

NCHRP synthesizes highway solutions

“State DOTs aren’t satisfied with the status quo,” says Brian Blanchard, Florida DOT’s assistant secretary for engineering and operations. “We all want to innovate. We also know that often the most efficient path to innovation is to borrow good ideas from one another.” That’s exactly what the NCHRP synthesis program helps state DOTs do through a formal process of documenting leading technologies and practices on a wide range of transportation topics.

Compiling best practices

Blanchard is chair of the NCHRP Project 20-05 panel that oversees the NCHRP Syntheses of Highway Practice (trb.org/SynthesisPrograms/SynthesesNCHRP.aspx). “For a given issue or area in transportation,” he says, “there are sure to be many successful practices out there, but the information is often fragmented and hard to find. The NCHRP synthesis program serves to locate and assemble techniques that have been used to address a particular problem.”

About 15 NCHRP syntheses are funded each year, says Jon Williams, director of the NCHRP synthesis program. To date, NCHRP has published nearly 500 syntheses (those produced since 2001 are available at trb.org/Publications/PubsNCHRPSynthesisReportsAll.aspx/), with complementary TRB programs synthesizing practice for airports and transit topics.

NCHRP synthesis topics are selected to address problems that are widespread enough to generate broad interest and that are timely and critical with respect to safety, economic, or social impacts. Topics typically address practices that are not uniform or consistent from agency to agency and where there is

Anatomy of an NCHRP Synthesis

Regardless of the topic, each NCHRP synthesis shares these aims:

- Locate and assemble documented information on the selected topic.
- Learn what practices have been used to solve or alleviate the problem.
- Identify all relevant ongoing research.
- Identify gaps in knowledge and research needs.
- Organize, evaluate, and document the useful information that is acquired.
- Disseminate the synthesis information to all who might benefit from it.

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a need to organize and condense existing knowledge.

“For a given topic,” Williams says, “the expert investigator conducts a study that includes an exhaustive literature search as well as a survey of state DOTs.” Williams notes that the required minimum survey response rate of 80 percent ensures credible findings.

In addition, a technical oversight panel is established for each topic to guide the investigator in organizing and evaluating the collected data and to review the report. This assures readers that the contents of the syntheses have been thoroughly evaluated by topic experts.

Timely and valid findings

John Mason, vice president for research and economic development at Auburn University, has a multifaceted perspective on the program, having served in several roles: NCHRP synthesis program oversight panelist, member of several technical review

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panels for individual syntheses, and principal investigator for *NCHRP Synthesis 316: Design Exception Practices*.

Based on this experience, Mason concludes that NCHRP synthesis reports are among TRB’s top products. “The utility of a synthesis is very high,” he says. The timeliness and validity of synthesis findings are of particular importance to Mason.

“The synthesis process is rapid, with a typical timeline of about a year from project commencement to report publication,” Mason says. As a consequence, each published synthesis represents the state of the art for the selected topic. Further, because each synthesis is formally reviewed by a technical panel of experts, the findings are highly credible and valuable to state transportation agencies.



NCHRP Synthesis 364 has helped forge public-private partnerships by compiling best practices on forecasting toll road demand and revenue.

In the case of *NCHRP Synthesis 316*, Mason reports that the compilation of design exception practices proved to be used widely among state DOTs. “The synthesis gave states the chance to see what other agencies are doing,” he says. “It served as an important reality check in considering the varying approaches to management, analysis, and rulemaking for design exceptions.”

The target audience often goes beyond DOT practitioners to include academia and industry as well. *NCHRP Synthesis 364: Estimating Toll Road Demand and Revenue* compiled best practices that helped public agencies and

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private industry alike make better traffic forecasts and more informed infrastructure investments. “More reliable traffic numbers can mean more credible revenue forecasts, better bond ratings, and lower costs for all concerned,” says principal investigator David Kriger of David Kriger Consultants.

The value of *NCHRP Synthesis 364* extends past the original scope, permeating public sector decision making. “The forecasting methodologies in this synthesis are used beyond toll roads,” Kriger says. “Agencies rely on credible demand forecasts for highway and transit projects of all kinds, as well as environmental and economic impact studies.”

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Making state and national impacts

NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs was another among many syntheses that had a big payoff. Interest in the construction manager-at-risk delivery method (equivalently called “construction manager/general contractor”) is high, and the synthesis was timely.

“Many state DOTs have adopted this practice, and the number keeps going up,” says synthesis principal investigator Doug Gransberg, a professor at Iowa State University.



GPS-guided construction was just starting to take off when *NCHRP Synthesis 372* assembled best practices on this and other new construction technologies.

The synthesis of findings in this area became a springboard for a follow-up NCHRP research study. Gransberg went on to conduct NCHRP Project 10-85, “A Guidebook for Construction Manager-at-Risk Contracting for Highway Projects.” AASHTO is in the process of adopting the findings as an official guidance document, he says.

Even given all this follow-up work, the synthesis itself remains a highly relevant tool. “It continues to provide a concise description and examples of how this delivery method works,” Gransberg says. “A transportation agency interested in learning about this practice would want to start by reading the NCHRP synthesis.”

Moreover, this synthesis has had a reach beyond state DOTs, playing a role in federal policy and funding. In 2011, the U.S. DOT’s review of a draft transportation authorization bill cited *NCHRP Synthesis 402* to explain the benefits of construction manager-at-risk contracting. Similar language was ultimately included in the Moving Ahead for Progress in the 21st Century Act, effectively fast-tracking this delivery method for federal-aid highway projects.

On the leading edge

Syntheses also help lead the way on emerging practices. John Hannon, a professor with the University of Southern Mississippi, was the principal investigator for *NCHRP Synthesis 372: Emerging Technologies for Construction Delivery*. He describes the project conducted nearly a decade ago as ahead of its time. “Many of the technologies that are more commonplace now—remote monitoring, GPS machine guidance, 4-D modeling—were just in the process of becoming available,” Hannon says.

“The synthesis came at a perfect time,” he says. “There was a lot of excitement about what different states were doing. The synthesis was instrumental in spurring along state-sponsored studies, pilot projects, and implementation of these technologies.”

This project too led to follow-up research: NCHRP Project 10-77, “Use of Automated

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Machine Guidance (AMG) within the Transportation Industry.” The forthcoming report will provide AMG technical specifications and implementation guidelines for DOTs.

As technology continues to evolve, Hannon thinks the time is right for another synthesis in this area. “A new synthesis on construction delivery systems would similarly help guide DOTs in the decade to come,” he says.

An enduring legacy

Given the successes seen in this small selection of syntheses, it is not surprising that the program has been greeted with ongoing enthusiasm and has enjoyed such longevity. The synthesis program is in its 46th

year, making it just a few years younger than NCHRP itself.

Mason explains that each year, the fifteen or so funded projects are selected from a pool that typically exceeds 100. “This large application pool is a real positive,” he says. “Practitioners in every area of transportation see that the synthesis program can address their needs.”

Blanchard also sees the value of the comprehensive reach of the program. “The synthesis program helps us address problems in all areas of transportation,” he says. “That includes design, contracting, operations, maintenance—everything that we do as a DOT.”

A recent program update is available in *NCHRP Research Results Digest 392: Continuing Project to Synthesize Information on Highway Problems* (trb.org/Main/Blurbs/171932.aspx).

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NCHRP Research Results Digest 392 provides a comprehensive overview of the NCHRP synthesis program and results to date.

ACKNOWLEDGMENT OF SPONSORSHIP Work was sponsored by the American Association of State Highway and Transportation Officials, in cooperation with the Federal Highway Administration, and was conducted in the National Cooperative Highway Research Program, which is administered by the Transportation Research Board of the National Academies.

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