Scanning the Home Front for Transportation's Best Practices

Program Facilitates State Agency Exchange of Information, Technology

CHRIS PORTER

The author is Senior Associate, Cambridge Systematics, Inc., Boston, Massachusetts.

In 2004, the National Cooperative Highway Research Program (NCHRP) proposed a domestic scanning program to facilitate information sharing and technology exchange among state departments of transportation (DOTs) and other transportation agencies and to identify actionable items of common interest. The model for the proposed program was the successful International Technology Scanning Program sponsored by the American Association of State Highway and Transportation Officials (AASHTO), the Federal Highway Administration (FHWA), and NCHRP.

The domestic program would sponsor site visits to different states by groups of transportation professionals who would meet with state transportation agency staff and other practitioners to learn about, document, and disseminate information on current practices of interest and importance. In July 2005, NCHRP completed a business plan for the program, establishing a template for the management and conduct of individual scans (*1*).

The following January, NCHRP awarded an initial contract to a consultant to conduct two pilot scans and to evaluate the benefits and lessons learned. The topics selected for the two pilot scans were

Don Toner (*left*), ROW Administrator for Texas DOT's Austin District, briefs the scan team on ROW and utilities relocation procedures.

Texas DOT's accelerated procedures to relocate utilities for the State Highway 130 project in Central Texas was a main topic of study for the pilot domestic scan team. The procedures allowed property acquisition, design, and construction to be undertaken simultaneously.

- Transportation asset management; and
- Right-of-way (ROW) acquisition and utilities relocation.

The pilot scans were conducted that summer, and reports were published in December 2006 (*2, 3*). An evaluation of the pilot scans was completed in June 2007 (*4*).

The pilots demonstrated that a domestic scan program could be valuable in assisting transportation professionals to improve the state of practice in the United States. NCHRP therefore has allocated additional funding of $1 million for the domestic scan program during Fiscal Years 2008 and 2009.

Program Objectives

Through continuing innovation, U.S. transportation agencies have produced substantial benefits to the nation—for example, through new materials for pavements and structures, new ways of collecting and analyzing information about transportation system users and the environment, and new ways of funding improvements in public safety and in the efficiency of travel. Personal contact with new ideas and their appli-

John Griffith, Administrative Engineer, Minnesota DOT, narrates a tour of the reconstruction of the I-494 corridor during the scan team visit.

cations is a key to the exchange of information. In the past, U.S. transportation professionals have visited colleagues in other countries and have returned with information that they have communicated to domestic colleagues, who have applied the new knowledge and techniques to improve domestic practice.

These experiences have shown that the scan approach is productive, encouraging the spread of information and innovation. Many participants in the international program have noted that new ideas are emerging in state and local transportation agencies around the United States and that faster dissemination could yield similar benefits.

Effective scan programs supplement and make use of a variety of mechanisms for information exchange—such as trade and professional journals, conferences, and peer-to-peer forums. The core of a scan program, however, is the face-to-face discussion of current experience, providing opportunities for a unique exchange of information that is difficult or impossible to replicate through written materials, telephone conversations, and e-mails. The informal discussions yield useful, practical information drawing on the participants' observations and experience.

Program Design

A scan program recruits knowledgeable people who complete four key tasks:

1. Identify novel practices in their field;
2. Assess the likelihood that these new ideas might yield benefits in other settings;
3. Select the new practices that offer the most promise, arrange field visits to observe the practices, identify any issues relating to development and application, and assess appropriate opportunities and methods for technology transfer; and
4. Document the results for use and application.

The domestic scan program covers a range of topics, including any innovative practices of high-performing transportation agencies that can be adopted to benefit other interested agencies. The program includes regular cycles of topic selection, scans, and documentation. AASHTO committees solicit ideas for scan topics, and an NCHRP project panel selects the topics.

Working with AASHTO and NCHRP staff, the project panel appoints two cochairs for each scan. Each scan tour includes 8 to 16 participants from state DOTs, FHWA, and sometimes other agencies. AASHTO committees and FHWA program staff solicit nominations and select the participants—usually senior and midlevel staff who have

- Sufficient experience in the topic area to ask probing and insightful questions;
- A track record of working to implement innovations within their own agency and of communicating with peers at other agencies through participation in professional activities;
- Enough time remaining in their careers to communicate the innovations and knowledge gained from the tour within their professional communities; and
- Contributions to make to the mix of the group, in terms of state or agency context (e.g., geographic location, urban or rural, small or large); professional

PHOTO: MINNESOTA DOT

The scan team viewed implementation of the Minnesota DOT's ROW and utilities relocation procedures for Phase 2 reconstruction on I-494, west of Minneapolis.

background; non-DOT or DOT perspectives; and racial, ethnic, or gender diversity.

A subject matter expert guides each scan, researching the potential agencies and sites to visit, leading discussions with the host agencies, and completing a report on the scan findings. A consultant hired by NCHRP assists the subject matter expert by managing the program, taking care of administrative and logistical details, and contributing to the documentation.

The scan tour is an intensive process. Each tour spans a one- to two-week period of visits to two to six geographically dispersed sites. The group typically spends one to three days at each site, visiting up to three sites in the course of a week. Meetings are held with host state DOT staff and sometimes with other local agencies. Field visits also may be scheduled. The tour participants hold daily debriefings, which are critical to capturing the lessons learned.

Documentation of the scan findings takes two principal forms:

- A report, including a formal summary and detailed description of the findings; and
- A PowerPoint presentation, for the participants to use at conferences, meetings, and internal briefings.

In addition, each participant prepares a personal implementation plan identifying specific initiatives to explore within his or her own agency, as well as upcoming opportunities for sharing the findings with larger audiences. These communication and implementation activities ensure that the scan program has a widespread impact on improving transportation practice.

Participants also complete evaluations of the scan and, six months after the tour, report on their implementation activities. This helps NCHRP gauge the impacts of the program and improve future scans.

Asset Management Scan

The pilot scan of transportation asset management set out to identify best-case applications of principles and practice. During two separate weeks, the scan team met with representatives of six state DOTs—Florida, Michigan, Minnesota, Ohio, Oregon, and Utah—as well as with staff at regional and local agencies and at asset management organizations in those states. The 11-person scan team included 5 state DOT officials, 4 FHWA officials, a university professor, and a consultant.

The agencies on the tours were at different stages in applying asset management to the transportation decision-making process. Michigan DOT and Ohio DOT, for example, displayed a comprehensive and sophisticated approach, integrated throughout their organizations. Other agencies, such as Oregon DOT and Utah DOT, have not yet reached a comparable level but have adopted innovative and successful approaches that will progress toward that goal in the next few years. The following observations derive from the experience of agencies at different stages of development in asset management.

The scan team at a briefing by Florida DOT staff: (*left to right*) Donald Jackson, FHWA Value Engineer and Utility Program Coordinator; and scan Cochairs John Campbell, Texas DOT, and Susan Lauffer, FHWA Office of Real Estate Services (now retired).

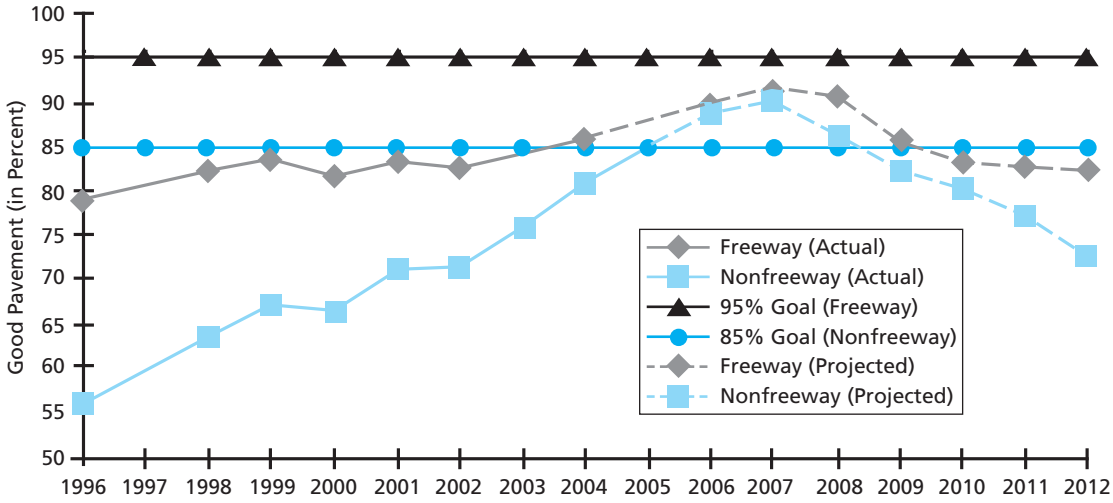
Investment Priorities

- **The agencies adopted a preservation-first strategy in determining priorities for investment**. In many cases, however, this strategy has raised concerns about reducing congestion and about creating new road capacity to handle population and employment growth.
- **In each case, the success of the asset management process was directly linked to the actions of an asset management champion or champions within the organization.** Until asset management became a standard operating procedure of the agency, the role of a champion was critical.
- **In several cases, the asset management process and the information that justified investment in the road system were instrumental in securing additional funds from the legislature.**
- **The most successful asset management has moved away from a worst-first investment strategy to adopt principles based on life-cycle costs that identify the most cost-effective preservation and maintenance strategies.** Although this concept can be difficult to explain to elected officials and to the general public, it provides a defensible and effective approach to infrastructure stewardship.

Performance Measures

- **The most successful asset management processes included performance measures that guided investment decisions throughout the organi-**

FIGURE 1 Pavement Condition in Michigan, 1996–2012



zation. Performance measures have become important in system monitoring; in one case, performance measures were used for annual personnel evaluations.

◆ **Scenario analyses that show the consequences in terms of performance measures were effective in convincing decision makers of the need to invest in the transportation system.** With the use of management systems, engineering analyses, and deterioration curves, agencies are able to show the expected conditions of pavements and bridges at different levels of investment.

Organizational Issues

◆ **No one organizational model defined asset management.** The scan found many different successful organizational models. Perhaps the most important organizational characteristic from the case studies was the team approach to defining and implementing asset management.

◆ **In almost all cases, the implementation of asset management fostered communication among different organizational units**. Many participants agreed that the cross-organizational coordination necessary for asset management has improved the effectiveness of the agency's planning and decision making.

◆ **Conducting an organizational self-assessment is a key starting point in implementing asset management**. Most of the DOT representatives identified AASHTO's *Asset Management Self-Assessment Guide* as a useful tool.

◆ **The application of risk analysis techniques to asset management was seldom observed.** Risk assessment allows transportation officials to determine the economic costs of infrastructure failure and to incorporate these costs into analyses. Other countries have adopted formal procedures for risk assessment. The approach will likely become part of U.S. asset management practice in the coming years.

Data Collection

◆ **In several cases, agencies viewed data as an asset and data collection as important for decision support.** The agencies that were visited valued high-quality data and cost-effective data collection, periodically verifying that the right data were being collected for the decisions that had to be made.

◆ **In several cases, the asset management process was customer-oriented.** Several agencies surveyed users of the road system to determine which aspects of infrastructure maintenance and condition were most important.

◆ **New technologies can make data collection for asset management more cost-effective and efficient**. Portable computer laptops combined with Global Positioning Systems, for example, can be used to collect condition data on the road network.

◆ **Agencies should document their performance measures and criteria, whether maintenance activities are performed in-house or through a private contract**. Some of the agencies used private contractors for long-term maintenance services—which they termed asset maintenance practice; others primarily relied on their own workforces.

The results of Michigan DOT's system preservation efforts since 1996 are shown in Figure 1. Although pavement conditions have improved significantly in the past 10 years, deterioration is expected unless investments can increase.

Right-of-Way and Utilities Scan

The second pilot scan sought to identify, document, and disseminate innovative state practices in acquiring ROWs and in relocating utilities to support the timely and cost-effective completion of projects.

ROW acquisition is the last step before construction and often is perceived as delaying a project's advertising and construction. Relocating and adjusting utilities also is critical to project development. In addition, rising real estate values, rapid property development in the planned project corridors, complications in relocating utilities, and concerns about private property rights have delayed transportation projects in many areas. Transportation agencies are realizing that ROW acquisition and utilities relocation can be expedited without compromising federal and state protections for property owners, tenants, and utilities.

The scan team consisted of 15 transportation professionals, including 9 state DOT officials from ROW and utilities offices, 4 FHWA officials, and 2 consultants who served as facilitators. The group visited three leading state agencies during one week:

- The Florida DOT District 5 Office in Central Florida;
- The Texas DOT Texas Turnpike Project Office in Austin; and
- Minnesota DOT in Minneapolis–St. Paul.

The scan team found that the states had improved their right-of-way acquisition and utilities relocation processes successfully, but no single "silver bullet" approach emerged that can be applied throughout the country. Instead, a range of tools and techniques may be adapted to different statutory, political, cultural, and geographic contexts.

Shared Traits

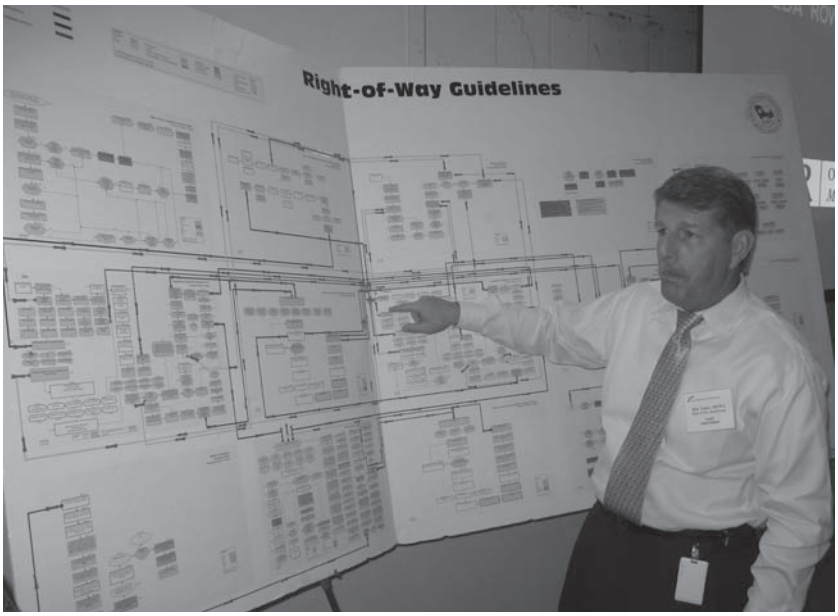
The team identified several traits that the three states shared:

- **A commitment to creating a supportive institutional environment.** ROW and utilities staff in all three states had the freedom to try new techniques and develop new processes, instead of having to adhere to established procedures and practices. In each case, upper management fostered a team approach.
- **A focus on process.** The experiences of Florida and Texas DOT demonstrated that explicit timelines and benchmarks, delegation of decision-making authority, colocation of major participants, and the use of conflict resolution techniques are effective in ensuring the timely performance of critical-path tasks, without delaying the process.

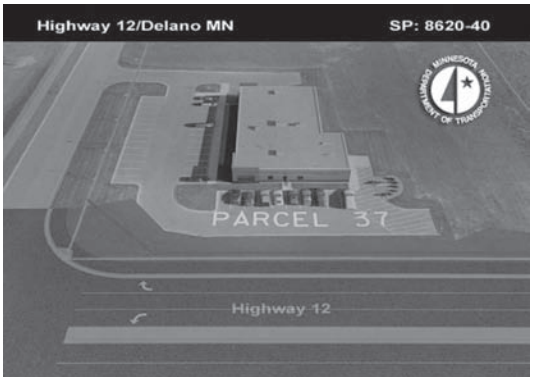
PHOTO: BILL LOHR, FHWA MINNESOTA DIVISION

The Right-of-Way and Utilities Scan tour group in front of the Minnesota state capitol. (*Front row, left to right:*) Jim Cheatham, FHWA Pennsylvania Division; Bimla Rinehart, Caltrans; Dan Mathis, FHWA Washington State Division; (*standing, left to right:*) Kevin Stout, Oklahoma DOT; Chris Porter, Cambridge Systematics; Jim Ware, Consultant; John Campbell, Texas DOT; Susan Lauffer, FHWA Office of Real Estate Services; J. D. Ewald, Texas DOT; Don Nelson, Washington State DOT; Rich Allen, Connecticut DOT; George Lovett, Florida DOT; John Sherman, Wyoming DOT; Ray Lorello, Ohio DOT; and Don Jackson, FHWA Office of Infrastructure.

- **Early and ongoing communication.** All three states made explicit efforts to have different disciplines working together from the earliest stage of project development, including design and engineering, ROW, utilities, environmental, and construction staff. Each agency also involved external stakeholders—such as property owners and utility



Toner explains a detailed flow chart of the Texas DOT ROW guidelines.



A visualization tool developed by the Minnesota Department of Transportation provides an animated fly-over of a three-dimensional representation of a project, showing ROW limits from the final design, as well as property lines.

company representatives—as early on as practicable, to identify and resolve potential conflicts.

◆ **Investment in technical tools.** Each state employed a comprehensive set of technical tools to support project management, property and utilities management, and public information efforts. Minnesota DOT has invested extensively in linked geographic information system databases, electronic data entry systems, and websites to track and communicate information about property status. Visualizations and animations have proved effective for explaining potential impacts to property owners and for resolving conflicts.

◆ **A willingness to make use of other incentives and techniques as appropriate.** Florida offers incentive acquisition and relocation payments to accelerate ROW clearance. Florida also makes utility reimbursements to expedite relocations in small and economically depressed communities. Minnesota assists local governments in acquiring property from willing sellers years in advance of a project. Creative design strategies often can mitigate or avoid the impacts of property takings and of utilities relocation. Subsurface utility engineering early in the design process can identify potential utility conflicts.

The scan team visited Texas State Highway 45, under construction, to gain insights into the application of the Texas DOT procedures.

Other Techniques and Benefits

Other techniques may vary, depending on a state's statutory requirements. Many states are expediting project development and delivery through design–build contracting. This requires attention to the structure of the contract, performance incentives, and risk sharing, to ensure that contractors conduct ROW acquisition and utilities relocation efficiently while complying with federal and state requirements.

The scan found that the most significant benefits of improved ROW acquisition and utilities relocation include shorter project delivery time and lower costs. Texas DOT, for example, has been able to move the large-scale and high-profile State Highway 130 project rapidly, in response to political pressures.

In some cases, the measures have produced direct cost savings, such as with Minnesota DOT's value engineering activities. In other cases, additional up-front costs—such as incentive payments—have led to lower long-run costs because of shortened schedules for project development and reduced expenses for litigation. Agencies anecdotally report other benefits—for example, all three states reported that the early involvement of stakeholders, especially of property owners and utilities representatives, has led to less animosity and better relationships with the stakeholders and with the public in general.

Evaluation of the Pilot Scans

An evaluation of the pilot scans was conducted to determine the benefits and impacts and to assist AASHTO in deciding whether to make the program permanent. The evaluations relied on three sources:

1. Feedback from participants on the value of the scan visits, from evaluation surveys completed immediately after the tour and again six months later. Feedback also was obtained informally from staff at the host agencies.
2. A review of the ways used for disseminating the scan findings, from reports by scan participants six months after the tour.
3. A review of actions taken to explore or implement practices within the participants' own agencies.

Feedback on the two pilot scans was positive. Participants indicated that the scans were valuable in advancing their professional knowledge. The host states also found the scan visits beneficial. In addi-

tion, the six-month evaluations confirmed that the lessons learned from the scans are being applied in practice. At least five states participating in the ROW and utilities scan and four states participating in the transportation asset management scan had implemented specific changes, and other states were considering changes.

The transportation asset management scan led to additional visits and to the creation of a quarterly webinar series that continued discussions about asset management practices and increased the availability of the scan products. In addition to making changes to their own agencies' practices, scan participants have presented findings at more than 16 regional and national conferences.

Future Directions

Because of these positive outcomes, AASHTO decided to continue the scan program under the general model outlined in the business plan. Minor adjustments to procedures were made to account for lessons learned from the two pilot scans.

In June 2007, NCHRP issued a request for proposals for a consultant to plan and manage domestic technology scans for an initial two-year period. NCHRP plans to request additional funds each year to continue the program. Work on the next round of scans started in December 2007 on the following topics:

- Project delivery management;
- Accelerated construction techniques;
- Winter maintenance;
- Regional, multiagency traffic signal operations management; and
- Bridge management decision making.

Utility poles are replaced as part of Texas DOT's accelerated State Highway 130 project.

The scan team viewed ROW and utilities relocation problems to be solved for the planned widening of US-50, west of Orlando, Florida.

The NCHRP domestic scan program represents an important new tool for spreading innovative practices throughout the U.S. transportation sector. The results should include improved mobility and safety for the traveling public, as well as responsible stewardship of fiscal and environmental resources.

Acknowledgments

Contributing to this article were Andrew Lemer, Senior Program Officer for the NCHRP domestic scan program; Michael D. Meyer, Georgia Institute of Technology, subject matter expert for the transportation asset management scan; James Ware, Consultant, subject matter expert for the ROW and utilities scan; and Joe Guerre and Lance Neumann of Cambridge Systematics, Inc.

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