and substantial funding, the state DOTs will become maintenance organizations without capital programs. The Director of the California Department of Transportation, Will Kempton, expressed concern about the “boom or bust” cycle that transportation funding seems to go through periodically and how that impacts his agency’s ability to plan and deliver projects across the state. With the prospect of a deficit in FY ’09 in the Federal Highway Trust Fund (HTF), coupled with declining state revenues from motor fuel tax receipts and other economic factors, the level of real or perceived instability in funding is impacting the state DOTs in a tangible way.

The states are attempting to deal with this situation in a variety of ways including greater emphasis on toll roads, public-private-partnerships (PPP), and state generated revenues. Florida has relied on tolls for virtually every new major capacity improvement for many years. Texas embarked on an aggressive program seeking Developers to finance and build key corridors. Pennsylvania is in the process of soliciting interested Developers to enter into a long-term lease of their turnpike in an effort to capitalize their assets and invest in an aging system. All told, the status quo of ample and certain federal funding doesn’t exist. The states are concerned and are aggressively seeking alternative funding sources to shore up their capital and operations programs.

Inflation is eroding programmed dollars at an accelerated pace, adding to the funding issue. Reports of cost increases year over year range from 5% up to 20% and the final cost of a project is a moving target. Estimating requires planners and managers to predict the future, not knowing what global economic trends such as oil prices will be doing in six months, let alone three or four years in the future. Predicting costs is always a challenging proposition but projects rising to the mega-project status create an even more difficult situation for state DOTs.

Many projects cost more today and require states to set aside large portions of their programs to accommodate them. These mega-projects necessitate many years of study, preparation and development before they can be constructed. Funding is often uncertain in the beginning, even when political commitments point to a sure source of money at a future date. States are concerned that current federal requirements for preparing a fiscally constrained STIP limit their ability to advance large projects, for which funding details are yet to be worked out in the political process. A state’s inability to advance large projects due to this constraint limits their ability to do preliminary work or construct essential related projects. The questions arise: Should fiscal constraint drive the planning process or should the planning process drive the funding picture? Should a state’s needs be artificially constrained by known fiscal limitations or should needs be accurately depicted so that visionary and thoughtful financial plans can be laid?

The issue of fiscal constraint in the planning process and tying definitive numbers to a project early in its life is a major concern among the states. Estimates prepared in the planning phase of a project are general in nature. Values applied to work items are based on historical data and much detail is left out because it is not available. In contrast, significant emphasis is placed on the financial elements of a DOT's Statewide Transportation Improvement Program and the need to utilize substantial rigor in putting those numbers together. In the end, states are concerned that "audit level" analysis is employed on the financial elements and revenue estimates included in the STIP when the projects themselves are a compilation of relatively gross estimates of future costs.

Other funding and budget issues identified through this research included:

- Lack of flexibility in the funding categories for federal monies coming to the states.
- Insufficient earmarks for projects drain money from other critical needs that are already programmed.
- Often, a disconnect exists between prioritization of projects and allocation of funds and responsible asset management in the states.

Funding and its impacts are clearly a major cross-cutting issue when it comes to project and program delivery.

UTILITIES

Another impediment to effective project delivery identified by the state DOTs was the impact of known and unknown utilities on project costs and schedules. This issue can be one that strikes almost without notice—stopping construction all together or delaying critical work items on a project. The ways that utilities impact the project delivery process are summarized as follows:

- A major part of the project is the sheer number of utilities located in the state rights of way. Many are old and their movement or protection represents significant issues.
- It is impossible to move them all so designs must take into account some relocations and other utilities that will stay in place.
- Utility companies do not budget for relocations like those usually required for state DOT projects. Consequently they are hesitant to move ahead or do any more work than absolutely necessary.
- The uncertainty of state construction schedules is a major problem for the utility companies. State DOTs often don't know how their projects will impact a given utility facility until the design is very close to completion. These uncertainties in schedule and design impacts only make the utility companies more hesitant to get too far ahead in their own engineering and relocation efforts.

- Most concede that communication and coordination could be better between state DOTs and the utility companies.

One area of note where utility companies have shown a high level of cooperation is when a DOT has an emergency project to construct. In this situation a clear agenda exists with ample public expectation to restore whatever facility has been damaged or destroyed. The states noted that utility companies are more than cooperative under these circumstances and attribute some of that to the fact that they know what needs to be done and most of the schedule and design uncertainty at the state DOT noted above is gone. Similarly, where states have agreed to fund relocations due to schedule or other issues, the utility companies have been much more willing to move ahead with their work.

ORGANIZATIONAL ISSUES

The states noted that one cross-cutting issue that seems to pervade the process is the fact that many agencies haven't changed their structure in many years. While the names and designations might vary from state to state, the basic elements are typically the same. All state DOTs have a planning unit, a design section, a construction office, a utilities function, and so forth. The "silo" nature of state DOTs was cited time and time again as a major issue preventing or impeding effective project delivery. This is not an isolated issue and the strong consensus is that it must be addressed.

The "silo" nature of state DOTs impacts many facets of the project delivery process. Some cited examples include: a failure to communicate key commitments made during the environmental process to designers or field construction staff, maintenance concerns not incorporated into new designs that could save substantial money and time, and project cost or finance issues that aren't managed through the development and delivery life of a project, resulting in overruns and budgetary concerns.

The phrase "cradle to grave" describes the ability to manage a project from its inception as an idea to a completed and usable project. Most agree with the concept but contend that it is not happening effectively in all state DOTs. States conveyed a strong message that they must find a way to eliminate the "silo" effect of their organizations, create better communications between functions, and ensure comprehensive project management. As the states lament their organization's "silo" nature, they also point out that AASHTO organized itself around the same series of functional areas as exist in the state DOTs. In fact, the AASHTO committee and subcommittee structure is largely a mirror of how the states are organized. In an effort to achieve some form of cross-functional

interaction between its key committees and subcommittees, AASHTO formed two councils under the auspices of the Standing Committee on Highways. They are: the Council on Project Delivery and the Council on Operations. Each council is comprised of members from the respective subcommittees and task forces making up the Standing Committee on Highways. These councils meet on a regular basis to discuss issues that are relevant to their charges.

PUBLIC INVOLVEMENT

Public involvement has emerged as a major activity for most state DOTs as they strive to more effectively deliver their programs and projects. Some of this has been driven by the need for DOTs to better connect with stakeholders in order to advance their projects. The implementation of Context Sensitive Solutions (CSS) is also attributed with increasing the amount and nature of state DOTs activities in the public involvement arena. While effective public involvement isn't the panacea for all the ill will that might reside in a community about a project, it is nevertheless an effective tool in advancing projects to construction. Some notable issues surrounding public involvement as it relates to project delivery include:

- Even good technical solutions are impeded if an agency fails in the public involvement process.
- Sometimes failure in the public involvement arena is a process problem; other times it is an execution problem.
- If an agency has done a poor job of public involvement, it is hard to come back and do it right.
- Effective public involvement is requiring more and more resources from a state DOT. This becomes a strain on staff and budgets.
- The public involvement process can lead to expectations of compromise in standards and safety requirements on a project.
- An effective public involvement program does not guarantee consensus in a community. When consensus can't be achieved - then what?
- Delaware has found that keeping the public engaged over the long period of the NEPA process is sometimes a problem and that more effort must be expended to keep everyone involved--not just the activists who are passionate about a particular aspect of the project.

The importance of public involvement is undeniable in successful project or program delivery and yet, poorly done, can result in enough public sentiment against a project to delay the schedule or block its completion altogether.

DESIGN CRITERIA

Design criteria was noted by those participating in this research as an area that impacts project delivery and where improvements would enhance the overall process. In many cases, a sense of compromise results—both willingly accepted and somewhat forced upon the design community. Some assert that the Context Sensitive Solutions (CSS) initiative requires engineers to design their facilities to lesser standards of safety and performance. On the contrary, advocates of CSS state that its application only takes advantage of the flexibility already in place in the AASHTO Green Book and that the resulting designs are still safe and operational. Another force resulting in a feeling of compromise among designers could be related to CSS but seems to have a broader implication. This is the general expectation of the public for changes in standards or the use of exceptions whether these desires are the product of a CSS process or not. Some of this pressure is driven by political involvement in the details of projects. In all, the engineering side of the state DOT organizations is uncomfortable with these growing demands no matter what their origin.

Another dynamic in the design community relates to tension among project stakeholders. On the one hand a part of the group may want to increase or maximize the facility for congestion relief or other purposes. Yet, another group may find that a smaller “footprint” is more desirable. The designer is caught in the middle—forced to craft a solution that ultimately meets neither group’s expectations.

The engineering community is sometimes painted as inflexible in their approach to design criteria. Much of this is a result of years of experience and in dealing with litigation and tort issues that emanate from their work. These engineers have found that following established standards, such as those described in the AASHTO Green Book, give them the best protection available from possible litigation resulting from an accident on one of their facilities.

OTHER ISSUES

Other areas of concern were raised by those who were interviewed for this project. Each, in its own way, impacts project delivery and is worth noting here. They aren’t treated in great detail but to leave them out at this juncture would be a disservice to those charged with bringing projects to completion. These other areas include:

Right of way-this is a multi-faceted issue and is appropriately included in this report. Right of way impacts present themselves in delays due to the condemnation and eminent domain processes, and cost impacts due to exceptionally high prices for land in critical corridors. Right of way also affects ability to plan ahead in the acquisition process to

avoid procuring parcels that are about to develop and the disconnect between design efforts and the right of way process which sometimes delay the construction phase of a project.

Railroads-The railroads were identified as another element of the project delivery process that can have a negative impact on cost, time and money. Railroad conflicts are common and must be dealt with. These railroad issues can relate to existing crossings that must be upgraded, new crossings that require new bridges or other project improvements, or may even be limited to highway facilities that are so proximate to a railroad line that flaggers or other precautions are necessary to comply with their requirements. Railroad requirements can even limit the timeframes for work to be completed, such as restrictions on work that may “foul” their tracks (impede the passage of trains). This can be as extensive as the fourth quarter shutdown which severely limits work in the last three months of the year due to high train volumes, or daily issues where work must clear the track to avoid a passing train.

The railroads present other challenges to state DOTs because they are large and bureaucratic in nature and are focused on their business of moving freight. State DOTs across the country have lamented the fact that the railroads are not always responsive in their reviews and decisions as they advance projects in their programs.

Materials-In many ways, the business of building roads has remained unchanged for many years. This is not to discount the significant advances that have been made through the Strategic Highway Research Program (SHRP) and other initiatives, but the basic products being delivered don’t evolve or improve rapidly. Some feel this is a good thing since rapid change, without adequate research and study about performance can lead to unfortunate results. On the other hand, innovations present opportunities for incorporating new or improved materials or processes into transportation facilities that might expedite project delivery.

Staffing-One issue that came up in this study is the concern that state DOTs have with their staffing. In some states the skilled engineers who were the backbone of their project development process are gone and they have no choice but to outsource the work to the private sector. Issues with recruiting and retaining a qualified workforce have been researched in previous National Cooperative Highway Research Programs studies. The answers are complex. Staffing will continue to be an issue for many years to come as state DOTs compete with the private sector engineering firms for qualified talent to fill their ranks.

For every element listed in this chapter the reader can probably name two or three more. The list might include additional areas such as the pros and cons of outsourcing, changing roles and responsibilities in the areas of

Quality Control and Quality Assurance, and dealing with political influences that seem to be growing year after year or others. Those listed here represent a compilation of those offered by participants in this study in an unprompted fashion. In the minds of many experienced transportation professionals, they characterize the most significant influences among many.

CHAPTER FOUR

ADDRESSING PROJECT DELIVERY ISSUES

As states deal with the challenges of project delivery they have taken measures to address the issues that so often plague the process. These impediments to efficient and effective project delivery have been described in detail in Chapter 3 of this report. Some of the challenges are beyond the state DOT's ability to control. Others represent opportunities for mitigation, if creative or proactive steps are taken to do so. This chapter will focus on strategies which have proven useful in moving projects ahead in their development cycles.

The strategies that will be described in this chapter reflect the state DOT's efforts to deal with growing public pressure to deliver on their transportation programs in a more efficient manner. The reader will find many to be creative, some that are unique to the circumstances of a given state and a few with even more potential for project delivery improvement than currently being realized. In all, they should be viewed as doors of opportunity leading to issue resolution and not an ultimate solution to the problem. Most of the participants will readily admit that greater progress can and should be made in each of these areas to achieve their full value.

ENVIRONMENTAL IMPACTS

Perhaps no area has received more thought and consideration by the state DOTs than how they might mitigate the impacts of the environmental process on their project delivery activities. States recognize that substantive changes to limit or eliminate NEPA or state specific requirements are unlikely. Rhetoric and modest attempts to do so have done nothing to relieve them of the individual requirements of the process. That being the case, they have taken measures to control how the NEPA process and its many participants impact the project delivery process. Matthew Garrett, Director of the Oregon Department of Transportation and Chairman of AASHTO's Standing Committee on the Environment is quick to point out that the environmental requirements are not going away and not to expect anyone to 'lower the bar.' With that in mind, the following is a sampling of state DOT efforts identified in this research:

- Having designers and project managers be more aware of the specific environmental requirements for a given project greatly assists in moving the process forward and not missing some critical element or step along the way. While this may seem to be a logical point, enough projects are delayed due to a miscue in the process than most people realize.

- States are doing more and more design as part of the Environmental Impact Study (EIS) process. Thirty years ago the designs were largely conceptual and intended to give a general idea of what the project would entail. Today, stakeholders are demanding more information and detail. States are evolving to a position where a substantial amount of design has been completed prior to a Record of Decision (ROD) just to satisfy the many constituencies in the environmental process.
- Delaware has found the need to educate the public about different elements of the environmental process such as historic facilities and wetlands, and why the state must consider these elements in their decision-making process.
- A major concern is the responsiveness of the resource agencies in processing permits and plans. To counter this, some state DOTs have hired personnel to work in the offices of the respective resource agencies to expedite their needs. It is done as a defensive move and is seen as essential to getting good service. Some states like Texas are unable to place personnel into the resource agencies directly but would do it if they could to get more reliable service. Sometimes states provide funding in lieu of actual personnel. The Oregon DOT has endeavored to embed their own personnel into the resource agencies to help move things along. To date, they have 17 individuals in those agencies. These individuals have been embraced by the resource agencies because of their credentials and commitment to the process.
- Oregon is focused on showing the resource agencies that they are responsible in the way they handle the NEPA and state environmental processes—that they will do what they say they will do. They have worked to base their activities on outcomes instead of processes.
- Oregon recognizes the impact that the global warming initiative will have on transportation and already foresees the need to be proactive in dealing with this issue both at the national and state level. They are determined to be a leader in the discussion of CO₂ impacts and not just a responder to new regulations on the matter.
- Some states have engaged in productive meetings with the resource agencies at multiple levels and have found some success. Maryland has quarterly inter-agency management meetings, monthly staff-level meetings and project specific meetings with resource agencies. The Utah DOT meets regularly with leaders of the Environmental Protection Agency (EPA) in Denver and participates in a state Environmental Council that is made up of US Fish and Wildlife, the US Army Corps of Engineers and other agencies.

- The states seem to be recognizing the importance of addressing environmental issues early in the project development process and making sure that the knowledge of issues and the application of mitigating strategies cuts across all disciplines in their organizations.
- Some participants noted that 4F considerations can be seen from two vantage points—as a concern after a project is defined or prior to project definition where that knowledge is used to avoid or minimize the impacts all together.
- Several states have been successful in gaining agreements from the resource agencies on specific performance measures. The Michigan DOT has done so and reports good results. The Texas DOT actually funds performance by the resource agencies since it can't pay for personnel to staff the agencies. Not all states have been successful in securing these kinds of commitments from the resource agencies.
- In Missouri, the state does some of the work typically performed by the resource agencies. Their success is founded in providing very qualified personnel who the resource agencies have confidence in and whose expertise is unquestioned.
- The state of Arkansas is actually divided among three districts of the US Army Corps of Engineers. In an effort to avoid dealing with all three districts on environmental matters, the Corps and the Arkansas DOT have agreed that one district will handle all DOT issues regardless of their location in the state. This has helped to streamline the environmental process and avoid conflicts or misunderstandings that could have occurred with three different entities addressing issues and permits.
- Time and time again, comments from participants in this study focused on the need to develop trust between DOT staff and those employed by the resource agencies. Obviously, this trust is a “two-way street” and the resource agencies have to work towards this end as well.
- California has decided to assign a biologist to every major project as a mitigating strategy against possible project impacts.
- A common theme from the states is that many engage in a type of escalation process where they elevate issues for quicker resolution. In California, a cabinet level process is used to bring disputing state agencies together, similar to the White House Environmental Council. Elevating issues within the resource agencies was cited by a number of states as the means for breaking down roadblocks that impede their progress through the environmental process.

The consensus of the study participants is that the NEPA requirements are not going to change so their best efforts must be focused on working with the system they have. More partnerships, better relationships, and greater collaboration are all seen as strategies with promise. That said, for every state where such a relationship exists another is noted where there appears to be little prospect for its possible existence due to the peculiarities of the agencies and personnel involved.

FUNDING

Many of the finance questions facing the state DOTs today will not be answered for some time to come. While unfortunate and awkward to deal with, it is the reality of the state DOT world right now. Recent declines in vehicle-miles-traveled (VMT) which have impacted federal and state motor fuel tax revenues have coupled with the long-known issue of the deficit in the Highway Trust Fund to make planning and programming projects at the state level a very uncertain process. In spite of this, states are taking measures to shore up their financial positions. Some strategies adopted by the states are described below:

- Scope creep is an on-going issue in most states. Projects are placed in a Statewide Transportation Improvement Program (STIP) when little detail is known about the specifics of the work. This can ultimately cause prices to go up or scope to be reduced once detailed design is started. To counter this concern, some states including Missouri and Utah, use the first year or two of the STIP to “develop” some detail about a project so that by the time it progresses into the more formal years of the STIP process greater certainty about the project’s cost and scope is achieved.
- States are being more cautious than ever about the nature of their future funding. With the state and federal uncertainties already described, many respondents in this study expressed very conservative strategies for projecting funding that might be available in the next few years of their programs.
- State DOTs are reacting to project inflation concerns by focusing more attention on their cost estimating activities. In some cases, they are putting more internal resources on cost estimating activities and in other cases state DOTs are actually hiring retired contractors with project estimating experience to assist them in preparation of their cost information. These contractors also bring many other valuable insights and have helped the state DOTs deal with constructability issues. Utah has been progressive in doing this in recent years with significant successes reported in the form of cost savings to their projects.

- States are being more disciplined in their approach to project delivery and managing the cost and scope of projects. Over the last decade most have “cleaned up” their STIPs, so that they truly reflect which projects will be built. As painful as this process has been, these states now enjoy greater credibility among elected officials and their stakeholders.
- State DOT leadership is holding their regional and district leaders accountable for project delivery in terms of scope, schedule and budget. Will Kempton, California DOT Director, has entered into contracts with his 12 district engineers regarding very specific project delivery commitments. Others have done so as well, perhaps a less formal manner. The results are impressive, with many states delivering most or all their projects in a given year - in contrast to their performance of a decade ago.

While there may be no single solution for dealing with the issues of finance and funding in the states a clear trend is emerging towards greater discipline and rigor in the way these matters are viewed and addressed. Whether overt or more subtle, there appears to be a thread of risk management in each action taken by the states in response to the uncertainties of their financial futures.

UTILITIES

Utility conflicts are not going away. Participants in this study recognize this and offered some strategies for dealing with utilities that become a part of the process of the work on a transportation facility. Some or all of the following should be useful to state DOTs across the country.

- State DOTs need to appreciate the situation of utility companies. Final design for state projects are often uncertain and construction schedules unreliable. The utility companies most often respond to these uncertainties by delaying action until they know what will be done and when. They see this approach as pragmatic. The state DOTs see it as unresponsiveness. States are taking measures to create closer working relationships with utility companies by adding transparency to the scope and schedule of their projects. One study participant said, “Knowing what we know about our [state] process, I wouldn’t move my facilities before I see final plans.”
- Early identification of possible utility conflicts was cited as a means for improving the collaboration between state DOTs and the utility companies. In Missouri, this includes location work that might have normally been relegated to the utility company. This has improved their ability to plan and incorporate utility issues into their designs.

- States noted that many of the utility issues found on their projects are not a problem when emergency work is required.
- In Utah, the state determines which utility conflicts will be paid for by the DOT and which won't. This decision is based on the best interest of the state and not necessarily on any "prior rights" provisions in the law. If a project cannot tolerate a utility delay, UDOT agrees to pay for the work and avoids a more costly impact from a relocation problem.
- North Dakota and others have entered into agreements with the utility companies for their contractors to accomplish any needed relocations. This work is typically done by pre-approved contractors who have worked in the past with the utility company.
- In California the DOT has established a utility coordination function in their districts to work on locating utilities in the right of way and to deal with the individual utility companies.
- As with so many things, relationships matter. DOTs are working on their relationships with the various utility companies in their states. This effort is becoming more and more challenging as ownership of utilities changes from local to regional, regional to national.

ORGANIZATIONAL ISSUES

A frequently cited issue was that state DOTs are not optimally organized to address the cross-cutting issues associated with improving the project delivery. References to "silos" and the disconnect between project delivery functions or disciplines were common. The following strategies were noted as options for addressing this concern:

- Michigan works to overcome this problem by having multi-discipline teams do the initial scoping of projects. They tour planned projects together prior to development of the project concept and during the development phases.
- Over the last decade some state DOTs have migrated their project development process from the "silo oriented" approach to a Project Management effort. This approach allows for greater accountability, more effective management of cross-cutting issues and ultimately better control of scope, schedule and budget. John Njord, UDOT's Executive Director, noted the success that his agency has found in using Project Management to deliver their projects.
- Delaware has recognized the need to adopt a "cradle to grave" approach for their project development process. Commissioner Carol Ann Wicks collapsed their Environmental, Design and Construction units

into one division. Now they are able to integrate the needs of all three units into the planning, design and construction phases of their projects. Their State Construction Engineer signs off on the PS&E documents prior to bid. The district engineer or assistant also signs off on the plans before they are finalized.

PUBLIC INVOLVEMENT

This study was not intended to be a comprehensive look at public involvement and how it has changed over the years in state DOTs. Rather, public involvement becomes part of the report because of the integral nature of its contribution to successful project delivery. Below is a summary of the ideas that came from the interviews and discussions conducted for this study:

- States have found a direct correlation between time spent with stakeholders and the ability to gain consensus.
- States adopting CSS activities in their project development process have found that those efforts contribute to their normal public involvement activities. They have concluded that as they invest in CSS elements they are doing more than spending money on aesthetic treatments—they are investing in their relationship with the community.
- Delaware has noted the challenge of “keeping” the community with them all the way through the project development process. For many stakeholders, the process seems long and arduous and their interest wanes over time. The DOT works hard at explaining the process, how the steps work together and the need to follow each one to its conclusion.

MISCELLANEOUS STRATEGIES

A number of other strategies were mentioned during the course of this research effort. They are offered here as additional approaches to assist DOTs in their commitment to deliver infrastructure.

- The Oregon DOT is seeking ways to achieve concurrency in their project development process. This effort not only applies to their environmental activities but also to other steps in their project development process. Elimination of redundant activities assists them in shortening the timeframes required to move through these steps.
- An underlying effort to be more interested in how risk plays into the project development process seems to come from many of the discussions held in this study. Risk is a consideration and states are concerned with

how it impacts the schedule and budget attributes of a project. They recognize that they pay for risk each step of the way depending on the decisions that they make.

- Delaware is getting more and more pushback from the public about their use of consultants. Even though the state doesn't have sufficient personnel, the public is still concerned about their level of outsourcing. The state DOT must explain how and why they are using consultants and why they might not be from Delaware.
- Several states noted that they don't have employees with specific skill sets to deliver their projects. This causes them to make decisions regarding outsourcing which allow them to deliver projects they would not be able to build otherwise.
- Maryland described their project development process as collaborative decision-making. It is an indication of the cultural and procedural changes that have occurred in that agency as they have sought to be more successful with their projects.

All told, the state DOTs have taken many important and substantive steps to move their projects forward in the most efficient manner possible. They recognize that many of the challenges they face are not of their making, are unlikely to change in the near-term and will probably grow more complex with time. Rather than accept these barriers and shrink back from these cross-cutting issues, the states have a determined attitude to find ways to deal with them and are not deterred from what they see as their primary mission as an agency—to deliver transportation projects in a timely and efficient manner to the public.

CHAPTER FIVE

CONTEXT SENSITIVE SOLUTIONS

One of the tasks requirements of this research effort was to explore the issues surrounding Context Sensitive Solutions (CSS) and how best to incorporate this management approach into the AASHTO organizational structure. In light of this charge CSS was discussed with project participants and their thoughts were synthesized for this report.

The CSS concept had its origins in the late 1990's as key individuals representing federal, state, and local government, stakeholders and others, determined that a better approach to planning, designing and constructing projects was essential to advancing infrastructure in the states. From the original "Thinking Beyond the Pavement" conference held in Maryland in 1998 came the movement that is known today as Context Sensitive Solutions or CSS. While other names and acronyms are used among the state DOTs, the basic concept of this discussion is embodied in CSS. Fundamental to CSS is the recognition that elements adjacent to the transportation facility, such as historical, cultural, environmental or other community resources need to be taken into consideration in the planning, scoping, design and construction processes. It is recognized that effective project delivery encompasses a balance between these other resources and the safety, mobility and uniformity concerns of the highway community.

In the last ten years states adopted versions of CSS to suit their needs. No one model has been implemented or applied universally among the DOTs. In addition, those familiar with the subject of CSS will admit that results have varied from state to state. In fact, evidence exists that even within a given state varied models of CSS are applied. Obvious, positive gains have been achieved on many projects through the application of the principles of CSS. In response to the drive to implement CSS in the states, AASHTO established the CSS Task Force to connect the states and share information from their various experiences with one another.

There have been numerous occasions where the principles of CSS have been affirmed by the AASHTO states including the AASHTO/FHWA Peer Exchange held in September 2006 and the AASHTO/FHWA strategic planning process that culminated in the plan that was published in March of 2007. In addition, the discussion among the AASHTO states has varied relating to how best to continue to advance CSS within the states while still honoring the widely held individuality they guard so carefully.

As this study progressed many ideas were expressed about CSS, how it should be addressed in the future in AASHTO, and how it might be further applied within the state DOTs. A compilation of thoughts and themes expressed by those who participated in this research is summarized below:

- The public expects a state DOT to use CSS principles whether they are called CSS or not.
- Oregon sees CSS with an additional “S”; the third “S” stands for sustainable.
- CSS is best implemented as an activity within all of the functional areas of a state DOT. Creating a separate activity or office for CSS where other groups in the DOT don’t have ownership to the concept has not been as successful.
- The states adopted CSS as a project delivery tool because it is necessary and not because of any overt encouragement at the federal level.
- CSS is still vulnerable in the state DOTs. “Take away” the emphasis on CSS principles and it could go away.
- CSS is part of the everyday process in state agencies. It doesn’t need to be a separate entity or initiative.
- CSS has now been incorporated into some DOTs much as process improvement efforts have become part of the fabric of agency practices.
- Designers feel like they already apply the principles of CSS and they are being unduly criticized for not embracing something that they believe they are already doing.
- CSS is attributed with resolving many of the stakeholder problems some states had ten years ago. If a DOT does away with CSS, those problems will come back.
- Some have found CSS to be an investment in relationships that ultimately pays off as projects progress faster through the development process.
- For some states, CSS started out as an aesthetics process. They quickly found it to have many other dimensions. States note that CSS is more than better looking soundwalls.
- CSS makes a project manager examine the full range of alternatives before deciding how to build a project.
- CSS has created a different culture in state DOTs as they learn to work more closely with stakeholders, listen differently to inputs and adopt new approaches to solving transportation problems.
- CSS is more than a more robust public information program.

- Debra Miller, Secretary of the Kansas DOT said, “CSS is understanding that the state may own the facility but that the stakeholders have valid inputs that must be recognized.”
- The Missouri DOT adopted a concept known as “practical design.”
- Where CSS has been promoted by state DOTs, it has largely been embraced by the public. The bottom line: The stakeholders love it.
- CSS forces a state DOT to engage stakeholders early in the project delivery process. Everyone seems to think this is a good thing with or without CSS as the motivator.
- It takes a long time for CSS to become self-sustaining. Most didn’t think their agency had achieved that level of integration yet.

CSS has enjoyed success in many states. They genuinely recognize the value it brings to the project development process. That said, states that have not adopted CSS and feel their project delivery process is effective without it. As with many other facets of the transportation business, approaches and results vary from state to state.

Two key points emerged from the research conducted for this project. First, that the principles of CSS are valid and useful in the project delivery process and there is wide recognition of the value they bring to these efforts. Second, one thing is clear from the interviews—no desire exists to establish a Context Sensitive Solutions unit within the AASHTO committee structure. Rather, the consensus is that the respective committees should be free to adopt or embrace the principles of CSS as appropriate for their specific role in the project delivery process.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

This research focused on the totality of the project delivery process. Project delivery encompasses the study, planning, environmental, design, construction and maintenance phases of a project. It is a lengthy process with many professionals, organizations and stakeholders taking a role at one point or another. Given the nature of the work performed by state DOTs it is safe to say that no two projects are absolutely identical. Each project has its own unique characteristics that require the DOT to approach it with care and deliberateness.

The public expectation for service from their state DOT is high. They wonder why projects take so long to deliver. However, the process for getting a project from an idea to a drivable facility has never been more complex or lengthy. It is fraught with many project delivery issues or impediments to efficiency. This report not only assesses the barriers to project delivery but identifies current state DOT practices that are viable strategies for dealing with them. In addition, the study queried participants about how best to address CSS going forward in the project delivery arena.

CONCLUSIONS

Not surprisingly, the states listed the environmental process as the number one impediment to successful delivery of their projects. They respect the need for the NEPA requirements but lament the fact they have become more about process and less about outcomes. The states concede that the process isn't going to change substantially in the foreseeable future and so have engaged in efforts to improve upon it. Placing their staff in resource agencies or paying these agencies to expedite the DOT's work are the most common efforts. In addition, situations exist where the state DOTs have paid for a certain service level from the resource agencies in their states.

Quick on the heels of the environmental process is the uncertainty of funding. No one can predict the outcomes at the state and federal level over the next several years. Consequently, the states are taking a cautious approach to their view of the future. Strategies employed by the states to address their concerns with future funding include more rigor in their financial planning, greater efforts in their cost estimating activities, and more careful scoping of projects.

Other areas where the states express concern about impediments to the project delivery process include utility conflicts, organizational issues, public involvement, design criteria, right of way and railroads. In each case the states have strategies for mitigating the impacts of these challenges.

Context Sensitive Solutions is seen by many state DOTs as an important element of the project delivery process. Each state using CSS seems to have adopted their own version, which works for their unique circumstances and project delivery needs. State DOTs recognize the value that early adopting states and the AASHTO CSS Task Force brought to the establishment of these principles in the project delivery process. Time and time again the principles of CSS and its related elements have been affirmed by the states and their leadership. However, no clarion call emerged to do anything further with CSS in the AASHTO committee structure.

As the study respondents considered how best to address the challenges to project delivery many noted how the traditional structure of the state DOT, with its many “silos” of activity, is not conducive to effectively delivering projects in the current environment. What they need is a structure that allows for open communication and collaboration that crosses functional areas. Some have attempted to overcome these structural issues through the use of a Project Management approach to project delivery. The study participants also noted that AASHTO’s committee and subcommittee structure follows the traditional functional area format with the same mixed results experienced in the states. AASHTO tried to overcome this situation with the establishment of the Council on Operations and the Council on Project Delivery, but the intended outcomes of collaboration have been less than effective according to the study participants. In addition, a number of initiatives relating to project delivery are on-going in the committees of AASHTO; these appear to need greater coordination to achieve the most value from their efforts.

RECOMMENDATIONS

Four recommendations emanate from this study. The first two are specific recommendations relating AASHTO’s committee structure. The last two focus on the project delivery process and how to more effectively manage and deliver important infrastructure to the public.

Recommendation 1, The Role of CSS in the AASHTO Committee Structure-AASHTO should not create a task force, subcommittee or full committee focused on Context Sensitive Solutions. Rather, the existing committees within AASHTO should be charged to consider the principles of CSS as they perform their other duties including the preparation of manuals, guidebooks, guide specifications and other work products. No further changes to AASHTO’s committee structure are recommended at this time.

Recommendation 2, AASHTO Should Examine and Improve Committee/Subcommittee Collaboration-

AASHTO should address the concerns expressed by those participating in this study that the “silo” nature of its committee structure inhibits collaboration and communication on cross-functional issues. AASHTO should undertake a review of the Council on Operations and the Council on Project Delivery and consider ways to make the intended purposes of these councils more of a reality.

Recommendation 3, Implement Other Proven Project Delivery Strategies-AASHTO and the member states

should work together to share the information contained in this report, including the strategies already being used by state DOTs to more effectively deliver projects. Even with no further research, substantial benefits will accrue to those who take the ideas in this report and implement them in their state. In addition, the nature of this study leads one to believe that other ideas exist that would have similar benefit as they are shared from one state to another.

Recommendation 4, Coordination of Project Delivery Activities in AASHTO-AASHTO should inventory all

project delivery activities and initiatives currently in their committees, subcommittees and task forces to reduce duplication of effort, leverage scarce resources and otherwise make the efforts of this important area the state DOT mission more effective.

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Appendix A Key Issues Summary

NCHRP 20-07/ Task 258 Identification of Cross-Cutting Issues related to the Development, Management, and Delivery of Transportation Projects and Programs Key Issues Summary

Task 3 of this project required the submission of a key issues summary to the project panel for review and approval prior to proceeding with the remaining tasks in the work plan. In order to put this task in context portions of the Work Plan are provided here.

RESEARCH PROBLEM STATEMENT

AASHTO's committee structure mirrors the organizational structure of the typical state transportation agency, which is aligned along traditional functional areas including planning, environment, design, construction, maintenance, and operations. However, "project delivery" includes the development, management, implementation, and maintenance of a project throughout its useful life, and many project delivery issues cut across the traditional functional areas of State DOT organizations. The evolution of transportation program and projects delivery, is forcing a review of these traditional organizational approaches and philosophies, including the emergence of the "concept to completion" management philosophy. There exists a need within AASHTO for a committee to address cross-cutting project delivery and development issues.

OBJECTIVE

The primary objective of this research is to identify and prioritize cross-cutting issues related to development, management, and delivery of projects and programs for an AASHTO committee to address, and develop an organizational plan for integrating this committee within the AASHTO structure.

TASKS

The following tasks will be completed in order to deliver a successful project:

1. Conduct literature review-A literature review will be conducted relating to the topic area including, but not limited to information from NCHRP 20-69, "Guidance for Transportation Project Management," and NCHRP 20-73, "Accelerating Transportation Program and Project Delivery: Conception to Completion." A variety of sources

from throughout the industry will be examined including other industry associations, trade organizations and general management publications.

9. **Conduct key leader interviews**-Personal interviews will be conducted with the following leaders from within the AASHTO organization:

- a. Chair, Standing Committee on Highways (SCOH)
- b. Chair, Subcommittee on Design
- c. Chair, CSS Task Force
- d. Chair, Standing Committee on Finance and Administration
- e. Chair, Standing Committee on the Environment (SCOE)
- f. Chair, Standing Committee on Planning (SCOP)

Interviews will be conducted via teleconference but if circumstances permit an in-person interview will be completed. No travel expenses will be incurred for in-person interviews. Questions and discussions will focus on cross-cutting project delivery issues.

10. **Summarize and submit key issues**-A summary of the major cross-cutting project delivery issues from Tasks 1 and 2 that DOTs need to address to successfully deliver projects in the future. The summary will be submitted to the panel for approval prior to Task 4.

With this context the following summary of key issues is provided.

Key Issues in Project Delivery

The literature review and interviews conducted for this project have revealed a number of important issues relating to the subject of project delivery. In spite of the geographic diversity of the key leaders interviewed (Maryland, Delaware, Oregon, California, Kansas, Texas and Pennsylvania), there is consistency in the issues raised and many of the concerns expressed. These were similar to those found in the literature review although the breadth of the literature review provided additional detail that was not possible in the interview timeframe. In most cases, the lists were consistent with one another. The issues raised in the interviews will be summarized first and then those remaining from the literature review will be offered.

Key Issues Raised By AASHTO Leaders

The key issues raised by the AASHTO leaders interviewed included several common themes as well some that were unique to the individuals involved. While no numerical ranking is given for the issues they will be

presented here in order of significance to the project delivery process based on the subjective priority given by those involved.

Environmental Delays-This is unquestionably the most mentioned and difficult issue that the state DOTs are facing in project delivery. The literature confirms this to be so as well. In addition to outright delays, the uncertainty of the process and its schedule make this the most unmanageable part of the project delivery process. States are dealing with this in a variety of ways including providing staff or funding to resource agencies to ensure timely attention to permits and other regulatory issues.

Funding Uncertainty-This issue was raised by a number of those interviewed and appears to be emerging as a growing concern in the states. The fact that the DOTs cannot rely on a stable federal program and build that into their planning efforts makes the delivery of large projects and programs of projects more and more difficult with each reauthorization cycle.

CSS and Project Delivery-The states largely believe that CSS is an important element of the project delivery process but that it is best executed when integrated into all of the functions of the agency. They do not feel that a separate functional element within their agencies is the best approach for its inclusion in the project delivery process.

Integrating Project Delivery Functions-The states are clearly focused on making delivery of their projects more effective. They see it as an imperative and are moving from the more traditional “silo” type of organizational structure to groups who work on projects from start to finish and integrate planning, environment, design, and construction into the same or very related entities.

Manpower Shortages-States are increasingly challenged to staff their project delivery functions. Issues include lack of expertise, inexperienced staff and insufficient personnel to complete the work.

Additional Key Issues From The Literature Review

While the literature review found much in the way of confirmation of the key issues noted by the interviewed AASHTO leaders several others emerged and are worth noting here.

Utility Delays-Utility delays and conflicts are becoming an increasingly difficult issue in the process of delivering projects at the state DOTs. Issues of cooperation, coordination, unknown utility conflicts, project budget impacts and other aspects of this matter make this a relevant project delivery issue.

Traffic Management on Complex Projects-As projects become more and more complex the need to effectively manage traffic during intense periods of construction is a significant matter. States need to integrate traffic management and control plans earlier in the planning and design process in order to reduce the impact of their work on the traveling public.

Effective Use of Private Sector Resources- There is a need to utilize private sector resources to their highest and best use. This includes more than just hiring firms to do the work. It involves their processes, staff qualifications, integration of state and private resources into the overall capital program and other issues.

Lack of Bidders-The issue of few bidders seems to ebb and flow depending on the project, the market and various other factors. Notable examples exist where no bids or only one bid was submitted on a given project. States are then forced to determine what to do as a next step in these circumstances.

While other issues exist that impact the project delivery process those listed here have emerged as most challenging to the state DOTs.

As a by-product of the interviews conducted, and an issue that can't be ignored in the prosecution of this work, is AASHTO's organizational structure. States are evolving to become more integrated in the way they deliver projects and are changing their processes and organizational elements accordingly. All this is in response to the need to be more effective in their project delivery activities. The question has been raised, "Is the current 'silo' system of committees at AASHTO really serving the needs of the state DOTs?" It is an additional issue and one that will be addressed in the outcomes of this research project.