



Moving Forward:

Insights and Actions from the SHRP2 Freight Modeling and Data Improvement Program

Executive Summary

This report provides a summary of observations and recommended actions stemming from a series of freight data and modeling workshops. The workshops were held as part of the second Strategic Highway Research Program's (SHRP2) C20 effort, known as Freight Demand Modeling and Data Improvement. SHRP2, a national partnership among the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), and the Transportation Research Board (TRB), serves as a central resource for the development and deployment of innovative, practical, and proven tools to help transportation professionals address highway infrastructure needs, improve mobility, reduce congestion, improve safety, and improve decision making and professional capacity.

The SHRP2 C20 Freight Demand Modeling and Data Improvement effort aims to advance the state of the practice for freight data collection and modeling. It supports State Departments of Transportation (State

DOTs), metropolitan planning organizations (MPOs), other regional and local transportation agencies, Federal/national partners, and private sector stakeholders in sharing information and implementing strategies to improve freight transportation decision making, planning, and programming.

FHWA and AASHTO held ten SHRP2 C20 workshops (including a pilot workshop) over a 14-month period in 2016 and 2017. Each of the two-day workshops convened freight data decision makers, practitioners, analysts, researchers, and others representing State and regional/local agencies, private industry, universities, and other organizations. The workshops took place in metropolitan locations across the country. An Expert Task Group (ETG) helped oversee the workshop activities and development of action items; the ETG will also guide action item implementation.

The workshops featured robust discussion on freight data and regional collaboration opportunities and needs related to three themes: 1) communication, coordination, and capacity building; 2) data resource



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needs; and 3) the planning and decision-making process. Section 4 of the report details key observations from workshop participants, in addition to summarizing the regional perspectives presentations at each workshop and a brief overview of recommended actions by workshop. Participants stressed the importance of collaborating with partners to leverage data-sets and limit potentially duplicative data procurement efforts, and of promoting internal capacity building by public sector agencies to improve freight data analysis capabilities. They also noted that available freight data resources are often inadequate or misaligned with the types of analyses needed. They also identified challenges in accessing data reflective of rapidly evolving practices in freight mobility and delivery, such as the growth in e-commerce. Another recurring concern was how to effectively address public sector information gaps given the proprietary nature of much information held by private freight operators/carriers. Participants recommended mechanisms to better integrate freight data and criteria into existing planning, operations, and decision-making processes.

Following the discussions of opportunities and needs, workshop participants developed strategies and recommended actions to pursue following the workshops. The end of Section 4 highlights which recommended actions were emphasized in the action plans developed at each regional workshop. These action plans are expected to inform priorities for regional freight data collaboration roadmaps, which are also summarized in this report.

In addition to the summary of workshop discussions, this report presents a SHRP2 C20 recommended action framework in Section 5. The framework describes the highest-priority action items that emerged from the workshops as a whole, as well as specific strategies to carry out the actions. Further, it identifies responsible parties to oversee, manage, or support action implementation as well as an expected timeline for implementation. Among all actions included in the framework, those identified as most frequently mentioned from the workshops were: building and strengthening public and private sector partnerships as well as regional partnerships; enhancing training and technical capacity-building opportunities; and improving freight data quality at all levels of government.

In addition to this document, **Appendix A** (SHRP2 C20: Freight Demand Modeling and Data Improvement Post Workshop Assessment) summarizes the responses to an assessment given to participants 6–12 months after the workshop. **Appendix B** (SHRP2 C20 Regional Workshop Summary Reports) includes detailed summaries of each of the workshops, with details on the attendees, featured presentations, and discussions. Finally, a companion document to this summary report, the **SHRP2 C20 Freight Transportation Planning Data Guide**, was recently developed by CPCS and AASHTO and is available for further review. This guide is meant to lead readers through the process of selecting and acquiring data to address common freight issues, needs, and goals.

1. Background

The second Strategic Highway Research Program (SHRP2) is a national partnership among the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), and the Transportation Research Board (TRB). SHRP2 serves as a central resource for the development and deployment of innovative, practical, and proven tools to help transportation professionals address highway infrastructure needs, improve mobility, reduce congestion, improve safety, and improve decision making and professional capacity.

SHRP2's C20 product, Freight Demand Modeling and Data Improvement, focuses on improved freight modeling and freight data analysis/applications. These efforts are expected to result in a comprehensive roadmap to guide State Departments of Transportation (State DOTs), metropolitan planning organizations (MPOs), and other regional and local transportation agencies, Federal/national partners, and private sector stakeholders, to:

- **Foster greater efficiency and cost effectiveness** to support local, regional, and state freight transportation decision making, planning, and programming;
- **Develop and implement more consistent and efficient approaches** to collect and maintain local and regional freight data; and
- **Identify and share pooled resource options** that encourage coordinated data collection and analysis.

2. Purpose

The purpose of this document is to provide a summary of discussions and recommended actions resulting from a series of workshops on freight data and modeling held in 2016 and 2017. These workshops were conducted as part of the deployment of the SHRP2 C20 product, Freight Demand Modeling and Data Improvement.

Section 3 of this document provides details on the format for these regional workshops. Section 4 provides highlights of discussions held during the workshops and includes a summary of actions recommended by workshop participants to spur regional data innovation and coordination. Section 5 of this document provides the SHRP2 C20 recommended action framework. This framework builds on the recommended regional actions, but also identifies general implementation considerations to help move the actions into practice. The framework is not intended to be prescriptive; it provides a range of tools to support decision makers and stakeholders in advancing the freight modeling and analysis state of the practice and in building professional capacity.

3. Workshop Overview and Format

To obtain insights on C20-related topics and identify stakeholder priorities, FHWA and AASHTO delivered a series of one pilot workshop and nine regional workshops across the country between 2016 and 2017. The pilot was presented at the 2016 Transportation Research Board Annual Meeting to test out the agenda and refine some of the presentations. Workshop participants represented a range of stakeholders, including freight data decision makers, practitioners, freight/transportation analysts and modelers, and researchers. Collectively, workshop participants represented State DOTs, MPOs/local agencies, private industry, consulting firms, and the university/academic arena. Each workshop was preceded by a 1.5-hour webinar featuring SHRP2 and freight-related presentations, as well as information about the upcoming workshops.

Prior to the launch of the workshops, FHWA and AASHTO convened an Expert Task Group (ETG) to oversee and guide the workshop activities and the post-workshop development of a strategic plan and action items. The ETG met prior to the launch of the workshops and again after the second workshop to provide additional guidance. Following the completion of post-workshop activities, including this report, the ETG will meet one final time to review the recommendations provided in this report, and to discuss and close out this SHRP2 initiative.

An overview of the nine delivered regional workshops is provided below.

Location	Dates	MPO and State DOT Participants from:
Orlando, FL	August 8-9, 2016	AL, FL, GA, MS, NC, SC, TN
Portland, OR	September 27-28, 2016	AK, ID, MT, OR, WA, WY
Washington, DC	November 17-18, 2016	DC, DE, MD, PA, VA, WV

Location	Dates	MPO and State DOT Participants from:
Dallas, TX	January 23-24, 2017	AR, KS, LA, MO, OK, TX
Chicago, IL	February 15-16, 2017	IA, IL, IN, KY, MI, OH
Phoenix, AZ	March 15-16, 2017	AZ, CA, CO, HI, NM, NV, UT
Minneapolis, MN	April 5-6, 2017	MN, NE, ND, SD, WI
Hartford, CT	May 10-11, 2017	CT, MA, ME, NH, NJ, NY, RI, VT
Savannah, GA	October 17, 2017	MPO attendees from across the country (workshop held as part of the Association of MPOs [AMPO] Annual Conference)

Each workshop consisted of two half-day sessions, held over a two-day period. During the first day, participants learned about the background of the SHRP2 program, the efforts that led to the C20 project, and other freight initiatives and policies at the Federal level. They also discussed the challenges of, and opportunities for, improved state and regional collaboration around freight data. The workshop participants discussed a number of case studies on freight data collaboration from across the country and participated in a discussion of factors that led to these cooperative efforts. The presenters illustrated the current freight data landscape by sharing information on opportunities to improve freight data, along with information about FHWA freight-related requirements, such as the National Highway Freight Program and State Freight Plans. Presenters also highlighted examples of collaboration between the public and private sectors, including State DOTs, the freight industry, and MPOs. Each workshop featured a presentation on regional freight issues by one of the participants. The workshop agendas also provided attendees with opportunities to meet with one another in smaller groups to brainstorm and share data sources, tools, and resources their agency used, as well as to identify commonalities across agencies. Participants in the first C20 workshop proposed that “speed data” sessions be held on the first day of the workshop. These sessions consisted of presentations by the participants about their own freight data sources, as a means of raising awareness of various sources and fostering collaboration and data exchange. The sessions, which were included in the agenda of all of the subsequent workshops, resulted in valuable discussions and collaboration among workshop participants.

Day two of the workshops included regional perspective presentations (see Section 3.D. Regional Perspectives) to review freight planning activities and provide examples of collaborative efforts jointly led by several of the workshop’s participants. Participants shared their observations of freight-related datasets, tools, issues, new developments, and upcoming events or partnerships in their respective regions. After these discussions, participants organized into teams to discuss data needs and partnership opportunities. They developed strategies and action items to pursue following the workshops. Outcomes from these sessions are expected to inform priorities for regional freight data collaboration roadmaps and are summarized in this report.

Case studies presented at the regional workshops included:

- I-95 Corridor Coalition’s **vehicle probe project and group data purchasing**;
- Institute for Trade and Transportation Studies’ **freight multi-state regional data clearinghouse**;
- **Oversize overweight route and permit data** in Wisconsin, Minnesota, North Dakota, and findings in National Cooperative Highway Research Program Report 897;
- Arizona DOT and the Maricopa Association of Governments’ **sharing a vendor purchase** of statewide multimodal commodity flow and business establishment data;
- The Washington Metropolitan Council of Governments and the Baltimore Metropolitan Council’s **joint data collection efforts**;
- Iowa DOT’s **supply chain data applications** for planning;
- The Delaware Valley Regional Planning Commission and regional partners’ **Philly Freight Finder Freight Platform**;
- Utah DOT’s **Universal Sharing Platform, UPlan**; and
- **Web-based applications** like Aplan and PennShare.

4. Highlights of Discussions

The workshops fostered robust discussion on freight data and regional collaboration opportunities and needs, the recurring aspects of which are grouped below into four themes: 1) communication, coordination, and capacity building; 2) data resource needs; 3) planning and decision making process; and 4) regional perspectives. Additional details of the workshop discussions for each theme are provided below; bullets identify specific observations described by workshop participants.

A. Communication, Coordination, and Capacity Building

Workshop participants emphasized the importance of communication, coordination, and partnerships, among themselves and together with their regional and federal partners. They described the observed and anticipated benefits to these activities, including improved data sharing, more strategic use of shared resources, increased efficiencies and cost-effectiveness, and more standardized, higher-quality data. Specific observations made by workshop participants regarding communication, coordination, and capacity building include:

- **Partnerships—including within and between local/regional and municipal agencies, State agencies and Federal organizations, and private industry—are critical for improved freight data quality, agency efficiencies, and cost-effectiveness.** Collaboration supports the entire data lifecycle, from data collection and compilation to analysis/visualization and management or maintenance of information over time. Some data (e.g., gas and oil industry data) may in fact only be available through partnership with local stakeholders or other agencies.
 - With collecting private sector data, sunshine/freedom of information laws can significantly hamper State DOTs’ and MPOs’ abilities to access and protect private sector data that may be considered proprietary, so agencies need to be creative in how they share information. They can use non-disclosure agreements, work with third-party intermediaries that anonymize data to ensure it is scrubbed of sensitive or personally identifiable information, and take other steps to ensure that sharing data does not lead to competitive disadvantages for its contributors.
 - With data from other agencies, many State DOTs emphasized that partnerships with other State-level departments (e.g., economic development, commerce, and tax/revenue) can create greater awareness of what data is already available, minimizing duplication of efforts and leveraging resources. However, they noted that even intra-State data sharing can be subject to restrictions and limitations.
- **When considering procuring new data from private sources, agencies should identify opportunities to scale data procurements and share in acquisition costs.** Many State DOTs and MPOs partner with others on data acquisition, whether by sharing large data sets from private providers (e.g., INRIX, American Transportation Research Institute (ATRI), HERE, Transearch, etc.) or making State-level data available to MPOs. Participants in nearly all of the workshops emphasized the need to plan in advance for implementing a collaborative arrangement for data procurement. Such advanced planning might include conducting due diligence research on other agencies in the region, state, or municipal area that already have a contract with the data provider and investigating opportunities to join the contract without undergoing a new bidding process. Several participants suggested developing a model contract or agreement for data purchase and acquisition, to avoid duplication or having inconsistencies across regions. Similarly, when initiating a bidding process, many participants worked with other agencies in their region or State to procure data at multiple scales and for different geographic locations. Notably, the I-95 Corridor Coalition procures certain data sets on behalf of its members and makes the data available at a reduced cost or as part of membership in the coalition. This, in turn, ensures regional and corridor-wide data consistency.
- **Agencies need to develop a consistent and effective narrative to communicate the benefits of data sharing and foster continued coordination.** Outreach to multiple stakeholders at all levels—including agency leadership, elected officials, regional/local decision makers, private industry, the public, and others—is needed to demonstrate how having more robust freight data contributes to better decisions and outcomes, which in turn fosters improved freight mobility and economic growth. Workshop participants suggested developing a business case tailored to agency leadership that demonstrates the importance of investing in quality data and sharing it with other State/regional partners. Visual depictions can be valuable in “telling the freight story” in a compelling way and show how freight investments support regional and state economic development and quality of life. Workshop participants noted the challenges of engaging the private sector in data-sharing activities, especially as public planning processes can take years while the business community’s planning horizons may be days or weeks. In both the public and private sectors, organizations may hesitate to invest in data development or procurement without a full understanding of its benefits. Further, organizational silos can generate disconnects or miscommunication within and between departments. Some

participants noted it can be difficult to trace benefits precisely from any one particular investment to improved trade flows or economic performance. This makes it particularly important to make the business case showing how freight data investments lead to positive outcomes for the entire transportation system, as well as overall economic development.

- **There is a need to improve public sector agencies' internal capacities for developing, analyzing, and applying freight data, moving beyond a reliance on private contractors for these tasks.** Specific capacity-related challenges include having limited funds or staff with the necessary time or expertise; difficulty identifying common internal agency goals around data sharing and analysis; and difficulty managing internal workloads to ensure that staff have dedicated time for data collaboration. Workshop participants recommended several specific strategies for capacity building:
 - Implement targeted trainings or workshops.
 - Develop and participate in information exchange forums, especially peer exchanges or other in-person meetings, but also through webinars.
 - Produce guidance documents or data cheat sheets, or both, specifically on how to apply data to support different types of analysis.
 - Engage in internal agency coordination to “right-size” priorities and ensure alignment with staff availabilities/capabilities. Agencies may also coordinate with higher education institutions as a way to leverage resources or knowledge.
 - Ensure that the right individuals are “in the room” to identify strategies and identify clear champions to carry out these strategies.
 - Identify and share best practices more widely. Topics of special interest for best practices included the use of specific tools for data visualization (such as the National Performance Management Research Dataset [NPMRDS]).

B. Data Needs and Resources

Workshop participants described significant limitations in agencies' abilities to collect, organize, and analyze freight data. Many observed that while data was voluminous, knowledge of which data to use was scarce. Data from a variety of sources is often not available at the same geographic scale. They also noted that freight data can also vary widely in quality. They discussed an array of strategies to address these limitations. Many participants noted that strategies need to be multi-faceted and deployed in coordination with other stakeholders in order to be effective. Specific observations made by workshop participants regarding data needs and resources include:

- **There is a mismatch between available freight data resources and needs.** For example, resources such as the Freight Analysis Framework (FAF) are very valuable; however, many participants noted that these tools lack local and regional granularity, which limits their usefulness. While there is a vast amount of probe data available for monitoring traffic speeds, such as the NPMRDS, this data is not available for all roadways and lacks origin–destination information. At the time of the workshops, participants reported having difficulty conflating NPMRDS data with data that uses a different network, such as the Highway Performance Monitoring System (HPMS). Aligning data geographies can also be a challenge, as many Federal data sets rely on State and county geography, which may not match MPO planning area boundaries. For instance, in Connecticut and Massachusetts, the MPO boundaries do not align with county boundaries. In these cases, FAF data must be processed to align with MPO boundaries, which adds time and cost, especially if this work needs to be contracted.
- **Different agencies have different standards for how to handle freight and permitting data.** Agencies struggle to establish common data standards and priorities, especially for cross-border oversize/overweight (OS/OW) freight traffic. Similarly, data on freight flows monitored by one State DOT may not always align with the freight flows tracked by a neighboring State DOT, even if traffic is flowing along a single corridor. Different data attributes, standards, and data-sharing agreements further limit access to data across State boundaries and sometimes across MPO boundaries. Mechanisms to support further cross-border data collaboration activity could include developing memoranda of understanding among regional/State agencies to share data and develop benchmarks.

- **One of the most significant data gaps is caused by the inability of information generation to keep pace with rapidly evolving trends.** For example, participants noted that due to the rise of e-commerce, it has become more important to learn about the travel characteristics around large distribution centers and where companies plan to locate them in the future. This issue is expected to become more significant given the rapidly evolving system of freight delivery, which is trending towards the use of smaller vehicles and faster delivery times, particularly in urban areas. To address this particular gap, agencies can contact real estate companies to access their annual reports on large transactions, work with their state economic development agencies, or work with freight industry either informally or through freight advisory councils. As another example, to address gaps on freight route usage, some agencies (including Kentucky Transportation Cabinet, Southeast Wisconsin Regional Planning Commission, and Minnesota DOT) reported conducting random sample truck surveys along major routes and at truck parking areas.
- **The proprietary nature of information on private freight operator/carrier needs and practices can limit the public sector's ability to obtain this information.** Some examples of gaps in public sector information include data on the frequency and characteristics of short-haul trips (e.g., local deliveries, e-commerce, etc.). There is also limited public sector access to rail and pipeline data.

Data Opportunities and Challenges

Attendees at the nine workshops discussed a series of data opportunities and challenges as part of the Day 1 agenda. Below is a summary of the frequently discussed opportunities and challenges associated with accessing freight data throughout the country.

Opportunities:

- Integrating local data sources (gas/oil industry, other state agencies)
- Building partnerships to share existing sources
- Resolving private industry concerns about proprietary data
- Developing cross-jurisdictional data-sharing agreements
- Working with informal sources of freight data (industry discussions, facility tours, manual truck counts)
- Acquiring data through freight advisory committees
- Building data-sharing partnerships across international borders

Challenges:

- Encountering barriers to data access (public records laws, transparency)
- Capturing reliable data on rapidly-evolving consumer demand and shipping patterns (e-commerce growth)
- Identifying sources for data about short-haul trips and first/last-mile travel
- Understanding truck parking needs
- Addressing variations in data quality
- Lacking data that is sufficiently granular for state/regional modeling
- Overcoming data mismatches across jurisdictional boundaries
- Addressing institutional issues (leadership support, need for freight modelers)
- Prioritizing rural versus urban infrastructure investment for freight

Participants engaged in discussions on strategies to address these and other public sector data gaps. Suggested strategies included consulting literature reviews to find data or conducting manual or video truck surveys (specifically to address the short-haul trip data gap). Many private sector stakeholders will share data if adequate precautions are taken to address concerns about sharing proprietary information. For example, proprietary data can be consolidated or anonymized. Public agencies can also talk to data vendors about what information is available to address specific gaps.

Many participants noted that developing strong working relationships with private sector freight actors is critical to obtaining information to better understand private industry perspectives on freight movement. In many cases, this information may be qualitative, but helps provide deeper context on challenges, trends, and private sector decision making. For example, some participants mentioned conducting workshops, one-on-one interviews, or surveys with freight carriers. These discussions with the private sector have generated contextual information to help agencies understand where or why bottlenecks occur. To develop strong partnerships, it is important to communicate to the private sector why their perspectives or data are valuable for making decisions on transportation improvements. It is also important to follow up with private sector stakeholders when freight improvements are made; this will help demonstrate that their involvement led to positive outcomes and will encourage continued engagement.

■ **Agencies should consider new approaches to freight modeling and planning.** For example, Caltrans is moving from capacity-based models to vehicle miles traveled (VMT)-based models, in part to respond to state legislation that requires new metrics to identify and mitigate transportation impacts.

Many agencies described efforts to align transportation, land

use, and roadway design data. Historically, land use has not been fully considered in transportation planning, but for many agencies this is becoming an important method of tying freight needs to roadway planning and design.

C. Planning and Decision-Making Process

Spurred by recent Federal transportation legislation including the Fixing America's Surface Transportation (FAST) Act, transportation and freight planners/practitioners have emphasized the need to articulate how freight fits into public planning, programming, and decision-making processes. Workshop participants noted that freight data should play an integral role in these conversations. Having better, higher-quality, and more robust data will support agencies in aligning freight needs and leveraging available funds and resources to implement freight transportation projects. Specific observations made by workshop participants regarding how freight fits in with the transportation and decision-making process include:

- **Data analysis approaches that respond to FAST Act requirements are still evolving.** Many agencies noted that they experienced challenges in meeting the timeline for developing FAST Act-compliant State freight plans. These plans were required to be in place for a State to be eligible to obligate Federal National Highway Freight Program funds after December 4, 2017. In particular, agencies found the requirement to establish clear frameworks and develop scoring mechanisms to prioritize projects for inclusion in the State freight plans challenging to implement.
- **Freight data should be better integrated with infrastructure planning and operations.** Many participants noted that general VMT is considered in infrastructure investment decisions and planning projections but not necessarily freight VMT. Additionally, freight planning considerations are given less weight in project prioritization and operations and maintenance decision making. Some participants noted that even trends that seem driven by consumer demand and the private sector—such as local freight deliveries and e-commerce—have significant impacts for public sector planning and operations. For example, warehouse siting can impact roadway design, increase freight flows on highway infrastructure, and change the special characteristics of land uses (such as large distribution centers located in exurban/rural fringe areas). Ideally, agencies will be able to integrate freight data into existing processes to the point that project priorities and actual outcomes are closely aligned with freight needs.

D. Regional Perspectives

At each of the regional workshops, one or more agencies with noteworthy practices relating to freight data modeling, data acquisition, or collaboration provided context on regional perspectives for consideration by all attendees. These presentations provided an opportunity to identify and share noteworthy practices, but also spurred conversations about challenges and constraints to collaboration and strategies to address them. The regional perspective presentations included the following:

- **Orlando, FL (August 2016):** Florida DOT and several MPOs shared examples of collaboration and joint data collection efforts in the Orlando region. They also discussed how mega-regional organizations, such as the I-95 Corridor Coalition and the Institute for Trade and Transportation Studies, provide good forums for coordination and data standardization.
- **Portland, OR (September 2016):** Oregon DOT (ODOT), the Puget Sound Regional Council (PSRC), and Washington State DOT (WSDOT) described how freight data is addressed in their respective jurisdictions with the support of a data modeling committee comprised of members of ODOT, WSDOT, PSRC, other MPOs, and local universities.
- **Washington, DC (November 2016):** Maryland SHA presented on a number of ongoing freight data initiatives in the State of Maryland, including efforts to improve truck bottleneck analysis, data on service issues and idling, and identification of problematic locations where freight volume exceeds parking availability.
- **Dallas, TX (January 2017):** Texas DOT (TxDOT) described its approach to freight planning and the scope and projections of its work, and provided an overview of its first multimodal freight plan. TxDOT also discussed its partnership with ATRI to map Texas's integral role in bringing goods and materials to the rest of the country and into Canada.
- **Chicago, IL (February 2017):** The Chicago Metropolitan Agency for Planning (CMAP) presented an innovative freight modeling tool funded through the FHWA Exploratory Advanced Research program. The CMAP model served as an example for other behavior-based freight models funded by SHRP2 in Baltimore, MD; Phoenix, AZ; and Portland, OR.

- **Minneapolis, MN (April 2017):** Minnesota DOT (MnDOT) presented on its efforts to identify freight data and information needs—in partnership with its Freight Advisory Council—to support competitiveness, identify bottlenecks, and demonstrate the benefits of investments. The agency also reviewed its recently-completed MnDOT Freight Investment Plan (2016), which was updated to comply with FAST Act requirements and includes a National Highway Freight Program spending plan. Finally, the University of Minnesota discussed its collaboration with MnDOT to identify truck bottlenecks and sources of truck mobility data.
- **Hartford, CT (May 2017):** Connecticut DOT presented on the development of its state freight planning effort, which began in earnest in 2001. The agency described its State freight plan, which was developed in collaboration with the State’s eight urban area councils of government, and seven rural MPOs. In addition, the Port Authority of New York and New Jersey discussed three freight data efforts underway: a web portal for OS/OW information, targeted enforcement of OS/OW violations on bridges, and improved airport and marine port access routes. Finally, North Jersey Transportation Planning Authority presented on freight movement in New Jersey and the evolving supply chain, particularly in light of recent supply chain disruptions such as e-commerce growth, retail last-mile deliveries, emerging technology (drone delivery, three-dimensional printing, Neo-Panamax ships), and transformative information technology (block-chain accounting, geo-fencing).
- **Phoenix, AZ (June 2017):** Arizona DOT (ADOT) presented on its draft State freight plan, which was developed through a process of robust collaboration with MPOs and private industry partners. ADOT planned to take its draft plan to the State’s Freight Advisory Committee for review in July 2017 and submit the final plan for FHWA review in September 2017.
- **Savannah, GA (October 2017):** Georgia Ports Authority (GPA) presented on the economic impact of shipping and freight in the Savannah area, home to five deep-water terminals handling 3.85 million twenty-foot equivalent units on an annual basis. GPA then took participants and other conference attendees on a tour of the Port of Savannah, which included views of the growing number of automated cranes and recently redesigned truck access and exit points.

E. Actions Recommended by Workshop Participants

The following table summarizes the key actions identified by workshop participants at each of the nine workshops. The emphasis is on actions that were uniquely identified at an individual workshop, or specific aspects of a commonly-suggested action that were highlighted by participants at one workshop. Further detail on each workshop and the associated action plans identified by participants are included in the workshop summaries (Appendix B).

As the table shows, a recommendation that frequently arose from each of the workshops was to develop a nationwide, common source or repository to detail the attributes of the available public and private data sets, training opportunities, and best practices. A companion document to this summary report, the **SHRP2 C20 Freight Transportation Planning Data Guide**, was recently developed by CPCS and AASHTO and is available for further review. This guide is meant to assist readers through the process of selecting and acquiring data to address common freight issues, needs, and goals. Agencies and practitioners should consult this guide for support in the data decision-making process.

Table 4.1. Regional Action Plan Summaries

Workshop	Action Plan Summary
Orlando, FL (August 2016)	<p>Participants at the Orlando workshop developed ideas for collaborative actions following the workshop. The recommended actions included:</p> <ul style="list-style-type: none"> • Participate in data purchasing and aggregation efforts with national and regional organizations to avoid duplicative efforts. • Establish consistent baselines for data standards, such as requirements for bottleneck analysis and FAST Act Freight Network designation, while allowing for scalability. • Support regular and ongoing forums for peer exchange and communication. • Improve staff capabilities for data analysis. • Expand partnerships and data exchange with private sector sources, including data vendors and broader industry. • Develop a common repository for all data and training opportunities. • Readily share best practices with other agencies to grow awareness around data-driven decisionmaking.
Portland, OR (September 2016)	<p>Attendees of the Portland workshop focused on ongoing regional and multi-state coordination, while seeking to leverage key opportunities to overcome common obstacles. The recommended actions included:</p> <ul style="list-style-type: none"> • Provide mechanisms for ongoing regional and multi-State coordination. • Expand data linkages, such as examining correlation between truck parking availability and truck crashes. • Address legal, resource, and data privacy challenges by exploring opportunities for collaboration with other agencies and organizations. • Focus on acquiring data that has the greatest impact for the largest number of partners, rather than focusing on the quantity of data. • Convene multi-jurisdictional and cross-disciplinary agencies, universities, and private partners to establish data and research sharing efforts and pilot studies.

Workshop	Action Plan Summary
<p>Washington, DC (November 2016)</p>	<p>Participants in the Washington, DC workshop emphasized building on existing partnerships in the Mid-Atlantic region to establish consistent messaging and data awareness for freight infrastructure investments. The recommended actions included:</p> <ul style="list-style-type: none"> • Leverage expertise and data availability to build a strong case for private sector and public agency stakeholders to participate in freight planning processes. • Identify effective means of communication with partners and private sector, whether broad outreach through freight advisory committees or directed outreach to specific individuals or groups. • Develop an effective project prioritization process for projects of regional significance that impact freight movement. • Expand truck parking research and data availability. • Tie freight data efforts to economic development and industry awareness, particularly with commodity flow information.
<p>Dallas, TX (January 2017)</p>	<p>Participants at the Dallas workshop focused on efforts to collaborate between States and regions (such as Texas and Louisiana, or Texas and Kansas). The recommended actions included:</p> <ul style="list-style-type: none"> • Develop training, guidance, and cheat sheets on freight data so MPO and State DOT staff are aware of which resources are available. • Develop a marketing plan for the current system of freight movement and build a case for why freight matters in the region. • Improve data sharing agreements to ensure that public agencies can properly protect proprietary data while using it for planning purposes. • Establish shared standards regarding freight traffic and OS/OW vehicles across State boundaries.
<p>Chicago, IL (February 2017)</p>	<p>Attendees of the Chicago workshop focused on moving toward data tools and resources that could enhance planning at the regional and multi-state scale. The recommended actions included:</p> <ul style="list-style-type: none"> • Work with Mid-America Freight Coalition to disseminate the group's methodology for identifying truck parking locations for planning purposes. • Share attributes and networks for modeling at the regional scale to ensure a consistent approach for modeling in-state and out-of-state freight trips. • Better integrate goods movement into the scenario planning and modeling process. • Establishing consistent measures for pavement wear from trucks, clearly defining local freight in modeling, and accounting for seasonal shifts in agricultural freight. • Encourage public-private partnerships for freight data access. • Improve incident management plans to better address routing of trucks during incidents and better understand the impact re-routing has on local roads.
<p>Minneapolis, MN (April 2017)</p>	<p>Participants in the workshop in Minneapolis came up with actions for future activity. The recommended actions included:</p> <ul style="list-style-type: none"> • Build partnerships to bridge the public-private gap, particularly by identifying specific planning and data products that can benefit private freight providers. • Work across State boundaries to share data and to establish consistent data sets and standards, especially by standardizing OS/OW permitting and using consistent roadway attributes. • Develop a "cheat sheet" on third-party global positioning system (GPS) and other data sets for easy access by data practitioners. • Provide input to Federal and other data sets to enhance their usability and to share best practices in visualization and usage between agencies.
<p>Hartford, CT (May 2017)</p>	<p>The Hartford workshop attendees emphasized regional approaches to planning, data standardization, and practice sharing. The recommended actions included:</p> <ul style="list-style-type: none"> • Establish a listserv for regional collaboration and sharing of best practices across States and MPOs, as well as investigating the use of pooled fund studies to pursue bulk data purchases. • Collaborate to standardize envelope data for OS/OW permitting and to ensure consistency in the use of technology tools for permitting. • Identify projects, corridors, or facilities with regional significance for freight and work to develop regional plans across planning boundaries. • Partner with universities to serve as neutral data clearinghouses to aid in improving access to private sector data. • Improve insight into local land use planning to understand the relationship between land use and freight impacts.
<p>Phoenix, AZ (June 2017)</p>	<p>Participants in Phoenix identified a series of post-workshop actions. The recommended actions included:</p> <ul style="list-style-type: none"> • Improve connections between freight planning and land use planning to encourage dialogue among traffic engineers, transportation planners, developers, and local land use planners. • Promote collaboration with freight industry partners, including leveraging 511 applications to share freight-related information. • Encourage Federal partners to take an active role in promoting collaboration, whether through peer exchanges, pooled fund studies, or improvements to existing data sets (FAF, NPMRDS, etc.). • Collaborate on freight planning efforts between agencies, particularly as a means to bridge gaps in skills at smaller agencies. • Encourage more advanced planning for data procurement and engage other agencies in the process so as to maximize the number of agencies that may benefit from a procurement and manage costs.
<p>Savannah, GA (AMPO, October 2017)</p>	<p>The Savannah workshop participants—all representatives from MPOs—discussed actions following the workshop in a round-robin style discussion. The recommended actions included:</p> <ul style="list-style-type: none"> • Incorporate freight impacts as part of the project prioritization process in the MPO Transportation Improvement Program (TIP). • Partner with other States and MPOs in data acquisition or data sharing and identify a common platform for sharing access to data. • Identify specific, non-traditional sources of freight data, including land use planning data, granular data on port movements, and safety and crash data on trucks. • Ensure that all stakeholders are engaged in the freight planning process, particularly private sector partners and members of the public most vulnerable to freight-related impacts. • Solicit feedback on freight plans from outside the agency, particularly from other agencies in the freight data community represented at these workshops.

5. SHRP2 C20 Recommended Action Framework

Workshop participants suggested a variety of action items to improve freight modeling and data innovation, specifically to address many of the challenges described in the above sections. These action items provide the basis for the regional-level action plans summarized in Section 4.E (and provided in full in Appendix B).

Participants at each workshop were encouraged to pursue opportunities for collaboration based on their identified action items. Results of an assessment conducted after the workshops (completed by about one third of all participants) indicate that the workshops were effective in helping participants identify strategies to collaborate and advance the practice in freight data analysis. For example, many participants reported that workshops helped provide a stronger foundation for ongoing collaborative work, especially through identifying and sharing new data-sharing examples and resources.

The recommended action framework, which is presented below, contains the highest-priority action items discussed at the workshops (action items are labeled with letters, e.g., A.1, A.2). Each action item is associated with a bulleted list of strategies. The actions and strategies are grouped according to the first three themes detailed in Section 4 (communication, coordination and capacity building; data needs and resources; and planning and decision-making process).

The C20 recommended action framework also identifies the responsible parties to oversee, manage, or support implementation of the action items. The roles and responsibilities include the following:

- **Advocates:** Parties that provide resources and support for implementation of an action item. Roles might include providing overall strategic guidance on action implementation, and conducting evaluation or assessment of progress.
- **Lead Implementers:** Parties with primary responsibility to carry out implementation of strategies associated with an action item.
- **Partners:** Parties whose buy-in, contributions (e.g., information sharing), and support are important to ensure successful implementation of strategies. In some cases, partners may not be transportation agencies.

Table 5.1 on the next page provides details on these responsible parties and their freight data and modeling-related activities. Table 5.2 matches each action item to a party. Parties are not mutually exclusive; for example, FHWA is identified as a steward for some actions and as a lead for others.

Table 5.1. Responsible Parties and Freight Data/Modeling Activities

Responsible Party Type(s)	Primary Agency Examples	Freight Data/Modeling Activities
Steward, Lead	FHWA and other USDOT agencies	<ul style="list-style-type: none"> • Establishes national policy and requirements driving freight data applications. • Provides funds and resources for freight transportation projects. • Convenes stakeholders for information exchange. • Procures and maintains Federal datasets and resources (FAF, NPMRDS). • Sponsors and conducts research with state, national organization, and academic partners.
Steward, Lead	AASHTO and peer national organizations (AMPO, TRB, etc.)	<ul style="list-style-type: none"> • Promotes data/modeling standards and specifications. • Develops guidance to support stakeholders in meeting Federal and other data-related requirements. • Convenes stakeholders for information exchange. • Sponsors and conducts research with federal, state, and academic partners.
Steward, Lead, Partner	State DOTs	<ul style="list-style-type: none"> • Responds to Federal and other mandates through freight data analysis. • Uses freight data in preparing State Freight Plan and Long Range Transportation Plan. • Gains industry input on freight issues from State Freight Advisory Councils. • Identifies priority freight transportation projects in coordination with MPOs/ regional/local agencies and others. • Obligates Federal and state funds for implementation of freight transportation projects. • Operates and manages the transportation system by collecting and using real time data. • Sponsors and conducts research with Federal partners, national organizations, and academic partners.

Responsible Party Type(s)	Primary Agency Examples	Freight Data/Modeling Activities
Steward, Lead, Partner	MPOs and regional agencies	<ul style="list-style-type: none"> • Responds to Federal and other mandates using freight data. • Uses freight data in preparing MPO Transportation Plan. • Identifies priority freight transportation projects in coordination with State DOT, municipalities, and local stakeholders. • Operates freight intermodal facilities (ports, airports) through local authorities. • Promotes industrial development through economic development authorities.
Lead, Partner	Other State agencies (e.g. transit agencies, State police, port authorities, economic development, etc.)	<ul style="list-style-type: none"> • Operates freight intermodal facilities (e.g., ports, airports) through local authorities. • Collects and houses data on freight-relevant information, such as tax assessment data, OS/OW permitting approvals, and economic development activity. • Promotes industrial development through economic development authorities.
Lead, Partner	Local planning agencies (city planning, etc.)	<ul style="list-style-type: none"> • Prepares land use plans and zoning codes that controls freight-dependent development. • Collects and owns data on local land use and transportation planning activities. • Identifies sites for industrial and warehouse development. • Addresses and plans for last-mile freight activity and local deliveries. • Monitors urban and suburban congestion and travel conditions.
Lead, Partner	Private sector freight operators	<ul style="list-style-type: none"> • Primary owner and operator of freight vehicles and freight infrastructure. • Develops and deploys supply chain logistics to respond to consumer demand. • Generates and analyzes extensive freight-related data to support business analytics. • Participates in public processes including data-sharing.
Lead, Partner	Private sector data owners (e.g., INRIX, HERE, TomTom, etc.)	<ul style="list-style-type: none"> • Develops and maintains proprietary data sets and related tools (many of which are used by freight operators as well). • Tailors data sets to local and regional scale, at cost.
Lead, Partner	Academic and research organizations	<ul style="list-style-type: none"> • Conducts research on technologies and modeling to support improved data. • Supports pilot studies and research to identify improved safety, roadway design, and other practices. • Partners with transportation agencies in data acquisition, especially by developing anonymized data sets or conducting industry surveys.

Table 5.2 summarizes how agencies are expected to engage in each action item, as stewards, leads, or partners, as well as anticipated timelines for implementation. The table is intended for use by decision makers to help them develop a comprehensive plan for who should carry out the action items, with whom they should coordinate, and when items should be implemented. Table 5.2 also provides a priority indicator for each action item. The priority indicator aligns with the frequency with which each action was brought up in the regional workshops. Actions that frequently recurred across workshops are listed as higher priority than those that were less frequently recurring. Finally, the timeline for action column in the table indicates a rough estimate of the amount of time each action would take for implementation. Short term indicates items that can be completed within 1–12 months, medium term indicates within 1–3 years, and long term indicates 3 years or more, starting from the publication of this report.

Table 5.2. Summary of Parties Matched with Action Items

ACTION ITEM	Priority (from workshop attendees)	Timeline for Action (short, medium, long term)	FHWA and USDOT agencies	AASHTO, AMPO, and other national orgs	State DOTs	MPOs, RPCs and regional agencies	Other State Agencies	Local Planning Agencies	Private sector freight operators	Private sector data owners	Academic/research orgs
A.1 Build and strengthen partnerships between the public and private sectors		Medium	L	S	L	L		P	P		P
A.2 Build and strengthen regional partnerships between transportation agencies		Long			S	S	P	P			
A.3 Communicate the benefits of freight data analysis for improved agency decisionmaking		Short	S	S	L	L					
A.4 Enhance training and technical capacity opportunities		Medium	S	L	P	P		P			
A.5 Document and share best practices among agencies		Short	S	L	P	P					
B.1 Enhance data and improve data accessibility		Short	S	S	L	L	P	P	P	L	L
B.2 Improve freight data quality at the national, State, regional, and local levels		Long	S	S	S	S	L	L	P	L	L
B.3 Improve efficiencies in data collection, compilation, sharing, and standardization		Medium	S	S							
B.4 Enhance freight data tools and data collection		Medium	S	S	L	L		P	P	P	P
C.1 Improve integration of freight into transportation and land use planning		Short			S	S	P	L			P
C.2 Improve integration of freight within transportation system management and operations		Long	S	L	L	L					
C.3 Support the integration of multimodal freight transportation and data		Long	S	L	L	L		P	P		P
C.4 Improve collaboration on OS/OW permitting		Medium	S		S	S	L	P	L		P
C.5 Improve research-to-practice connections		Long	S	L	L	L					L

S: Steward; L: Lead; P: Partner

A. Communication, Coordination, and Capacity Building

A.1 Build and strengthen partnerships between the public and private sectors

Steward: AASHTO

- **Develop formal mechanisms to encourage data collection and data sharing.** This could take various forms, but could include developing data-sharing agreements, forming interagency committees to discuss regional data needs, etc. *Lead: State DOTs and MPOs*
- **Investigate opportunities for private sector businesses to share anonymized or aggregated data** with the public sector that would otherwise be proprietary. One example would be sharing data through a third party such as a university partnership. *Lead: AASHTO, AMPO, and FHWA*
- **Identify and regularly communicate to industry partners** the benefits of their active participation in the freight planning process and the importance of information sharing. Coordinating with a State freight advisory committee could be particularly effective. *Lead: State DOTs and MPOs*
- **Leverage opportunities for the public sector to directly engage with freight operators and carriers** (such as the trucking industry) to foster effective engagement and buy-in for public sector planning processes. A number of workshop participants reported that one-on-one interviews fostered more open communication with trucking industry leadership and operators, rather than engagement through bigger focus groups or public meetings. A State freight advisory committee could also provide a useful forum for coordination. *Lead: State DOTs and MPOs*

- **Use targeted communications and supporting technology to engage industry partners.** For example, the availability of the 511 system and web and GIS tools (like the Philly Freight Finder) can encourage freight providers, logistics companies, and others to access up-to-date information. These and other tools can help communicate information such as locations of freight corridors or truck routing restrictions. *Lead: State DOTs and MPOs*
- **Explore development and deployment of technology that can expand the understanding of freight flows and data.** Tools such as connected vehicles, intelligent transportation systems (ITS), advanced traveler information system (ATIS) technologies, truck parking information systems, and real-time information applications can inform freight carriers and operators of downstream system conditions (like closures, crashes, or delays; congestion alerts; or terminal queues) and help highlight the value of information sharing. *Lead: All agencies*

A.2 Build and strengthen regional partnerships between transportation agencies

Stewards: State DOTs and MPOs

- **Develop regional, strategic data plans.** Regional data plans can spell out roles and responsibilities for partners at various levels (Federal, State DOTs, MPOs, etc.). *Lead: AASHTO and FHWA*
- **Leverage current efforts or resources to build broader regional initiatives.** Identify opportunities to share resources and costs, especially given differing resource levels across agencies. Agencies may also need to identify their individual needs, capabilities, and resources, and identify where collaboration could help address any gaps. *Lead: State DOTs and MPOs*
- **Identify a process for encouraging early regional engagement.** Processes such as Planning Environmental Linkage (PEL) can facilitate early regional engagement in planning for transportation improvements well before National Environmental Policy Act reviews. *Lead: State DOTs and MPOs*
- **Make the business case for regional coordination** by identifying the cost savings derived by working regionally. State freight advisory committees can provide important forums for regional coordination. (For regional coordination examples, see Sun Corridor coordination, I-95 Coalition, and Intermountain West). *Lead: State DOTs and MPOs*
- **Emphasize collaborative data for projects with regional significance,** particularly in how to scope projects and share information. *Lead: State DOTs and MPOs*
- **Identify other non-transportation agencies that can be a source of data,** such as State departments of commerce, agriculture, etc. *Lead: State DOTs and MPOs*
- **Develop intra-state, sub-regional plans** for areas that share similar freight challenges. *Lead: State DOTs and MPOs*
- **Identify appropriate mechanisms to encourage regional coordination and dialogue,** such as regional conference calls, webinars, online forum, and listservs. *Lead: AASHTO*

A.3 Communicate the benefits of freight data analysis for improved agency decision making

Stewards: AASHTO and FHWA

- **Identify and share examples of freight data analysis for improved decision making.** This might include communicating to leadership and agency staff that a given dataset may be the best available, even if it is not perfect, and seek continual improvement in data quality, coverage, and richness. *Lead: FHWA, AASHTO, State DOTs, and MPOs*
- **Identify resources to assist in data communications,** such as local technical assistance program funding. *Lead: State DOTs*
- **Identify ways to make data user friendly for local and municipal staff,** who may not have in-depth technical skill-sets. *Lead: State DOTs and MPOs*
- **Identify needs for and develop communication materials that help show the overall significance of freight data** to major decision makers. *Lead: AASHTO, State DOTs, and MPOs*
- **Use trip generation data to make proposed projects more context sensitive.** In particular, freight specialists within an agency should work to share data collected for freight planning early in the project proposal and planning process to ensure appropriate consideration of freight impacts. *Lead: State DOTs, MPOs, and local agencies*

- **Use existing data to inform land use decision making.** Similar to sharing trip generation data, sharing freight data with land use planners and local agencies can ensure consideration of freight impacts. *Lead: Local agencies, State DOTs, and MPOs*

A.4 Enhance training and technical capacity opportunities

Steward: FHWA

- **Identify and implement training and technical capacity needs for agency staff**, especially on data applications and analysis (e.g., FAF data gaps and lessons learned in processing data). Other topics could include guidance to help agencies allocate staff resources for collaborative freight data activities or guidelines for staff time and workload management. Additionally, training modules could be developed on private sector supply chain management strategies and business models. *Lead: State DOTs and MPOs*
- **Partner with academia on coursework, training programs, and research projects** to benefit State freight programs. *Lead: State DOTs*
- **Initiate cooperative efforts among State DOTs and MPOs to hire staff** dedicated to collaborative data activities or explore strategies to permit more dedicated staff time for these efforts. *Lead: State DOTs and MPOs*
- **Develop opportunities to train and educate future freight data analysts and specialists**, including outside of the traditional academic pipeline. *Lead: All organizations*
- **Identify and promote resources and funds for MPO or agency staff, or both, to attend trainings or travel to national conferences.** *Lead: AASHTO, State DOTs, and MPOs*
- **Identify mechanisms for knowledge transfer within and between organizations.** This is particularly important, since many agencies rely on early-career staff for data processing). *Lead: State DOTs, MPOs, and AASHTO*
- **Promote models for resource sharing or other collaboration among States.** Some agencies have limited staffing or lack specific skills needed to enhance freight models and can draw upon the experience of other agencies for potential solutions. *Lead: FHWA and AASHTO*

A.5 Document and share best practices among agencies

Stewards: FHWA

- **Identify and share best practices between State DOTs and MPOs**, especially those relating to the following topics:
 - Inter-agency cooperation
 - Inter-State data collection or analysis efforts, such as sharing the terms of data procurement/contracts
 - Historical agriculture data and loads over time
 - Classification counts and truck route maps
 - Travel time reliability reporting using RITIS to connect to NPMRDS
 - Language for non-disclosure agreements and data contracts

Lead: FHWA and AASHTO

- **Identify appropriate mechanisms to collect and disseminate best practices**, including:
 - Peer exchanges
 - Webinars
 - Case studies/cheat sheets
 - Recorded interviews/documentation
 - Online best practice repository
 - Video conferences
 - Workshops

Lead: FHWA and AASHTO

B. Data Needs and Resources

B.1 Enhance data and improve data accessibility

Stewards: AASHTO and FHWA

- **Encourage Federal agencies to take a leadership role to support data enhancement.** For example, participants asked if the Federal government could expanding the NPMRDS data coverage to include additional elements such as integrating the NPMRDS with origin–destination data or combining the NPMRDS with the Freight Analysis Framework (FAF) data in order to better understand freight fluidity. *Lead: FHWA*
- **Support Federal development and maintenance of a data clearinghouse or repository** that would make information more readily accessible to a broader set of stakeholders. A detailed compilation that explains data biases or limitations for Federal data sets could support this effort, particularly for a complex dataset like NPMRDS. *Lead: FHWA*
- **Develop a comprehensive list of available freight data sources** with information on how each data source could be used. Many workshop participants described wanting to have a user-friendly freight data reference or guide. This could include:
 - Recommendations for how to obtain/collect data as well as analyze and visualize the data.
 - Strategies to connect and align different freight data sources.
 - Approaches to collaborate with private industry and public sector agencies to identify new freight data sources.
 - Tips for improved data collection, specifically to capture multiple truck types and smaller freight vehicles.

Lead: AASHTO

- **Provide information and guidance on available tools to support data analysis** such as modeling, database analysis, visualization, and data-sharing platforms. *Lead: AASHTO*

B.2 Improve freight data quality at the national, State, regional, and local levels

*Note: in support of recommended action B2, AASHTO has released a companion document to this summary report, the **SHRP2 C20 Freight Transportation Planning Data Guide**, developed in partnership with CPCS. This guide is meant to guide readers through the process of selecting and acquiring data to address common freight issues, needs, and goals. Agencies and practitioners should consult this guide for support in the data decision-making process.*

Stewards: FHWA, AASHTO, State DOTs and MPOs

- **Identify tactics to collect more accurate and robust data at the local, MPO, State, and national levels:**
 - Develop a quick reference guide (or cheat sheet) on third-party GPS data—i.e., which organizations collect data, how it is available, and best practices for data acquisition by public agencies.
 - Produce an inventory of data gaps.
 - Identify available data resources, including those from across State lines and MPO boundaries, and how they would address the gaps.
 - Plan data procurement further in advance, including 1) incorporating shared purchasing as part of scoping data needs, 2) aligning procurement processes to allow different agencies to contribute funds, 3) creating a template to create consistency among data procurement contracts, and 4) involving people from different agencies early.
 - Encourage data set providers to incorporate additional sources of data (e.g., waybill data in Colorado).
 - Work with Federal government to vet Transearch/commodity flow data.
 - Provide guidance for local data collection, such as local business surveys and truck driver diaries.
 - Provide recommendations and guidance on performing data quality control and validation.

Lead: AASHTO and FHWA

- **Identify ways to make existing national datasets more robust** to help fully meet the needs of State DOTs and MPOs and reduce the amount of time and resources spent on procuring supplemental data. In coordination with national organizations and universities, Federal agencies could also help review and identify strategies to address data gaps.
 - Identify potential expansions to existing data sets. Specifically, investigate opportunities to broaden NPMRDS to include additional data components and develop new approaches for FAF data to reflect MPO-level or county-level goods/truck movement.
 - Identify opportunities for collaboration with State DOTs, e.g., agencies can unite as customers to provide more data/input, or join pooled funds to help with new data procurements.
 - Use of GPS in trucks and data sharing with third-parties/FHWA/ATRI to get a more robust sample of frequency distributions.

Lead: State DOTs, MPOs, and AASHTO

B.3 Improve efficiencies in data collection, compilation, sharing, and standardization

Steward: AASHTO

- **Identify specifications for and develop a centralized, interagency data-sharing platform.** This would involve developing the administrative, programmatic, or organizational structures needed to manage or oversee such a tool, such as a data department or Chief Data Officer/statewide data committee. *Lead: AASHTO*
- **Use a collaborative process to develop common attributes, data formats, or conventions for freight data standardization,** especially on envelope and OS/OW vehicle data, roadway GIS layers, and consistency in technology platforms. *Lead: FHWA and AASHTO*
- **Identify and promote models for data procurement (such as sample memoranda of understanding) and data standardization across platforms.** *Lead: FHWA and AASHTO*
- **Leverage existing venues such as State freight advisory committee meetings** to share information on potential data sources. *Lead: State DOTs and MPOs*
- **Partner with universities that can serve as neutral data clearinghouses,** particularly for data sets that use sensitive information such as transponder data. *Lead: State DOTs and MPOs*
- **Work with the private sector to remove proprietary information from commercial data** before sharing with government agencies. *Lead: AASHTO, AMPO, and ATRI*
- **Advance State DOT and MPO truck counting programs and funding.** Identify tactics to achieve cost-savings in truck counting programs. *Lead: State DOTs and MPOs*
- **Identify and promote opportunities to leverage new funding resources for data procurement or data-sharing activities** (such as FASTLANE grant funding set-asides, State Planning and Research (SPR) funds, and Surface Transportation Program funds). *Lead: State DOTs, MPOs, and FHWA*
- **Ensure that data is made available and shared with other offices within the agency or with local planning partners.** Making it accessible, usable, and understandable by others in the organization will increase the data's beneficial use—the more people using the data, the more valuable it is. *Lead: State DOTs and MPOs*
- **Ensure that acquired data is being integrated with other data to make it more useful.** Fusing the data with other data and analysis helps add value, for example, combining speed data with RWIS data and incident data to ID locations where weather is impacting freight movement. *Lead: State DOTs and MPOs*

B.4 Enhance freight data tools and data collection

Stewards: AASHTO and FHWA

- **Improve data visualization techniques.** Develop and refine visualization tools for presentation of data and understanding of trends by decision makers. *Lead: AASHTO and FHWA*
- **Consider the needs of smaller-sized transportation agencies** (such as counties, small MPOs) when developing data tools, guides for freight data acquisition, and trainings. *Lead: AASHTO and FHWA*
- **Identify opportunities to use ITS and connected vehicle technology for data collection.** This can include ITS, ATIS technologies, data from traffic management centers, connected vehicles (vehicle-to-vehicle and vehicle-to-infrastructure), safety and mobility applications, truck parking information systems, and weigh-in-motion (WIM) system. *Lead: FHWA*

C. Planning and Decision-Making Process

C.1 Improve integration of freight into transportation and land use planning

Stewards: State DOTs and MPOs

- **Develop mechanisms or venues to promote dialogue between freight/transportation practitioners and private developers**, to improve data on how freight, land use, and development intersect. *Lead: State DOTs and MPOs*
- **Identify tactics to integrate freight considerations into land use planning**, such as developing criteria for evaluating development proposals that consider impact on freight facilities. *Lead: State DOTs, MPOs, and local agencies*
- **Develop a framework or criteria, or both, to evaluate a project's anticipated benefits for economic development and improved freight mobility** as part of the TIP project prioritization process. *Lead: State DOTs and MPOs*

C.2 Improve integration of freight data and analysis within transportation system management and operations (TSM&O)

Steward: FHWA

- **Support the integration of freight considerations within analysis tools for emerging TSM&O practices**. State DOTs and MPOs should integrate freight data into the TSM&O objectives-driven, performance-based approach to identify operations issues, recommend strategies for implementation, and monitor system performance. *Lead: FHWA*
- **Ensure integration of freight into the development of tools and resources for the congestion management process (CMP)**. Large MPOs are required to have a process to address congestion management through a cooperatively developed and implemented, metropolitan-wide transportation operations strategy. Freight data should be integrated into the CMP operations analysis and strategy implementation. *Lead: FHWA*

C.3 Support the integration of multimodal freight transportation data

Steward: FHWA

- **Identify data sources and tools for understanding freight fluidities across multiple modes**. State DOTs and MPOs, as well as transportation agencies in Canada and Mexico, have expressed interest in measuring the movement of specific commodities across multiple modes and taking a systems-wide perspective to how freight moves from origin to destination. *Lead: FHWA*
- **Identify data sources on commodity movements at intermodal facilities**. For example, agencies can examine what data might be available to track commodities or shipments when transferring from rail to truck, or when offloading at a port. *Lead: FHWA, State DOTs, and MPOs*
- **Identify and develop data sources to support understanding of integrated freight corridors**. These corridors, which extend beyond highway corridors, consider how goods move across a system of transportation modes. *Lead: FHWA, State DOTs, and MPOs*

C.4 Improve collaboration on OS/OW permitting data

Stewards: State DOTs, FHWA

- **Clarify roles and responsibilities for all agencies involved in OS/OW permitting, processing, and review**, including transportation, highway safety, licensing, and other agencies. *Lead: State DOTs and FHWA*
- **Support peer exchanges and meetings to promote dialogue among stakeholders and agencies**, especially to encourage regional coordination and cooperation. *Lead: FHWA and AASHTO*
- **Encourage sharing of best practices on the use of innovative technologies** (e.g., machine learning for video processing, tolling data, connected and automated vehicle technology) for OS/OW permitting and verification. *Lead: FHWA, AASHTO*

C.5 Improve research-to-practice connections

Steward: FHWA

- **Work with university partners to improve any freight industry surveys**, with the goal of gaining better insights on freight provider behavior. Administering surveys one on one (via in-person discussions or interviews) may also improve response levels. *Lead: AASHTO, FHWA*
- **Partner with academia on research projects** that will lead to benefits for State freight data programs. *Lead: State DOTs and MPOs*
- **Establish online research repositories** for easy access to information on ongoing research projects. *Lead: AASHTO*
- **Pursue pooled fund studies using SPR or other funds** on topics such as:
 - Bulk purchases of data
 - National freight data needs
 - Development of freight data tools and processing software
 - Skills development and training

Lead: State DOTs

How to Get Involved

To learn more about Summary of Themes and Proposed Actions, contact FHWA's Jeff Purdy at jeffrey.purdy@dot.gov or AASHTO's Matt Hardy at mhardy@aaashto.org.

Stay up-to-date on SHRP2 product news by visiting www.fhwa.dot.gov/goshrp2/ or <http://shrp2.transportation.org>, where you can also sign up to join the SHRP2 email list.

