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SHRP 2 Capacity Research

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Systematic Approach to Addressing Complex Community or Environmental Issues

New resource helps agencies better evaluate and integrate project goals in cost- and time-efficient ways

Transportation agencies increasingly need to collaborate with other agencies, local governments, and communities to implement capacity expansion projects, particularly in areas with sensitive natural environments or in established communities. Capacity improvements necessary to support strong communities and economies could be delayed through the planning, programming, and environmental review process.

At the same time, elected officials and the public are demanding that highway projects be delivered with fewer delays, with more transparency and collaboration, and in ways that address environmental challenges. Current processes can get bogged down in indecision and rework.

Transportation for Communities, Advancing Projects through Partnerships (TCAPP) provides a research-based, collaborative decision-making framework, case studies, and guides to help agencies create more collaborative processes that will lead to better projects delivered more quickly.

Guidance for Improving Collaborative Decision Making

The Solution

TCAPP provides a systematic approach that has proven successful on projects with complex community and environmental issues. This web-based resource can be used as a trouble-shooting guide or as a roadmap for improving a transportation agency’s process for planning and developing highway projects. The web portal was built from research about successful practices and is designed to support collaborative decision making in the transportation planning and project development process. It defines stakeholder and partner roles based on federal requirements and provides guidance on how to engage each party. TCAPP organizes information around the key decision points in the long-range planning, corridor planning, capital programming, and environmental review processes. It provides case studies, decision resources, and links within a web resource.
The Benefits
TCAPP puts forward best practices for quickly advancing highway capacity projects through planning processes while integrating community and environmental goals. By ensuring the right people are engaged at the right time with the right information, these strategies and performance measures can help generate better clarity about project goals. TCAPP strengthens the basis for decision making about when, where, and how much capacity is needed; what the economic impacts will be; and how to build capacity in ways that will enhance communities and the environment.

How can you learn more?
Transportation for Communities—Advancing Projects through Partnerships (TCAPP), is available at the beta website www.transportationforcommunities.com, and is scheduled for implementation in 2014. A Framework for Collaborative Decision Making on Additions to Highway Capacity is available online at http://www.trb.org/Main/Blurbs/166046.aspx. For more information, contact Gary Jensen at FHWA, gary.jensen@dot.gov; Spencer Stevens at FHWA, spencer.stevens@dot.gov; Matt Hardy at AASHTO, mhardy@aashto.org; or Steve Andrle at TRB, sandrle@nas.edu.
Proven performance measures to evaluate major transportation projects

Tools will enable broader assessments of impacts

Transportation agencies face increasing scrutiny about the value of their projects and the tradeoffs associated with project choices. As a result, many are building new performance management programs or are expanding their existing programs to guide project and system decision making. To date, agencies have had the most experience with operations and maintenance-related measures such as pavement quality, bridge deficiency, and safety; and capacity-related measures such as volume-to-capacity ratio or level-of-service. Although the pavement and bridge measures have been effective, the measures used to measure capacity have not yet proven satisfactory.

A new process developed through the second Strategic Highway Research Program (SHRP2) will offer agencies additional measures they can use to undertake a broader assessment of the tradeoffs necessary to address capacity problems.

Performance Measures for Highway Capacity Decision Making provides a framework and web-based tool for evaluating transportation projects designed to add capacity. These measures allow agencies to consider environmental justice, greenhouse gas emissions, infrastructure vulnerability to climate change, air toxics exposure, consistency with land use, community cohesion, and visual quality. The product provides model performance measures that address a broad range of issue areas, advice, and ideas on data collection, and a framework for integrating performance measures into a collaborative decision-making process.

This SHRP2 product was developed prior to MAP-21 and is a resource for agencies seeking to integrate performance measures into their planning and project development processes. FHWA will be addressing MAP-21 performance measures in future rulemaking.

The Solution

The solution allows an agency to select performance measures in five categories or stages of the planning process: transportation, environment, economics, community, and cost; using 17 performance factors. The product helps identify the types of impacts that are important in making informed decisions when considering adding new
capacity, and describes the level of detail needed to evaluate major transportation projects. The product includes a web-based tool that will enable an agency to understand how the performance measures can be used in long-range planning, programming, environmental review, and permitting.

**The Benefits**
In addition to their analytical value, these performance measures also help stakeholders and the public better understand transportation problems, solutions, and the consequences of leaving problems unaddressed.

**How can you learn more?**
The report, *Performance Measurement Framework for Highway Capacity Decision Making*, is available online at [http://www.trb.org/Publications/Blurbs/161859.aspx](http://www.trb.org/Publications/Blurbs/161859.aspx). The performance measurement framework is available in TCAPP at [www.transportationforcommunities.com](http://www.transportationforcommunities.com). For more information on this SHRP2 Solution, contact Egan Smith at FHWA, [egan.smith@dot.gov](mailto:egan.smith@dot.gov); Matt Hardy at AASHTO, [mhardy@aashto.org](mailto:mhardy@aashto.org); or Steve Andrle at TRB, [sandrle@nas.edu](mailto:sandrle@nas.edu).
Modeling Reliability

*Improved analysis of the benefits of operational strategies to reduce congestion*

Early travel demand models were developed to help modelers and decision makers analyze recurring congestion and its solutions. The models have been instrumental to metropolitan planning by allowing the estimation of benefits from traditional projects such as adding lanes or expanding an interchange.

Those models, however, were limited in their ability to meet the demands of today’s decision makers. The models could not easily capture the effects at the network level of some operational strategies such as adding auxiliary lanes or channelizing an intersection. Without the ability to model these issues, planners and decision makers were constrained in how they could capture or compare the benefits of such potential solutions.

In today’s complex environment, transportation agencies need improved accuracy from network travel demand models and the models need to capture highway user responses to congestion, reliability, and tolling.

The Solution

Recent research from the second Strategic Highway Research Program (SHRP2) has identified *new equations and processes that can be incorporated into travel demand models for improved modeling that shows how operations can affect a highway network’s performance.*

*Improving Our Understanding of How Highway Congestion and Pricing Affect Travel Demand* (C04) develops mathematical descriptions of the full range of highway-user behavioral responses to congestion, travel-time reliability, and pricing. This report formats the mathematical descriptions of behavior so that they can be incorporated into various travel-demand modeling systems in use or being developed. The report also examines network assignment practices needed to support models that simulate behavioral responses to congestion, travel-time reliability, and pricing.

*Understanding the Contribution of Operations, Technology, and Design to Meeting Highway Capacity Needs* (C05) is a new guide that will allow transportation agencies to use enhanced simulation models to test the effectiveness of highway operations strategies. The guide shows modelers how to compare the effectiveness of less complex operational strategies, such as intersection channelization, with more expensive and complex treatments, such as adding general-purpose highway lanes. This research will enable departments of transportation to measure the cost and effectiveness of traffic operations strategies and demonstrate whether they solve a particular congestion problem.
The Benefits

These products provide modelers with new equations and guidance on how to more accurately capture the benefits or effectiveness of various operations strategies. Agencies or metropolitan planning organizations can gain a better understanding of how operations projects can improve the function of their highway networks.

How can you learn more?

The reports are available at www.trb.org/Main/Blurbs/168141.aspx and www.trb.org/Main/Blurbs/166939.aspx. For more information, contact Patrick DeCorla-Souza at FHWA, patrick.decorla-souza@dot.gov; Matt Hardy at AASHTO, mhardy@aashto.org; or Steve Andrle at TRB, Sandrle@nas.edu.

About SHRP2 Implementation

The second Strategic Highway Research Program is a national partnership of key transportation organizations: the Federal Highway Administration, the American Association of State Highway and Transportation Officials, and the Transportation Research Board. Together, these partners conduct research and deploy products that will help the transportation community enhance the productivity, boost the efficiency, increase the safety, and improve the reliability of the Nation’s highway system.

Strategic Highway Research Program

U.S. Department of Transportation | Federal Highway Administration
American Association of State Highway and Transportation Officials • Transportation Research Board
Creating a Common Community Vision for Advancing Transportation Projects

A shared vision supports better projects with fewer delays

Transportation projects generate widespread discussions within communities and occasionally engender some controversy. Successful transportation agencies begin the project development process with an extensive community dialog that seeks to develop a shared vision between the transportation agency and the community. This shared vision can allow both the transportation agency and the community to identify common objectives, points of agreement, and mutual concerns.

Linking Community Visioning and Transportation Investments

The Solution

Developed through the second Strategic Highway Research Program (SHRP2), the Transportation Visioning for Communities (T-VIZ) guide and website provide proven approaches for transportation agencies to develop a shared vision with communities to shape transportation projects. T-VIZ provides a model approach, a step-by-step process, and case studies intended to generate consensus for a transportation project. This SHRP2 product builds on successful examples at both the project and regional levels to create consensus on the need, scope, and outcomes for important transportation projects. The case studies illustrate a wide range of projects and demonstrate how the collaborative planning and visioning process can create consensus and support for projects and regional plans.

The Benefits

By investing in visioning early in the planning process, transportation agencies can generate important community support not only for an individual project but also for entire programs. This community support can help agencies avoid costly delays in the environmental review and ecological permitting stages. Agencies also may generate greater goodwill, which can translate into increased financial support for transportation.
How can you learn more?

Research reports, the website, and training videos are available for the T-VIZ project at http://shrp2visionguide.camsys.com/. The complete library of case studies can be found at http://www.trb.org/StrategicHighwayResearchProgram2SHRP2/Pages/Case_Studies_in_Collaboration_373.aspx. A broader perspective and strategies for collaborative decision making throughout the planning and project-development processes can be found at the website for Transportation for Communities: Advancing Projects through Partnerships at http://transportationforcommunities.com/shrpc01/. For more information, contact Brian Betlyon at FHWA, brian.betlyon@dot.gov; Matt Hardy at AASHTO, mhardy@aashto.org; or Steve Andrle at TRB, Sandrle@nas.edu.

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Considering Public-Private Partnerships in the Planning Process

How to evaluate public-private partnerships when weighing capacity projects

The decision guide for Transportation for Communities — Advancing Projects through Partnerships (TCAPP) creates a framework for collaborative decision making when considering whether to expand highways to increase their capacity. Adding a private partner introduces new and different considerations into the planning process.

The Solution

Developed through the second Strategic Highway Research Project (SHRP2), this project addresses how and when to consider public-private partnerships (P3s) in the project planning process. Using the TCAPP guide as a framework, this report will include a business process to be followed when incorporating P3s as one potential vehicle for developing new capacity products.

Although private financing can attract new funding and can even expedite projects, it can also create tradeoffs that must be weighed against other stakeholder issues, such as environmental or neighborhood impacts. This report will assess the interplay between the use of P3s and the transportation and environmental planning processes in order to identify how and when they should be considered as a means to procure transportation improvements. Issues addressed will include tolling, design-build, design-build-operate, leasing, and other forms of private-sector involvement.

How can you learn more?

The report is available at www.trb.org/Main/Blurbs/166940.aspx and at http://transportationforcommunities.com. For more information, contact Larry Anderson at FHWA, larry.anderson@dot.gov; Matt Hardy at AASHTO, mhardy@aashto.org; or Steve Andrle at TRB, Sandrle@nas.edu.

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Saving time and money while delivering better transportation and environmental outcomes

Tools and techniques to expedite project delivery

Speeding up the delivery of needed transportation projects is high on everyone’s agenda—from the traveling public who desire timely improvements to the local communities that rely on scheduled delivery of goods and services.

Transportation agencies are being challenged to deliver projects with greater efficiency and speed at the same time that funding and staffing are decreasing and transportation needs are growing. The use of innovative approaches and early coordination with resources agencies, the public, and stakeholders can help transportation agencies achieve timely project delivery.

Under the second Strategic Highway Research Program (SHRP2), research was conducted to evaluate the common types of constraints to expediting project delivery as well as the strategies needed to address them. The research also developed a set of case studies that illustrate how the constraints have been successfully encountered and addressed.

The Solution

The research included in the resulting report, Expediting Planning and Environmental Review (C19), identifies 24 strategies for addressing or avoiding 16 common constraints that would improve planning and environmental review and expedite the delivery of transportation projects. Common constraints are grouped under six objectives: improve public involvement and support; improve resource agency involvement and collaboration; demonstrate agency commitment to the project; improve internal communication and coordination; streamline decision making; and integrate the process across all phases of project delivery. While initially focused on the planning and environmental phases of project delivery, the research found that strategies implemented in the early phases of project development can typically provide expedited benefits in subsequent phases.

The likely severity of the effects on delay and cost of not addressing a constraint are categorized as low, medium, or high. Multiple strategies are suggested for each severity category. A worksheet included in the companion website allows the user to quickly identify the types of issues and/or constraints that could cause delay within their project scope, and offers mitigation strategies for each constraint. These strategies not only contribute to reducing project delays, they provide
innovative approaches to improve transportation decision making. The strategies that are useful throughout the project delivery process include:

- Strategy 1: Change-Control Practices
- Strategy 2: Consolidated Decision Council
- Strategy 3: Context-Sensitive Design and Solutions
- Strategy 4: Coordinated and Responsive Agency Involvement
- Strategy 5: Dispute-Resolution Process
- Strategy 6: Department of Transportation-Funded Resource Agency Liaisons
- Strategy 7: Early Commitment of Construction Funding
- Strategy 8: Expedited Internal Review and Decision Making
- Strategy 9: Facilitation to Align Expectations Up Front
- Strategy 10: Highly Responsive Public Engagement
- Strategy 11: Incentive Payments to Expedite Relocations
- Strategy 12: Media Relations Manager
- Strategy 13: Performance Standards
- Strategy 14: Planning and Environmental Linkages
- Strategy 15: Planning-Level Environmental Screening Criteria
- Strategy 16: Programmatic Agreement for Section 106
- Strategy 17: Programmatic or Batched Permitting
- Strategy 18: Real-Time Collaborative Interagency Reviews
- Strategy 19: Regional Environmental Analysis Framework
- Strategy 20: Risk Management
- Strategy 21: Strategic Oversight and Readiness Assessment
- Strategy 22: Team Co-location
- Strategy 23: Tiered National Environmental Policy Process
- Strategy 24: Up-Front Environmental Commitments

The Benefits
Reducing project delays saves more than time and money. This SHRP2 Solution offers project delivery strategies that agencies can use to anticipate where delays are likely to occur. Agencies can then apply tested strategies to improve planning and environmental decision making while avoiding or minimizing delays during all phases of project development and delivery.

How can you learn more?
For additional information, contact Neel Vanikar at FHWA, neel.vanikar@dot.gov; Shannon Eggleston at AASHTO, seggleston@aashto.org; or Steve Andrle at TRB, sandrle@nas.edu. The research is complete and a final report, Expedited Planning and Environmental Review of Highway Projects, is available online and from the TRB Bookstore. The worksheet and strategies can be accessed through http://www.transportationforcommunities.com/shrpc01/expediting_project_delivery_questions_new.
Communicating the Value of TCAPP

Strategies and messages to promote a new tool that can speed delivery of transportation improvements

Transportation for Communities – Advancing Projects through Partnerships, or TCAPP, is the centerpiece of the capacity focus area research conducted under the second Strategic Highway Research Program (SHRP2). Primary users of TCAPP are expected to be agency practitioners who work directly with external stakeholders to reach consensus on capacity expansion projects.

Changes in business practices, however, are generally empowered from the top. Decision makers at state and local transportation agencies as well as federal agencies need to understand the value, benefits, and utility of integrating TCAPP into their general business practices.

The Solution

This project developed messages and strategies that effectively convey the value of TCAPP to these executives. It included extensive market research of the target audience. Based on this research, messages that resonate with decision makers and potential marketing strategies were developed. The effort was directed not only at the transportation agencies, but also at the executives of resource agencies who review, and often approve or reject alternatives for capacity-expansion projects. The lessons learned through this work will inform the implementation of TCAPP in 2014.

How can you learn more?

For more information, contact Gary Jensen at FHWA, gary.jensen@dot.gov; Spencer Stevens at FHWA, spencer.stevens@dot.gov; Matt Hardy at AASHTO, mhardy@aashto.org; or Steve Andrle at TRB, Sandrle@nas.edu.
Next Generation Transportation Modeling for Better Decisions and Targeted Investments

New modeling procedure allows transportation agencies to estimate travel demand by integrating travel activities and behaviors, transportation network conditions, and mode options—all in a single package that can more effectively test alternatives.

For the first time, transportation agencies will be able to estimate travel demand in a way that integrates activities, networks, and the environment, offering more precise data to forecast mode split and trip generation. Developed through the second Strategic Highway Research Program (SHRP2), this new approach dynamically evaluates the interplay of traveler behavior and transportation network conditions, including more mode options. The models support more informed decisions for adding highway and transit capacity, improving traffic operations, introducing priced roads, and improving traveler information.

The Solution

The Dynamic Integrated Travel Demand Model and Time Sensitive Network links travel behavior choices, such as departure time or route, with congested network conditions to better reflect real-world dynamics in the model. Planners can then more directly test the effects for various alternatives on congestion.

The software is available via an open source license and includes manuals and application documentation. This SHRP2 Solution advances existing modeling applications to include sensitivities for traffic shifts by time of day or route in response to capacity increases, operation actions, or management actions. It can also dynamically integrate travel-time reliability, greenhouse gas emissions, road pricing, mode shifts, and nontravel choices such as work/shop at home or flex-time policies.
The Benefits

The immediate benefit of the models is that they address the essential question of how travel behavior responds to network conditions and network conditions respond to behavior. The result is a dynamic model that better analyzes transportation alternatives and provides more precision to support transportation planning decisions. Ultimately, the benefit of more effective and precise modeling is more informed transportation planning.

Who is using these tools?

Pilot tests to validate the results and refine the usability of these tools will be completed late in 2013. Model sets are available for Jacksonville, FL, Sacramento, CA, and Burlington, VT.

How can you learn more?

Implementation for this product is expected in 2014. For more information, contact Brian Gardner, at FHWA, brian.gardner@dot.gov; Matt Hardy at AASHTO, mhardy@aashto.org; or Steve Andrle at TRB, sandrle@nas.edu.
Resources for Using State-of-the-Art Travel Demand Models

**Primer on how to use advanced integrated travel demand models**

Many states and metropolitan planning organizations (MPOs) are considering moving forward with new activity-based (AB) models. The skills required to build, test, and implement an AB model are limited, however, to a small number of MPOs, state departments of transportation, vendors, and consulting firms.

**The Solution**

This project will develop a **practical how-to guide on AB models for managers and practitioners**. Delivered as an online manual, the primer will support the use of the Dynamic Integrated Travel Demand Model and Time Sensitive Network open-source models produced in the C10A and C10B projects. These models link travel behavior choices, such as departure time or route, with congested network conditions and land-use models to better reflect real-world dynamics. By using these models, planners can more directly test the effects for various alternatives on congestion.

In addition to the primer, the project will deliver a strategic implementation plan that addresses the benefits, issues, and barriers to migrating from a “traditional” approach to using travel-demand modeling to an AB modeling approach.

**How can you learn more?**

The online primer will be incorporated into the Travel Forecasting Resource (TF Resource) website hosted by TRB at [www.tfresource.org](http://www.tfresource.org). The site is a collaborative effort to collect travel forecasting resources and to augment them with the experience and practical understanding of the travel forecasting community. This project is active and the primer is expected to be available in mid-2014. For more information, contact Brian Gardner at FHWA, brian.gardner@dot.gov; Matt Hardy at AASHTO, mhardy@aashto.org; or Steve Andrle at TRB, Sandrle@nas.edu.

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**About SHRP2 Implementation**

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**Strategic Highway Research Program**

U.S. Department of Transportation | Federal Highway Administration
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New Economic Analysis Tools Allow Planners to Quantify Impacts of Transportation Projects

*New tools provide more accurate estimates of the economic impacts of highway capacity projects based on case studies*

Elected officials, agency staff, and taxpayers need to define the economic impacts of highway capacity improvements to make the business case for investments and to inform decision making. This is not a simple matter: transportation projects influence economic vitality in complex and often indirect ways. Current tools for estimating economic impacts are difficult to explain to decision makers and the public, resulting in a failure to understand the critical role that capacity investments play in a region’s economic health. Because economic impacts can be difficult to measure, planning processes neither fully integrate economic effects nor reflect the economic effects of highway capacity on land use. Agencies need forecasting models that are more realistic and easier to articulate, and that provide a more complete picture of economic impacts.

Developed through the second Strategic Highway Research Program (SHRP2), these new economic development tools build on existing practices by better assessing the net impacts—economic gains and losses—as well as primary and secondary effects of highway capacity projects on regional economic vitality. This includes straightforward, transparent, open-source statistical forecasting models based on actual case studies, as well as guidance for developing economic development performance measures and impact studies.

*Interactions between Transportation Capacity, Economic Systems, and Land Use Merged with Integrating Economic Considerations into Project Development and Development of Improved Economic Analysis Tools*

**The Solution**

This suite of new forecasting tools and statistical models incorporate the full range of reasonable economic impacts of proposed highway projects. This includes impacts that may vary by region of the country, whether the region is urban or rural; political attitudes; land use and development policies; major economic drivers; economic growth forces; the nature of capacity problems; and the solutions proposed. It also includes such secondary effects as environmental justice factors, the value of environmental resources lost or degraded, and cumulative impacts.

These new tools provide for broader economic analyses by integrating four components: reliability of travel time, connectivity to intermodal facilities for freight and passengers, access to labor and product markets, and an accounting...
tool that integrates the other three components and creates benchmarks to local areas. The end result is a clear picture of a project’s ultimate economic impact in terms of direct effect, total local effect, and total national effect.

The toolkit includes Transportation Project Impact Case Studies (T-PICS), a web-based sketch planning tool that helps planners quickly estimate the likely range of economic impacts of a proposed project. It measures the economic development impacts of a project on the basis of 100 case studies of already-built highway capacity projects. Each case study includes pre- and post-project economic and land development data and local interviews that, together, portray the actual, observed economic development impacts of those projects, as measured at least five years after implementation.

By considering the net economic effects of potential projects, these SHRP2 tools provide decision makers with better information for answering the question about whether a region will be economically better off because of a transportation investment, and, if so, by how much.

The Benefits

Highway capacity improvements can support economic vitality by providing better access to markets and the labor force, saving time and money otherwise spent as a result of traffic delays, improving safety, reducing pollution, and supporting a higher quality of life. The question is: Which improvements actually make a difference and how do we make accurate projections about that? Better understanding how changes in productivity such as improvements in market accessibility, intermodal connectivity, scheduling, logistics, and international competitiveness, help identify transportation options that meet community goals.

This suite of tools helps planners make broader-based, more realistic assessments of the economic impacts of highway capacity projects. This leads to better decisions, more prudent investments, and—ultimately—a more robust economy at the local, regional, and national levels.

Who is using these tools?

Pilot tests to validate the results and refine the usability of these tools will be completed late in 2013.

How can you learn more?

The final report, Interactions Between Transportation Capacity, Economic Systems, and Land Use, is available online at http://www.trb.org/Main/Blurbs/166934.aspx and from the TRB bookstore (www.trb.org/shrp2). The case study projects embedded in the T-PICS tool can be viewed through Google Earth; the T-PICS tool is available at http://transportationforcommunities.com/t-pics. The analysis tools are in development and will be available for download from the T-PICs website in 2013. The tools are scheduled for implementation in 2014. For more information, contact Stefan Natzke at FHWA, stefan.natzke@dot.gov; Matt Hardy at AASHTO, mhardy@aashto.org; or Steve Andrle at TRB, sandrle@nas.edu.

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Strategic Highway Research Program
Recommended Approach to Improve Data and Modeling for Freight Project Decision Making

Developing tools for more informed freight planning

Efficient freight and commercial truck travel is essential to national, state, and local transportation infrastructure planning and our economic well-being. Incorporating freight movement considerations in the transportation planning process, however, may be difficult.

Current freight planning and forecasting tools, data, and techniques have limitations. For example, current tools and data are not precise enough to reflect the nature of supply chains or the increasingly complex logistics practices of the industry. Basic data on freight movements, particularly granular data at local or regional levels, may be difficult to determine. Adequate freight planning is further complicated because there is not a single clearing house for freight information. The freight data sets that are available are produced by different agencies, each with a unique format and update cycle.

Moreover, much of the most important data are generated by private sources and are not readily available in the public domain.

Although government and industry officials agree that freight planning is important and that freight projects can create many benefits, new tools are needed to advance the state of the industry.

Freight Demand Modeling and Data Improvement Strategic Plan

The Solution

A new document developed through the second Strategic Highway Research Program (SHRP2) offers a road map that will lead to improved freight data sets and freight modeling practices. The Freight Demand Modeling and Data Improvement Strategic Plan outlines an organizational approach that will help identify freight modeling and data priority needs, spur innovative ideas, and result in breakthrough solutions for wide application. The Global Freight Research Consortium would be created as an ongoing international forum of key stakeholders to expand the dialogue on freight analysis and data innovation. The plan also includes recommendations to improve the knowledge base for planners, refine national freight-modeling practices, develop sound freight data sets and subsets, and create visualization tools for improved decision making.
The Benefits
Freight planners and decision makers will benefit from having the tools and data available to consistently evaluate transportation projects that affect freight movement. Creating better data and models will allow state, regional, and local planners to better predict freight movement trends and make more informed project investment decisions.

The Next Steps
The *Freight Demand Modeling and Data Improvement Strategic Plan* has been completed and follow-up work has prioritized initial data collection needs. The major follow-up steps are:

- Develop a multi-agency group to spearhead implementation of the strategic plan;
- Explore how supply chain behavior can be incorporated into freight demand models at the national, regional, state, metropolitan, and local levels; and
- Explore how private sector supply chain data can be aggregated and used for public sector freight transportation planning purposes.

How can you learn more?
The strategic plan is online at [www.trb.org/Main/Blurbs/167629.aspx](http://www.trb.org/Main/Blurbs/167629.aspx) and the research report, *Freight Demand Modeling and Data Improvement*, is available at [www.trb.org/Main/Blurbs/167628.aspx](http://www.trb.org/Main/Blurbs/167628.aspx). For more information, contact Ed Strocko at FHWA, Ed.Strocko@dot.gov; Matt Hardy at AASHTO, mhardy@aashto.org; or Steve Andrle at TRB, Sandrle@nas.edu.

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Addressing Greenhouse Gas Emissions in Planning and Programming

Understanding, estimating, and reducing greenhouse gas emissions

Transportation policy makers and members of the general public are expressing increasing concern over the effects of greenhouse gas (GHG) emissions. With elements of the transportation sector producing more than a quarter of all these emissions, transportation planners and agencies are often asked how their projects can assist in reducing these emissions. Systematic procedures for integrating GHG screening and analyses into the transportation planning and project development processes are now available.

Greenhouse Gas Analysis Guide

The Solution

Developed through the second Strategic Highway Research Program (SHRP2), the new guidebook illustrates how GHG emissions calculations can be incorporated into transportation planning and decision making. Four decision contexts—long-range planning, programming, corridor planning, and National Environmental Policy Act/permitting—are described, along with questions that analysts should ask if interested in incorporating GHG emissions calculations into key decision points. A technical framework is presented for the models, data sources, and methods that can be used to conduct GHG emissions analysis. This application can be used to develop transportation plans and projects that both improve efficiencies and reduce vehicle miles traveled (VMT).

An appendix to the report provides more detailed technical information. Examples of states with legislation to reduce GHG emissions, regional climate action plans, and GHG analysis in environmental review are provided.

The Benefits

The guidebook and website enables an agency to demonstrate that it has fully considered GHG issues throughout the project development and planning process. The agency can document that it has relied upon current and recognized analytic procedures and that it has integrated GHG issues from the earliest stages of its decision making.
How can you learn more?

The guidebook website [http://transportationforcommunities.com/shrpc01/ghg_application_kdps/26/0](http://transportationforcommunities.com/shrpc01/ghg_application_kdps/26/0) allows a user to navigate the key decision points in a project and see how GHGs can be considered at each point. It also includes links to analytical tools for estimating GHG emissions from various transportation strategies. A pre-publication version of the practitioner’s guide is available at [http://www.trb.org/Main/Blurbs/166940.aspx](http://www.trb.org/Main/Blurbs/166940.aspx). A pre-publication version of the final report is available at [http://www.trb.org/Main/Blurbs/166936.aspx](http://www.trb.org/Main/Blurbs/166936.aspx). The guidebook and website are components within the larger *Transportation for Communities: Advancing Projects through Partnership* (TCAPP) project, with information available at [http://transportationforcommunities.com/shrpc01/](http://transportationforcommunities.com/shrpc01/). For more information, contact Larry Anderson at FHWA, larry.anderson@dot.gov; Jennifer Brickett at AASHTO, jbrickett@aashto.org; or Steve Andrle at TRB, Sandrl@nas.edu.

About SHRP2 Implementation

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Strategic Highway Research Program

U.S. Department of Transportation | Federal Highway Administration
American Association of State Highway and Transportation Officials ● Transportation Research Board
Broad-based Ecological Approach to Highway Planning Stretches Project Implementation Dollars

An early focus on ecological resources reduces review times and costs when projects move from planning to implementation

In today’s economic climate, transportation agencies must find ways to stretch dollars while meeting ever-shifting operating demands. The context is changing. Ecosystem and watershed restoration and species recovery needs are expanding as a more holistic view of the Endangered Species Act is taking hold. Stakeholders expect more from government agencies in terms of avoiding impacts to ecosystems and using transportation projects as a way to support ecosystem recovery. Environmental mitigation comes at a real cost to transportation agencies. The Environmental Law Institute estimates that $2.9 billion is spent annually on compensatory wetland mitigation alone.

The benefits of integrating ecosystem-level environmental considerations into highway planning are widely recognized, and there is an immediate need for practical guidance on how to implement these approaches cost-efficiently. A new tool developed through the second Strategic Highway Research Program (SHRP2) provides a step-by-step process for making decisions within an ecological framework, effectively integrating conservation with transportation planning. It is a blueprint for a structured, multi-agency approach, including supporting tools and data.

Integrating Ecological Mitigation to Enhance Efficiency

The Solution

The Integrated Ecological Framework (IEF) is a nine-step, science-based process that helps planners integrate ecological priorities and make timely decisions about transportation capacity enhancements and other system investments at the pre-NEPA planning stage. The framework provides clear, practical steps to enhance integration and to support an ecological approach to environmental stewardship.

The framework includes tools for overcoming important obstacles to integrating highway planning and ecological considerations such as the need to build collaborative interagency relationships and usable data collections from existing data sets, analyze alternatives and cumulative effects, and develop regulatory assurances and ecosystem crediting strategies. The IEF also provides a template for developing organizational strategies to make ecological approaches a priority.
The Benefits
By better coordinating transportation planning with natural resource planning through an IEF, opportunities to avoid or minimize environmental impacts can be identified at the planning stage, potentially reducing mitigation requirements or reducing delays during project-level environmental review and permitting. The IEF process can also identify opportunities for advanced mitigation when it is needed, ensuring that a plan is in place when the project is built. The IEF provides a structure that allows transportation and natural resource agencies to systematically establish more collaborative working relationships to achieve transportation goals, mutual environmental goals, and reduced costs. In particular, reducing delay means real savings: for a $100 million transportation project, a year of delay costs roughly $5 million. The long-term benefits of applying the IEF process are better environmental outcomes and lowered costs associated with planning, environmental review, and regulatory decision making. In the short term, the IEF provides practical guidance on selecting and using the most appropriate effective data, methods, tools, and processes to achieve an integrated, landscape-scale approach to transportation decision making.

Who is using these tools?
The IEF process is being pilot tested in four locations:

- **Oregon:** The Rogue Valley Council of Governments has put in place the first three steps of the IEF. Outcomes: Biological and ecosystem processes were integrated. Ecological corridors were preserved, red tape reduced, and costs cut.

- **California:** Caltrans and the University of California, Davis, are working together on the SR 37 corridor study (north side of San Francisco Bay) to apply the IEF process. Outcomes: Better system planning, early stakeholder engagement, and enhanced issue awareness. Established a foundation for continued ecological actions. Is informing statewide system planning guidelines for sensitive corridors and SLR adaptation.

- **West Virginia:** The West Virginia Department of Transportation (DOT), Division of Highways, is working with the West Virginia University to revisit mitigation plans for proposed new freeways using the IEF process. Outcomes: Enhanced awareness of regional tools to conduct alternatives analysis of route selection impacts. Provided a guide for quantifying impacts within the regulatory framework of the existing mitigation tool. Provided a standardized, defensible approach to avoiding or minimizing environmental impacts. Provided a watershed-based approach to mitigation.

- **Colorado:** The Colorado DOT and the Colorado State University is using the IEF process as part of a corridor study of the widening of SH 285 in Park County. Outcomes: Confirmed IEF is well suited to long-range and corridor-level planning and that using IEF requires a shift from a permit-driven to strategy-driven approach at all levels of the DOT.

How can you learn more?
*An Ecological Approach to Integrating Conservation and Highway Planning, Volume 2,* is available online at [http://www.trb.org/Main/Blurbs/166938.aspx](http://www.trb.org/Main/Blurbs/166938.aspx). The IEF and related tools are being integrated into the web-based resource *Transportation for Communities: Advancing Projects through Partnerships (TCAPP)*, available at [www.transportationforcommunities.com](http://www.transportationforcommunities.com), and are scheduled for implementation in 2013. For more information, contact Marlys Osterhues at FHWA, [marlys.osterhues@dot.gov](mailto:marlys.osterhues@dot.gov); Kate Kurgan at AASHTO, [kkurgan@aashto.org](mailto:kkurgan@aashto.org); or Steve Andrle at TRB, [sandrle@nas.edu](mailto:sandrle@nas.edu).

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Better Integrating Freight Transport into Highway Capacity Planning and Decisions

New practitioner’s guide offers blueprint for effectively considering freight in planning and decision making for new highway capacity

Freight transport continues to use a growing portion of highway capacity. In fact, freight demand for new highway capacity is growing substantially faster than all travel demand, and many new freight shipping bottlenecks will likely develop around the nation in the next two to three decades. Until recently, however, freight considerations for effective highway planning had not been fully researched or understood, nor have the appropriate stakeholders typically been involved in highway planning processes.

Recent research from the second Strategic Highway Research Program (SHRP2) has identified new insights, processes, and a decision making framework to help effectively integrate market-driven freight considerations into transportation planning.

The Solution

Calling on new research from the past five years, the new Freight Planning Guide provides guidance to public transportation agencies, decision makers, and stakeholders, including guidance on:

► Where to start in considering freight needs as part of the highway capacity planning process;

► How to get the right freight stakeholders with the right information involved at the right time—delineating key decision points in the planning process for freight considerations;

► How to ensure that all types of freight movement, from international to local deliveries, are considered in highway capacity planning—particularly because local deliveries tend to be “invisible” in the planning process yet represent a significant portion of local transportation system demand; and,

► Appropriate consideration of freight that will serve economic development—ensuring that passenger and freight capacity improvements can be mutually beneficial.
The guidance will include case studies and examples of successful practice. These will also be incorporated into www.transportationforcommunities.com, the online decision guide for highway planning.

**The Benefits**

The *Freight Planning Guide* helps the planning and engineering communities better understand freight economics so they can make transportation capacity decisions that are beneficial to goods movement and balance other capacity considerations. That in turn helps public agencies plan for and provide highway capacity that serves economic development by meeting local community capacity needs while meeting national shipping and market supply needs. Effective freight considerations that address projected freight growth can also address the potential for delays and safety concerns associated with unanticipated freight movement bottlenecks.

**How can you learn more?**

Implementation for this product is expected in 2014.

The *Freight Planning Guide* will be available online and from the TRB Bookstore at http://www.trb.org/StrategicHighwayResearchProgram2SHRP2/PublicationsSHRP2.aspx. It will also be integrated into www.transportationforcommunities.com, the online decision guide for highway planning.

For more information, contact Spencer Stevens at FHWA, spencer.stevens@dot.gov; Matt Hardy at AASHTO, mhardy@aashto.org; or Steve Andrle at TRB, sandrle@nas.edu.

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Integrating Smart Growth Strategies within Transportation Planning

*Using land use strategies to reduce congestion*

Although considerable research has been conducted on the transportation-land use connection and the impact of smart growth strategies on daily travel, there is a lack of practical guidance and tools for translating these insights for regional planning. This creates a challenge for estimating the effects of smart growth development patterns and transportation management on traffic conditions and congestion.

For smart growth to be a component of regional congestion relief, transportation planners need to be able to assess what types of “smart growth development” are most suitable for given environments, as well as how best to link the development strategies to specific transportation solutions.

**The Effect of Smart Growth on Daily Travel**

**The Solution**

Developed through the second Strategic Highway Research Program (SHRP2), the Smart Growth Area Planning or SmartGAP provides planners with scenario-forecasting tools they can use to estimate smart growth’s effect on peak-hour travel, as well as its effects on sprawl, energy reduction, active travel, and carbon footprints. The new research report and software tool enable state transportation and regional agency planners to estimate the effects of different smart growth strategies on regional peak-hour travel demand and other transportation parameters.

The SmartGAP tool allows a user to input different scenarios for land use, population growth, and transportation strategies, and then create a model of their effects on several critical performance areas. SmartGAP tracks individual households and businesses in a region to determine transportation impacts from growth. The tool is free, open-sourced, and user-friendly. A model user’s guide was developed to support implementation, and SmartGAP has been tested in three pilot locations.
The Benefits

SmartGAP offers a reliable tool that transportation and land use planners can use to better understand how smart growth strategies will influence travel demand, the environment, the economy, and local communities. This capability reports smart growth benefits from induced travel and from both peak and non-peak travel. Agencies that lack travel demand models may especially benefit from this new tool.

How can you learn more?

The SmartGAP tool will be available on the TRB website in early 2013. The report will be published in early 2013 and will be available at http://www.trb.org/StrategicHighwayResearchProgram2SHRP2/Pages/Smart_Growth_486.asp x#reports. For more information contact Eric Pihl at FHWA, eric.pihl@dot.gov; Matt Hardy at AASHTO, mhardy@aashto.org; or Steve Andrle at TRB, Sandrle@nas.edu.

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