FHWA Northeast Megaregion Workshop

August 8 – 9, 2017
Providence, RI

Final Report – December 2017

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TABLE OF CONTENTS

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This report reviews and highlights key content and outcomes identified at the Northeast Megaregion Workshop held on August 8-9, 2017 in Providence, Rhode Island. The event was sponsored by the Federal Highway Administration's (FHWA) Office of Planning, Environment, & Realty (HEP) to examine shared regional issues of mutual concern to FHWA and transportation stakeholders in the Northeast Megaregion.

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INTRODUCTION

This document summarizes the August 8-9, 2017, Northeast Megaregion workshop titled “Are We Ready for the Rise of the Megaregion?” The workshop brought together local, state, private sector, and Federal transportation decision-makers to identify how states, metropolitan planning organizations (MPOs), and other planning partners can better connect with each other and coordinate statewide freight plan development and discuss shared economic development opportunities. The workshop agenda also included the identification of common approaches to address traffic congestion and aging infrastructure at the megaregion scale. The workshop took place in Providence, Rhode Island.

This report summarizes the Workshop presentations and discussions. Appendix A contains the workshop agenda; Appendix B contains the Northeast White Paper; Appendix C contains key contacts and Appendix D contains the list of participants.

OVERVIEW OF THE NORTHEAST MEGAREGION WORKSHOP

The Federal Highway Administration (FHWA) hosted a workshop focused on the Northeast Megaregion. For the purposes of the workshop, the FHWA defined the Northeast Megaregion as including Connecticut (CT), Massachusetts (MA), Maine (ME), New Hampshire (NH), New Jersey (NJ), New York (NY), Pennsylvania (PA), Rhode Island (RI), and Vermont (VT). More information about megaregions can be found on FHWA’s Megaregion website.

This workshop brought together members of the public and private sectors to discuss how to connect better and collaboratively address common transportation and economic issues and opportunities in the Northeast Megaregion and identify next steps for doing so.

Transportation officials and planning representatives explored emerging trends, new technologies, planning practices, and opportunities for multi-jurisdictional coordination. Topics of the workshop included the Northeast economy and the role of transportation, existing megaregion collaboration efforts, public- and private-sector perspectives on freight and economic development, asset management and freight planning efforts for states and MPOs in the megaregion.

DAY 1: PART 1 – SETTING THE STAGE

WELCOME/INTRODUCTIONS

Amy Jackson-Grove, Division Administrator, Connecticut Division, FHWA

Ms. Jackson-Grove opened the Workshop by welcoming participants to Providence, RI, and emphasized the importance of collaboration for the Northeast Megaregion. She articulated the workshop's goals and objectives, setting the foundation for the day's discussions.

Peter Alviti, Director, Rhode Island Department of Transportation

Mr. Alviti began his remarks by welcoming everyone to Providence, RI. He noted that in recent years Rhode Island has seen many new opportunities. For example, a new ferry service to Newport began last year, the state has recovered all 39,000 jobs since the 2008 recession, and the state ranked #1 nationwide in construction jobs. Construction employment grew by 13 percent last year alone. In addition, there is a new program, RhodeWorks, that is focused on stimulating growth in the state by providing Federal and state funding to achieve state of good repair for the state's roads and bridges and designating necessary planning, management, and funding approaches. Since RhodeWorks started, 48 projects have received notice to proceed, initiating construction on those projects. Thirty-two of these 48 projects relate to bridges, and the state has also implemented tolling systems that include commercial vehicles. Regarding megaregion-related governance, it is important to provide leadership to enhance transportation infrastructure and state of good repair by 2020 which is the mission in RI.

Robert Arnold, Director of Field Services-North, FHWA

Mr. Arnold referenced the importance of coordinated safety target-setting by states, MPOs, and transportation providers. FHWA has developed a safety target-setting study to establish the state of the practice, particularly in countries with a strong history of advances in roadway safety. Safety is the primary consideration and infrastructure construction costs may rise by as much as seven percent over the next ten years.

STARTING THE MEGAREGION CONVERSATION: THE NORTHEAST ECONOMY AND TRANSPORTATION'S ROLE

This session set the stage for the workshop and its desired outcomes. FHWA's leadership in this effort dates back to 2016, when the agency began facilitating a series of workshops and peer exchanges for transportation stakeholders on key issues surrounding megaregions, such as economic vitality, environment/air quality, freight, infrastructure/congestion, and safety. Each event focused on issues specific to that megaregion, and included efforts to create dialogue regarding common transportation topics of mutual concern across jurisdictional boundaries. The role of FHWA headquarters, divisions, and the workshop participants were also discussed, as detailed in the following subsections for the speakers, questions, and discussion.

Catherine Ross, Director of the Center for Quality Growth and Regional Development (CQGRD) at the Georgia Institute of Technology

The workshop's purpose is to connect stakeholders involved in different parts of the transportation field and different parts of the megaregion across the public and private sectors. There are challenges and common opportunities shared by both. The "four Cs" of megaregional planning are important for success: communication, collaboration, consultation, and commitment. By keeping these in mind, it is possible to identify these opportunities, find solutions, and build implementation steps.

Just as the neighborhood is a critical building block for a city, cities are now the building blocks for megaregions, which in turn are the new economic unit in world markets. In the United States, megaregions are 25 percent of the land area, but contain 75 percent of the population, 76 percent of the employment, 87 percent of Fortune 500 companies, and generate approximately 90 percent of patents. Challenges stretch beyond standard jurisdictional silos to include infrastructure repair and maintenance, finding sufficient capacity, and sustainability. However, there are major opportunities for transportation stakeholders to work beyond their boundaries on key megaregional issues, such as multimodal freight terminals, the impact of the Panama Canal expansion, private-sector involvement, and the growth of e-commerce, as evidenced by the concentrated location of fulfillment centers for Walmart, Target, and Amazon in megaregions, including the Northeast Megaregion.

Barry Seymour, Executive Director, Delaware Valley Regional Planning Commission (DVRPC)

The Delaware Valley Regional Planning Commission (DVRPC) is by nature a multi-state planning organization as it is a nine-county region covering NJ and PA. One key megaregional effort that DVRPC leads is titled "Planning at the Edge." This important effort can be illustrated by the fact that coordination with places beyond the edge of a jurisdictional boundary is very important for finding common issues and building collaborative relationships which enables successful outcomes, since borders actually tend to be very fluid. For instance, DVRPC includes seven urbanized areas, which overlap with several other MPOs because of the region's density and interconnections. Planning at the Edge began as a coordinated effort 15 years ago when nine MPOs in five states came together to address shared issues. It began informally, and has been reinforced through memoranda of understanding and cooperative agreements. Potential Northeast Megaregion issues identified by this effort include: climate change, resiliency, sustainability, air quality and conformity, transportation and aging infrastructure. In addition to the "four Cs" (communication, collaboration, consultation, and commitment), there must first be a conversation to lay the foundation.

Q&A/Dialogue

Question: What are ways to bring the private sector into the planning process?

Answer by Barry Seymour: DVRPC's freight advisory committee, the Delaware Valley Goods Movement Task Force, brings together public and private sector stakeholders to discuss freight and mobility issues. Four times a year, trucking, railroad, port, airport, shipper, economic development and government representatives come together and primarily share information. Mr. Seymour highlighted that a good starting point is to invite the private sector in for

presentations and identify opportunities for the private sector to provide data, mapping, and analysis.

Answer by Catherine Ross: It is important to build relationships with chambers of commerce. In the case of Georgia Tech, the "Atlanta Chamber of Commerce is our new best friend." Major logistics companies participation in the chamber have been a conduit to understanding new freight trends in the region, and have played a key role in providing input to the MPOs' freight plans.

EXISTING MEGAREGIONAL COLLABORATION AND STUDIES IN THE NORTHEAST

This session examined past, current, and future collaboration activities that can form a foundation for megaregion collaboration and governance. The activities presented include the I-95 Coalition, the Northeast Corridor Commission, and Northeast Corridor (NEC) Future.

Marygrace Parker, Director of Freight, I-95 Corridor Coalition

The I-95 Corridor Coalition started around collaboration. Communication, collaboration, consultation, and commitment are very important; there is also a fifth C to consider in megaregional Planning and multi-jurisdictional coordination, which is capital – how to address investment in projects that impact multiple jurisdictions. Coalition-building is very important for freight planning along the I-95 corridor, which accommodates more than 5.3 billion tons of freight annually. Freight bottlenecks often transcend physical locations, so corridor and megaregion-level collaboration is the key to freight planning. It is important to foster collaboration among agencies and to identify projects that would yield improvements to several parties.

There are also other important questions to consider, including the following—

1) Who are the players in megaregion collaboration based on decision-making processes?

2) What institutional models work best to bring these projects across the finish line?

3) How should projects be delivered? and

4) How can we support other organizational models that can foster collaboration?

Emerging technologies such as connected and autonomous vehicles can provide both benefits and raise challenges and we need to consider the geographical differences when deploying these technologies. A challenge for megaregion-level planning is to determine how people and organizations can be incentivized to participate when the benefits are dispersed and may only benefit the investing organizations indirectly. For example, some projects that were identified under our Multi-State Rail Operations studies experienced this challenge. Collaboration really is the key to addressing the growing need for megaregion-level planning. In the meantime, we should continue to look at freight on a megaregion and corridor basis and support collaborative models.

Donnie Maley, Director of Planning, Northeast Corridor Commission

The Northeast Corridor's importance can be seen in the statistics that describe it: the NEC has a population exceeding 51 million people; it includes four of the nation's largest cities; it generates a $3 trillion annual economic output, and if it were a country it would rank as the fifth largest economy in the world. From a transportation perspective, the corridor has more than 40,000 daily Amtrak riders on 149 Amtrak trains, 780,000 daily riders on 2,000 commuter trains, and six freight rail operators. Nevertheless, all these take place on old infrastructure, and it is estimated that there is a $38 billion state of good repair backlog on corridor projects (bridges, tunnels, and basic infrastructure) and another $500 million lost annually due to delays.

A shutdown of the NEC could have a $100 million daily impact on the U.S. economy as a whole. Management and operations of the rail infrastructure that supports this economic output are heavily fragmented. There are four rail infrastructure owners, more than 20 station owners, nine passenger rail operators, and six freight rail operators.

The Northeast Corridor Commission is made up of members from each of the NEC states, Amtrak, and the U.S. Department of Transportation, with non-voting representatives from states with connecting corridors and freight railroads. The commission was formed in 2010 to promote cooperation and joint planning among the corridor's various owners and operators. One of the commission's early tasks was to devise a cost allocation formula for all of the different owners and operators. The Northeast Corridor Commission has collectively assembled a Cost Allocation Policy on its website, and has developed a five-year capital investment plan, one-year implementation plan, and annual reports.

Many of the commission's recommendations for increasing collaboration in the corridor became policy when Congress approved the Fixing America's Surface Transportation Act (FAST) the authorization bill for surface transportation funding. The bill funded intercity passenger rail in a multi-year authorization with other surface transportation for the first time and created new funding for intercity passenger rail programs authorizing more than $10 Billion for intercity passenger and freight rail grants.

Rebecca Reyes-Alicea, NEC Joint Program Advisor, Federal Railroad Administration (FRA)

The NEC Future is a comprehensive plan for the NEC initiated by the Federal Railroad Administration (FRA) in 2012, in cooperation with state and railroad partners. The plan presents a long-term growth vision for passenger rail through an incremental approach that proposes to improve rail service, modernize infrastructure, and expand rail capacity. NEC Future includes an array of physical improvements along the corridor that have been vetted with stakeholders, documented in a Service Development Plan (SDP), analyzed in a tier 1 Environmental Impact Statement (EIS), and approved by FRA in a Record of Decision (ROD). These documents describe the selected alternative and will guide future investments in the corridor. NEC faces the severe challenge of managing aging infrastructure due to underinvestment. Maintaining a state of good repair of the corridor is the first priority as rail ridership is expected to increase 35 percent by 2040.

Megaregion-level planning is important for the corridors' rail system. Greater New York (a very large area that includes the five boroughs of NYC, Southern New York State, Northeastern New Jersey, and Southwestern Connecticut) is the major generator/magnet on the corridor for all

trips. Trips to or from greater New York account for 78 percent of intercity auto trips, 91 percent of intercity rail trips, 64 percent of intercity air trips, and 91 percent of intercity bus trips in the region. Collaboration is extremely important since fixing the corridor often involves great amounts of public engagement and many meetings. The corridor needs a shared and coordinated vision and there needs to be integrated rail network with more travel options, improved passenger experience, more efficient operations, and flexibility to phase improvements. The next steps should be to continue working together to plan incremental implementation, identifying funding and financing sources, and prioritizing delivery of this multi-decade project.

Q&A/Dialogue

Question: Is the $500 million annual loss (due to delay) along the NEC due to passenger rail or freight?

Answer from Donnie Maley: It is related to passenger rail rather than freight. The $100 million daily loss has received significant traction and attention in discussion and the media since the impact extends beyond the users of the corridor.

Answer from Marygrace Parker: The passenger and freight interaction is critical, as congestion has started to divert people off transit onto highways. Though moving from transit to highways is a passenger issue, it creates additional system capacity demands and that is also a freight problem!

Question: The presentation did not mention the Gateway Program. How does it fit into outlooks?

Answer from Rebecca Reyes-Alicea: NEC Future took the Gateway Program into account and incorporated improvements. The plan is focusing on critical chokepoints.

Comments: Megaregion planning requires mega-financing. Maintaining what we have ignores new technology. How can we maintain but also fund new improvements? NEC Future just helps to tell the story as vision and plan, and sets the stage for what can be done and where funding is needed. The last five years have felt like getting ducks in a row and now we can have conversation about where that goes. The compendium of projects tells a story about the regional and national economy and shows how projects link together and how to move forward.

FOCUS ON FREIGHT AND ECONOMIC DEVELOPMENT IN THE NORTHEAST – PRIVATE SECTOR PERSPECTIVES

During this session private sector partners described freight trends, technology deployment, needs from the public sector, and other challenges they face.

Chris Haynes, Director of Northeast Logistics, Nestlé Waters

Nestlé is a major player in global food and beverage with over 900 billion gallons of water extracted yearly. Its core values are healthier lifestyles, sustainability, and community. Nestlé Pure Life is a national brand whose main factories are in Maine in the cities of Kingfield, providing 40 truckloads of product per day, Poland, and Hollis, one of largest bottling factories in the world. Each of the bottling plants has a bottling spring that is supplemented with water from

other springs that needs to be trucked in. The Poland facility (for Nestlé subsidiary Poland Springs) is examining sites for new projects, to meet demands of growth (400 million gallons needed to support growth over five years). Additional gallons will demand more trucks per day, requiring Nestlé to examine an intermodal shift. As a result, in 2016, they launched the Poland Spring Express Rail Intermodal Program which is based on collaboration between Maine and Connecticut DOTs. Their next phase is to use rail beyond ME and seek new payload and heavy-haul opportunities. Nestlé is endorsing northeast infrastructure enhancements and supports the assessment of alternative fuel vehicles capabilities and conditions. They are currently working with Connecticut Department of Transportation (ConnDOT) to establish future shipping locations.

David Fink, President of Pan Am Railways

Mr. Fink began the presentation by encouraging increased coordination with the private sector as a critical element to Megaregional collaboration. Pan Am Railways (PAR) is the "largest little railroad system" with 1,700+ miles of rail line serving five New England states. Demand for intermodal rail-truck freight movement is growing. The Northeast intermodal freight is probably the most challenging truck market, but it provides opportunities for growth in intermodal service as road freight capacity gets tighter. It is important to deploy new technologies across short rail lines. PAR is trying to determine how to use new fuel technology, such as diesel-free fleets, and has brought new locomotive fleets. They have also used forward facing cameras for safety reasons and have been working with General Electric (GE) analysts to have more information about operational insights which enhances crew-to-customer correspondence. The Federal Railroad Administration (FRA) has proposed new regulations consisting of drug testing for new employees and mandating crew size limits despite a lack of evidence that crew size impacts rail safety. Crew size has always been an issue decided upon by railroads, and where appropriate in discussions with organized labor. Unilateral regulation of crew size will severely limit operational flexibility and technology development to improve efficiency.

Q&A/Dialogue

Question for Chris Haynes: Are there any inter-coastal opportunities for water asset management?

Answer from Chris Haynes: From time to time. I have been contacted by entities who are one piece of an end-to-end network, but do not have the time to build it themselves. Best solution on short haul is to identify a contact person doing it, such as people from state DOTs, so that when there is something to talk about, they will communicate with him/her. Short-haul sea requires very large amounts of product to be feasible.

Question: With regards to legacy infrastructure, how are you adapting to 21st century needs, and how can the public-sector help?

Answer from David Fink: Use less expensive equipment, and single-stack cars. Put together economic package that works best for customers.

Question: Is the facility in NJ for international export?

Answer from Chris Haynes: It is a third party warehouse used for receiving ocean containers and heavy load containers are shipped mostly to customers. Some truckloads will be brought to Maine warehouse to ship.

Question: An MPO in PA has seen significant growth of short line service. It entered into a public private partnership (PPP) to beef up highway infrastructure to serve freight facilities. As a private entity, what questions would you ask the MPO to decide if we're "in"?

Answer from David Fink: Check on the person running short line railroad to make sure they have a proven track record.

Question: Since there is increase in water output and partnership with rail, do you see it as rail moving more, or just augmented number of trucks?

Answer from Chris Haynes: Rail is a long-term solution supplementing truck capacity. Investment in rail is investment for the future.

MEGAREGIONAL COLLABORATION AND IMPLEMENTATION IN NORTHERN CALIFORNIA

This session provided examples of how megaregion collaboration has worked elsewhere.

Vikrant Sood, Principal Planner, Metropolitan Transportation Commission (MTC) of California

The Northern California Megaregion Goods Movement Study is a joint project among Metropolitan Transportation Commission (MTC), Association of Monterey Bay Area Governments (AMBAG), Sacramento Area Council of Governments (SACOG), San Joaquin Council of Governments (SJCOG), and the California Department of Transportation (Caltrans). In addition, a working group of state, local and community stakeholders will participate in the study. Funded by Caltrans, this is the first ever comprehensive study of the Northern California goods movement system, which covers 19 counties and 147 cities (31.5 percent of CA population), employs over 1.7 million workers, and contributes over $10 billion to the megaregion's economic output. It was noted that MTC just developed its first freight plan last year. The focus of the goods movement study is economic development, but MTC's goal is to coordinate not only with MPOs but also with economic development agencies. In addition, the study aims to improve system efficiencies, grow jobs for the middle class, understand market drivers (reasons why certain industries locate where they do) and recommend strategies.

The megaregion matters for several regions: it is how economies work and how the jobs/housing balance works as there is only one housing market and one commute shed, which are all tied to supply chains. MTC's Regional Prosperity Plan found that there are not enough middle-wage jobs in the region, and freight-related jobs are seeing stable growth in the region. The region now probably will see growth of goods movement jobs outside the core jobs (truckers), such as lawyers and front desk jobs. It is necessary to have a better understanding of where firms are located and why, in order to better understand what is going on in goods movement clusters. Data collection and analysis are also important.

Q&A/Dialogue

Question: Are transportation plans getting closer to land use policy?

Answer from Vikrant Sood: Eventually MTC wants to bring transportation plans and land use policy closer together. There are locations that reduce truck traffic but also provide economic activities. It is important to make strategic megaregion investments.

Question: Is this type of analysis applicable to a rural state?

Answer from Vikrant Sood: Central Valley has low population density. These partners are interested in doing similar analysis for agricultural industry.

SUMMARY OF DAY 1 AND PREPARATION FOR DAY 2

Catherine Ross, Director of the Center for Quality Growth and Regional Development at Georgia Institute of Technology

Below are selected important thoughts and ideas about implementing the concept of megaregions in the Northeast from day one's presentations and dialogues.

- Educate the leadership about megaregion projects that go across your boundaries;
- Megaregion planning must be based on network analysis. Understanding what the network looks like is important;
- Support multi-state and multiregional coordination (e.g., identify the common bottlenecks in infrastructure and the strategies to deploy new technology);
- Develop megaregion financing and funding sources and processes;
- Develop analysis using the most extensive geographies that are practical and possible;
- Measure commodity flow in light of business proprietary needs;
- E-commerce should be better integrated into transportation planning.

DAY 2: PART 2 – CURRENT AND NEAR-TERM INITIATIVES

RECAP OF DAY 1 AND OVERVIEW OF DAY 2

Catherine Ross, Director of the Center for Quality Growth and Regional Development at Georgia Institute of Technology

Dr. Ross presented the summary of Day 1 by highlighting the remarks about megaregion governance and infrastructure planning.

Megaregion Governance:

- Educate state legislatures and leadership about megaregions and projects that connect.
- Megaregion planning must be based on network analysis and transcending local jurisdictions to identify system disruptions.
- U.S. DOT can help the MPOs and state DOTs with more basic messaging and training on the importance of collaboration, including how asset management supports economic sustainability and resiliency. Messaging to include how transportation funding, state DOTs, MPOs, and local governments support communities and economies.
- Support multistate and multi-region coordination and collaboration on issues of economic development, mobility congestion, bottlenecks, infrastructure improvements, and the integration of autonomous vehicles.
- Organize a megaregion council, supported by the state DOTs and MPOs to ensure the four Cs (coordination, communication, consultation, and commitment).
- Megaregion planning requires mega-financing.

Megaregion Infrastructure Planning:

- In order to support new freight private sectors and investment in facilities, we must understand their relationship to the larger metropolitan statistical areas (MSAs) and impact on traffic.
- Focus on the network, not the boundary.
- Double-stack freight rail cars.
- Develop a megaregion structure, including areas for financial/funding sources and alignment with the transportation planning process.
- Identify private-sector freight needs. Integrate them into the transportation planning process as part of the data to underlie the MPO plans and statewide long-range plans.
- Conduct rigorous analysis of transportation problems and topics using the most extensive geography that is possible or practical.
- Require or encourage multistate freight corridor planning for construction projects to improve freight movement. Retain and attract businesses through accelerated design / NEPA / construction projects to include private investment to reduce risk of businesses leaving at or before project completion.
- Develop domestic waterborne freight transportation options in the megaregions.

Dr. Ross asked several questions to initiate the discussion of Day 2:

- How do you ensure cross-border bridge crossings and their resiliency and/or replacement options in time of disruptions?

- How do we measure commodity flow in light of business needs to protect propriety information?
- How do we translate the benefits of addressing freight bottlenecks in one state to others?
- In partnership, what can the public sector do to help the private sector in exchange for relevant data etc.?
- How does the U.S. compare with other countries regarding megaregion planning?

TRANSPORTATION AND ECONOMIC DEVELOPMENT: PUBLIC SECTOR PERSPECTIVES

During this session participants discussed initiatives related to transportation, freight, and economic development that have benefits across the megaregion. Discussion focused on investments, challenges, and opportunities.

Steve Brown, Manager of Planning of the Port Authority of New York and New Jersey

The Port Authority of New York and New Jersey actively collaborates with public and private partners in making short and long-term improvements at its marine freight facilities. The Port of New York and New Jersey is the largest on the East Coast and includes six major container terminals; hosts 13 auto carriers, and 100 bulk vessels, regularly; and handled 200 billion dollars in cargo in 2016. With direct access to over 125 million consumers in 36 hours, the Port of New York & New Jersey serves 27 million consumers living within a two-hour drive and 45 million consumers within four hours. The Port supports a total of 400,000 jobs in its region. The Port Authority and its partners continue to make significant investments including the $1.6 billion Navigational Clearance Program to raise the Bayonne Bridge roadway to accommodate the new generation of large vessels, and $600 million in the on-dock rail system, ExpressRail. Over $1 billion in investments are identified in the Port Authority's 10-year capital plan.

Collaborative initiatives with Port stakeholders help maximize the benefits of infrastructure investments and are essential for improving operations at the Port and on the surrounding regional freight transportation network. The Council on Port Performance and the Goods Movement Action Program (G-MAP) are two such efforts. The Council is co-chaired by the Port Authority and the NY Shipping Association and includes marine shippers, terminal operators, ocean carriers, MPOs, and other relevant government organizations. Working together, accomplishments to date include rolling out a truck appointment system, establishing a centralized on-line port communication system (TIPS), and creating a Truckers' Resources Guide. Cybersecurity and resiliency planning are new areas being addressed by the group.

Improvements to the freight transportation network that carries freight between the Port and its regional markets is one of the strategic goals of G-MAP – a joint initiative of the Port Authority, New York State and New Jersey Departments of Transportation. G-MAP's multimodal, multi-agency regional focus builds on the plans and oversight processes of the region's many transportation agencies. Harmonizing roadway regulations, and knitting together roadway restriction information are examples of two technology-supported efforts aimed at improving truck navigation and regulatory compliance throughout the region.

Community and industry stakeholder participation is a key element in the Port Authority's ongoing development of a long-term Port Master Plan. Engaging stakeholders on Master Plan goals, drivers and considerations is necessary for creating an action plan and a flexible road map that will take the Port of New York & New Jersey thirty-years down the road to a strong future.

Tom Maziarz, Chief of Planning, Connecticut DOT (ConnDOT)

The presentation, entitled "Use of Economic Analysis by ConnDOT," illustrates the economic analysis (EA) tools that ConnDOT has used in the past five years to justify projects for implementation as major investments will also help grow the state economy. There is a need for better truck information, and since Steve Brown mentioned it, Mr. Maziarz would like to start collaborating with the Port Authority of NY and NJ on this effort.

ConnDOT's Strategic Transportation Plan, called "Let's Go CT," provides guidance for investing $100 billion over 30 years. The planning process involved a stakeholder council with 97 external stakeholders. There are two primary focuses: restoring aging infrastructure (65 percent) and achieving the state's vision for a better transportation future via expansion and enhancement (35 percent). Developing a plan that would help grow the economy is important, and ConnDOT's obligation is to develop a toolset that would demonstrate the economic value of major project investments. Four of ConnDOT's major projects illustrate this toolset:

- I-95 Widening Program;
- New Haven Line (NHL) Capacity Improvements;
- I-84 Corridor Improvements;
- Charter Oak Bridge Interchange.

Economic impact analysis and cost/benefit analysis were developed for these four projects, which demonstrated their economic benefits and facilitated project delivery. Even though these (EA) tools are somewhat expensive and time-consuming to use they are well worth it to justify major projects.

John Henshaw, Executive Director, Maine Port Authority (Maine Ports)

The Maine Port Authority (Maine Ports), in coordination with the Maine DOT (MaineDOT), has been working to maintain port infrastructure. One of Maine Ports' goals is to market and operate the port with Maine's interests in mind. In 2009, Mr. Henshaw met with businesses to understand their transportation needs, which helped him brainstorm new business plans for Maine's underutilized port that had been redeveloped as a dedicated freight facility. The major challenge was bringing freight in through the NY/NJ port. This process resulted in a variety of port improvements and initiatives that included: securing the supply chain, getting into steamship line system, building a collaborative relationship with LL Bean, creating 24-hour secure yard, and getting an initial Transportation Investment Generating Economic Recovery (TIGER) grant to turn a parking lot into a freight handling area. In 2014, the terminal doubled in size, and rail returned to the terminal for the first time in more than 30 years. The port expanded the trucking yard and received additional property. Rail operations began in 2016, and Maine Ports has witnessed container volume growth in recent years. The port authority is now working

on their next projects, including a project related to cold storage, increasing rail capacity, and the Marine Highway project that improves the intermodal freight efficiency and sustainability. It is important for public sector to reduce capital costs for shippers. Moreover, public-private partnerships (PPP) are important for the Maine Ports' work, as its barges are public and tugs are privately owned.

Lisa Wieland, Port Director, Massachusetts Port Authority (Massport)

The Port of Boston is home to 7,000 direct jobs and serves 1,600 businesses across the Northeast. Regional ports, like Boston, are vital to moving freight and keeping businesses competitive. Massport has been making the economic case for more than $850 million worth of waterside and landside infrastructure investments in the Port of Boston. The investments are critical for handling the larger container ships that started calling Boston in 2016 after the expanded Panama Canal opened. In addition to deepening the Boston Harbor, Massport and the Commonwealth are investing in new deeper berths and larger cranes at Conley Terminal. Massport also received a $42 million FASTLANE grant to help fund a project to modernize and upgrade the existing facility. These infrastructure investments, coupled with investments in operational improvements to lower costs and reduce congestion, and a partnership with the International Longshoreman's Association to improve productivity, have driven three consecutive years of record breaking container volume. Beyond cargo, the Port of Boston is experiencing growth in the cruise industry, with a 34% increase in cruise ship activity in 2017. Demand for seafood processing space is also rising.

As the Port grows, the Authority is also investing in new technologies to make sure cargo is safe. Massport has partnered with Passport Systems, the Department of Homeland Security, and the Commonwealth of Massachusetts to build a new state of the art cargo screening facility. In addition, Massport is working with the Massachusetts Department of Transportation (MassDOT) to update the state's freight plan, focusing on the preservation and enhancement of key truck routes.

Q&A/Dialogue

Question for John Henshaw: How did Maine Ports bring rail service back to the terminal?

Answer from John Henshaw: Traditionally, rail had served the terminal, but it was terminated in the 1960s. Maine Ports wanted to reconnect the terminal to rail, so it moved the terminal west and rebuilt the line to the main track.

Question for panel: Did the analysis on the port plan include job creation?

Answer from John Henshaw: The analysis that Maine Ports performed did include job creation, specifically on the cold storage project. Maine Ports looked at the economic impacts associated with investments.

Answer from Lisa Wieland: Massport's analysis did as well. The jobs picture resonates with elected officials. It is important to explain where job growth occurs.

Question: How are economic analyses funded?

Answer from Tom Maziarz: The cost of the economic analysis was built into the budget. The advantage is that it used the same model and consultant for all of the work and consistent processes help. Other states could use a combination of State and Federal funds to conduct economic analysis as part of Long Range Plan Updates to justify projects.

Question: Where did funding come from for the 30-year plan of $100 billion?

Answer from Tom Maziarz: ConnDOT did an economic analysis and benefit/cost analysis because we wanted to justify the level of investment. The agency was budgeted an extra $3 billion right up front (in addition to the $7 billion already allocated). The Connecticut General Assembly considered tolling and came to just a couple votes short of passing relevant legislation, but it did pass a transportation lock box. The transportation fund can only be used for transportation projects and cannot be diverted to other purposes.

STATE PERSPECTIVES ON FREIGHT, ECONOMIC DEVELOPMENT, AND MEGAREGIONAL COORDINATION

The roundtable discussion session allowed the CEO of each state DOT or the CEO's designee to highlight freight and economic development planning activities and coordination efforts within their state. The discussion generated a broader understanding of how to collaborate across state boundaries within a megaregion framework. Comments made by each of the state DOTs are summarized below, followed by the summary of the Q&A session.

Rhode Island Department of Transportation (RIDOT)

The Rhode Island DOT's freight plan (approved by FHWA) was developed through a multidisciplinary steering committee and advisory group. The plan was developed over two years, during which there was a great amount of collaboration, meetings, interviews, and coordination with the New England freight working group. Rhode Island has the country's highest ratio of structurally deficient bridges, which is a serious threat for safety and freight. The freight plan focuses on RhodeWorks and how to address those infrastructure needs. RIDOT is also investing in transit, and the plan includes projects that encourage people to travel by means aside from personal automobile. The Plan also addresses policy issues, not just projects.

Connecticut Department of Transportation (ConnDOT)

It is important to make a pitch for multi-state collaboration. ConnDOT recently submitted a draft freight plan and plans to deliver the final version in the fall. During the freight plan's development process, ConnDOT coordinated with the New England Regional Freight (NERF) group, which is an informal freight planning group that includes MPOs, the private sector, and local officials. There is no value in having all MPOs produce different plans, and all MPOs should be involved in the state freight planning process. Businesses have also been engaged in regular ConnDOT meetings. ConnDOT does not have a Freight Advisory Committee (FAC), but it does meet with freight stakeholders as needed. ConnDOT will propose that the New England Regional Freight (NERF) group transition into an annual or biannual summit on freight planning in the Northeast.

Connecticut is a very small state and there are no major freight facilities and many freight movements depend on NJ. Connecticut has the Ports of New Haven and New London, which

are not freight-related. About 94 percent of freight that is moved in Connecticut is moved by truck, so the state needs to focus on how to serve the truck industry. There are two reasons why a multi-state approach is necessary in freight planning. About 600 trucks per day loaded with water move from Maine through New England and none of that would have happened without help from Maine in terms of re-developing and enhancing facilities. Connecticut's rail facility help with the water delivery and also help to take trucks off the road. Regarding the state planning process, there is a need to improve electronic permitting, truck parking availability, truck travel information, and pre-clearance. These efforts should not just be developed on a state-by-state basis, but should address the whole region.

Maine Department of Transportation (MaineDOT)

Transportation matters more than anything else because at its core it relates to the economic development that smart investments drive. The latest video on Maineports.gov, which is named "Transportation Matters," shows how to create prosperity by reducing logistics costs. Cost-cutting is important, as well as defining businesses regionally rather than just by state. When costs are reduced for everyone, it is to everyone's advantage. Regarding the cruise industry, marketing destinations matters; it is not just about a single port. The beer industry is important to Maine, so the Maine Port Authority and others have pulled resources to create the Maine Beer Box, a custom shipping container fabricated to include more than 70 Maine-made beers on tap. The container will be shipped yearly to a different port along the Icelandic shipping company Eimskip's shipping routes.

New Hampshire Department of Transportation (NHDOT)

Even though New Hampshire is very much a rural state, it also has freight issues and bottlenecks. NHDOT has just started developing a freight plan and has established a freight advisory committee. NHDOT, MPOs and regional planning organizations (RPOs) focus on congestion relief. There has been limited interaction with other states, and NHDOT wants to do more with cross-state coordination. The challenges mainly come from a lack of funding sources. NHDOT has a Ten-Year Plan that is updated every two years by a grassroots-type effort. Another challenge is how to mobilize public interest, as the system is fragmented and every sector is dealing with individual interests. Expansion projects have created development opportunities. Several areas in the northernmost parts of New Hampshire (North Country) are trying to redevelop themselves with TIGER grants to invest in short-line rail projects.

New Jersey Department of Transportation (NJDOT)

The key freight priorities and challenges in New Jersey are spilling over into the rest of the region. During its statewide freight plan development, NJDOT realized that there is huge amount of demand and limited capacity primarily along I-95, which is the spine of New Jersey with lots numerous distribution centers along it.

In the near future, the state will experience impacts of larger ships, requiring port access improvements. From NJDOT's perspective, the roadway capacity is very limited relative to the volume going through ports. There will be an increase in containers coming soon; these will need to be offloaded as quickly as possible. Port authority and terminal operators must work on extending the hours and scheduling system to spread out arrival and distribution. New Jersey has been losing businesses to neighboring states where land is cheaper. Thus, land use decisions are critical for transportation and economic development. The ports in the southern

part of the state are growing and NJDOT is beginning to feel the impact of that growth. Land use and transportation coordination is a key issue and regulations are different from state to state. NJDOT is working with a subgroup of the Northeast Association of State Transportation Officials (NASTO) to harmonize regulations. The freight plan is underway and NJDOT has a freight advisory committee and a sub-committee on rail issues. Currently, NJDOT is at the point of defining needs and projects and then will move on to an investment plan.

New York State Department of Transportation (NYSDOT)

NYSDOT has been involved in eight freight plans, including the Goods Movement Action Program (G-MAP, the only bi-state freight plan), Freight NYC, the Smart Truck Freight Plan, the New York Metropolitan Transportation Council's (NYMTC) Regional Freight Plan, and the NYSDOT Freight Transportation Plan. The NYSDOT Freight Transportation Plan has confirmed that 70 percent of freight movements are by truck, and a great proportion of those truck movements are through traffic. The current priorities are investment in infrastructure to help the private sector be more efficient, and there are always governance challenges. NYSDOT has been continually focused on data sharing, and some of the details and priorities still need to be sorted out. There is fast growth in New York City as about 900,000 build permits will be issued in next year, which brings financial benefits and opportunities to the area. It is necessary to identify formula to capture the value generated by densification, such as constructing residential buildings on top of transportation assets, which can be added to revenue stream.

Pennsylvania Department of Transportation (PennDOT)

The PennDOT Long Range Transportation & Comprehensive Freight Movement Plan was completed in 2016, and it is the first comprehensive freight movement plan for PA. This freight plan consolidated and built upon existing regional and state plans. Highlights from the comprehensive freight plan include the fact that PA has 1.1 billion tons of freight annually (75 percent moved by trucks) equaling $1.6 trillion. The plan focuses on system preservation; highway investments alone need $1 billion in annual funding to maintain the existing system. Safety, personal mobility, and stewardship are the other major goals identified in the plan. The plan also identifies the top-100 freight bottlenecks and key corridors. The plan also developed the Commodity Information Management System (CIMS), which can really be used by MPOs/RPOs. The tool allows pinpointing changes that counties are going to see with current and future freight tonnage. Also, a prioritization tool has been developed from the plan, which has an economic impact assessment component.

Vermont Agency of Transportation (VTrans)

VTrans faces major issues of aging infrastructure, deferred maintenance, funding, and transportation and land use. VTrans has an FHWA-approved freight plan and an approved state rail plan. The state is small and mostly rural, but economic development activities are ongoing. Downtowns and villages are important, and municipalities need grant funding for redevelopment. The State Infrastructure Bank has funding for a variety of projects that include construction or reconstruction of highways, roads and bridges, as well as certain facilities related to rail transit. VTrans has been collaborating with other agencies like Regional Planning Commissions (RPCs) and has received broad support during natural disasters. VTrans is also an active participant in regional forums and is working on a tri-state agreement on highway performance management.

Q&A/Dialogue

Question: The New England Regional Freight (NERF) group should be involved. How will you get this going and officially engrained? It is not clear that it has to be that group per se, but it would be nice to have annual/bi-annual summits. We really want to engage the private sector in this.

Answer from Marygrace Parker: The I-95 Corridor Coalition recently interviewed member states about development of their freight plans and is looking at what it can do to support "regional and corridor-wide" collaboration. There were many ways states gathered private sector stakeholder input. One best practice approach was to hold a summit annually, based on a best practice used with the Wilmington MPO in Delaware. The I-95 Corridor Coalition is summarizing the interviews and will release a report to their members.

Question: In NY/NJ, MPOs do a good job of bringing together stakeholders from different levels of government. Among other state DOTs, what are the successful ways to think about logistics issues on the last mile level by working with local governments?

Answer from MaineDOT: We have a municipal and business partnership initiative, which will move the project up if the municipality is willing to contribute half of the project funding. This initiative encourages state and local collaboration.

Answer from NYSDOT: NYSDOT is working towards a solution as well.

METROPOLITAN FREIGHT ACTIVITIES AND MEGAREGIONAL COORDINATION

In this session, MPO participants discussed freight and economic development challenges, opportunities, and thoughts on enhancing coordination from the metropolitan perspective.

Capitol Region Council of Governments (CRCOG)

Connecticut has a population of 3.5 million, a land area of 5,500 square miles, and eight MPOs. CRCOG has a population below one million people and about 20 percent of the state's footprint. CRCOG covers 38 municipalities, including the capital city of Hartford. There are two major truck bottlenecks in the region, and CRCOG has been working to mitigate their effect. CRCOG has regular bi-monthly coordination meetings with ConnDOT on the I-84 reconstruction, and it also helps support freight-related amenities, such as rest stops and intelligent transportation systems (ITS). In 2005, CRCOG partnered with two other Connecticut RPOs and the Pioneer Valley Planning Commission in Massachusetts to conduct analysis on freight travel in the Hartford metro area and identify next steps. It was found that trucks carry approximately 98 percent of freight moving in, out and through the region, about 40 percent of truck traffic in the region is through traffic, and the movements are highly imbalanced with more inbound traffic than outbound. CRCOG did a preliminary analysis on existing freight infrastructure to understand municipalities' needs and local needs. The council is also working with the NPMRDS data set to understand congestion, travel times, speeds on NHS network as it relates to trucks. The data have been helpful. Efforts have been made to support training and education at the staff level (e.g., freight webinars) and to encourage DOTs to look at freight statewide. The council is involved in planning efforts with ConnDOT and the Statewide freight plan and assisted in conducting interviews with identified regional stakeholders.

Pioneer Valley MPO (PVMPO)

The region has 43 cities and towns, covers 1,200 square miles, and has a population of 627,000. The MPO created the New Knowledge Corridor Collaborative back in 2000, which is a mix of public entities, universities, and businesses. One takeaway is that the emergence of megaregions could end up in a cul-de-sac, and we all need to work on better connections. Currently the connections are robust in this planning region, but the connections need to be spread. The MPO designated critical and urban freight corridors. The MPO is restarting a regionally based freight plan to align with the state plan. There is ongoing advocacy for projects of regional consequence including a freight project. The state rail plan is underway and will be completed by the end of this year. PVMPO reviewed projects for inclusion in the plan. The MPO is also working on a CSX rail yard in Springfield, trying to solve last mile access problems. The main challenges include data availability, issues related to proprietary private-sector data, engagement with the private sector, lack of consideration/knowledge of broadband and pipelines; climate change; future unknowns of CV/AV and e-commerce; dearth of shopping centers; road pricing complexities; and workforce talent issues. The presentation concluded with a valid point: "choosing to connect is choosing to compete; collaboration is essential."

North Jersey Transportation Planning Authority (NJTPA)

The NJTPA region is a key distribution node: Over 814 million square feet of industrial space (one of the largest in the U.S.), the largest Port on the east coast with 6.3 million TEUs and 663,000 vehicles (of which one third are for export) in 2016, and extensive road and rail infrastructure. The demand for distribution facilities is huge. Plan 2045's freight element included a roundtable of 18 private-sector representatives who were brought together to identify needs and challenges. The rapid evolution of the retail industry and expedited deliveries is one of the key items that keeps supply chain professionals up at night. NJTPA has a freight initiative committee. Additionally, the agency conducts outreach to sub-regions with freight facility visits. During the freight facility visits, key activities included profiling key commodity flows, and developing a freight forecasting tool. Two examples of current projects include the Freight Rail Industrial Opportunity (FRIO) corridors program, which is focused on addressing the need for national standard rail freight access, and the freight concept development program, which creates a process for advancing freight improvements. NJTPA has a "Freight Activity Locator" tool and other freight information available on its website.

New York Metropolitan Transportation Council (NYMTC)

The NYMTC region covers all of New York City and five suburban areas. NYMTC recently adopted the 2045 Regional Transportation Plan. There are approximately 35 billion dollars in the 2017-2021 Transportation Improvement Program (TIP), of which freight is a major component. There are many stakeholders in the region, and NYMTC has formed a collaborative forum for engagement. The current freight plan relates to members' shared goals, identified in the LRTP. All planning initiatives are connected to the goals, which at times can be competing. NYMTC's freight plan is closely coordinated with several other plans, including NYSDOT's freight plan, the Goods Movement Action Plan (collaborative effort between the states of NY and NJ), the Freight Council Action Plan (NYC EDC) (public/private collaboration), and the Smart Truck Management Plan (by NYCDOT), which examines enforcement issues. NYCDOT has also conducted a pilot for an off-hour delivery program that has been very successful and is going to continue. The emergency management resiliency assessment program is the major element of transportation planning after Hurricane Sandy. NYMTC sees major challenges

including forecasted growth in commodity flows, which is expected to increase 67 percent by 2045 even while primary mode share remains the same (predominantly truck); data availability and the capacity to process data; availability of industrial space; private sector engagement especially regarding emerging trends; and new technologies. The megaregion conversation needs to be a continuous effort.

Lehigh Valley MPO

Lehigh Valley is an industrial area with a major transportation and warehousing sector of its economy. The MPO and two county planning commission have control over land use by regulating that "if you don't comply with regulation or the comprehensive plan, there is no money for you." The Bethlehem steel site is now an industrial center. Population has increased about one percent every year for 60 years. In the last three years, 30 million new square feet of warehouses, logistics space, and manufacturing space was built in the area. This has created interesting challenges as it increases the number of trucks. Class 1 railroads in the region are seeing heavy increases in their use. Of the 30 million new square feet of space, FedEx is building the largest ground facility in the world adjacent to Lehigh Valley International Airport. Therefore, it is imaginable that there will be growing air congestion. Regarding homeland security, there is the first climate safe zone outside of NJ. The MPO is working on hazard mitigation and is starting to update the HAZMAT plan. The MPO has developed its freight plan that is consistent with the statewide freight plan, and it also has a freight advisory committee. The freight advisory committee is almost a year old, but has grown to the point that it needs an alternate meeting space (more than 60 people). Freight and growth management are all about public-private partnership (PPP). The MPO is actively working with help from PennDOT, which opened an interchange with limited public funds. Companies rely on the natural environment, so the public sector can help to ensure natural resources are protected. Another "C" might be "community" in addition to the previously mentioned "Cs." The MPO is also doing a forum-type megaregion group that just came up with a new agreement of holding each other accountable to share data and build data sets.

Rhode Island Statewide MPO

The Rhode Island Statewide Planning Program acts as the state's MPO and is housed in the state department of administration and works on land use planning. RI has over one million residents and over 70 miles of connecting highways to other states. The state has $3.7 trillion in economic output and provides an international gateway into and out of region. The MPO has recently completed a freight plan in which it demonstrated that 26 percent of all jobs in RI are freight-related. The state faces challenges, such as the implementation of the freight plan. The state has just approved the continuing freight advisory committee, and the MPO needs to work hard to educate municipalities on the importance of freight.

Chittenden County Regional Planning Council (CCRPC)

CCRPC is a very small MPO since the region only has 163,000 population. The region accounts for 35 percent of gross regional product of Vermont. More than 90 percent of freight is moved by truck. Overall the region does not have major congestion issues but does have peak-hour congestion. According to the VTrans freight plan, there will be a 45 percent increase of truck traffic by 2035 so the RPC needs to pay attention to highways. The CCRPC has been focusing on congestion mitigation, safety, and addressing hot spots. It will need to explore ITS solutions to address operational issues. It is important to look at the corridor-level for freight and

economic development challenges. Committees and task forces do not work for CCRPC, but CCRPC still tries to keep them engaged by meeting with them rather than hosting meetings. CCRPC collaborates with VTrans and other regional planning commissions. One example of the state-regional collaboration success is the Western Corridor project that the MPO managed for the state that required coordination with five RPCs. CCRPC reached out to all the organizations with a stake in the corridor. Currently the RPC is working on updating the 2015 Metropolitan Transportation Plan (MTP), in which economic development and freight will be the focus.

Q&A/Dialogue

Question: In working with DOTs, you run your local aid program. Do you think there will be projects coming from locals that are freight related or all NHS?

Answer from NJTPA: All of the organizations here are dealing with legacy infrastructure. That's a concern for locals as they want to attract and retain business. Freight Rail Industrial Opportunity (FRIO) corridors are opportunities. NJTPA is working on a new program of Freight Concept Development. It should help progress freight projects through to construction, and it includes two local initiatives.

Answer from Lehigh Valley MPO: We will take project recommendations from anyone at our monthly meetings. This open platform allows for open conversations and questions (e.g., should all freight be on highways during peak periods?). We have just put out a study request on this topic. We cannot ignore local requests, especially since freight is everywhere.

Answer from Capitol Region COG: Some municipalities have requested adaptive traffic signal controls. Another municipality has a lot of truck crashes and has requested help. MPOs are also trying to do more related to local government education.

Answer from NYMTC: There are lot of requests for environment related projects, such as adopting cleaner fuels and deploying charging stations. A lot of locals go through the MPO to try to address these issues.

Question: How to address the negative impact on urban and suburban communities caused by big companies like Amazon?

Answer from Lehigh Valley MPO: Each municipal government can adopt an infrastructure plan. Urban communities are denser than suburban ones, so the balance between housing and business is even more important.

Answer from NJTPA: Municipalities do have a say in development. We should also consider the taxes and jobs that come with development; these facilities are huge job generators. Unanticipated situations do occur, such as the need to address workforce transportation to new locations. These emerging requirements can be addressed, for example through the use of transportation management associations for last mile connectivity and other transportation programs. NJTPA is also working on a truck traffic management best practice handbook to provide a range of ideas and approaches for communities.

Answer from VTrans: The state can apply development fees to apply for infrastructure improvements.

PART 3 – MOVING FORWARD

MANAGING MEGAREGIONAL ASSETS THROUGH ASSET MANAGEMENT

Shoshana Lew, Chief Operating Officer, Rhode Island Department of Transportation

Ms. Lew introduced the concept of asset management. Individual states are required to produce asset management plans and there is an opportunity to consider how those plans fit together across a megaregion. The asset management process is important because it allows us to assess and forecast the deterioration of assets.

Within Rhode Island, the "RhodeWorks" program is dictated by principals of asset management. Assets in Rhode Island's transportation plan include National Highway System (NHS) bridges/pavements, drainage assets, non-NHS pavement and bridges, roadside hardware, buildings and facilities, and equipment, etc. RhodeWorks found that 25 percent of bridges are structurally deficient, and it sets a target of reducing it to 10 percent by 2025. The RhodeWorks program brings about $950 million in savings by fixing bridges sooner. This equals a net savings of $750 million, which means that there will be more dollars for other investments.

Rhode Island's transportation asset manage program has several major objectives:
1) delivering the RhodeWorks initiative; 2) coordinating within/between divisions (also need to coordinate externally); 3) developing institutional knowledge to support asset management;
4) developing asset inventories and decision support systems; and 5) promoting asset management principles. Considering alignment of asset inventories across a megaregion can be an important step towards identifying opportunities to work together and identify shared priorities, such as freight assets. There are several regional risks regarding asset management, such as extreme weather, climate similarities, age of infrastructure, etc. It is an opportunity to collaborate with other agencies and understand approaches others are taking and how information will be shared. Lifecycle costs and measuring those across a region is also important. To conclude, there is a question that everyone should consider: what management strategies might be effective in dealing with assets on the megaregion scale?

Q&A/Dialogue

Question: Do asset management systems differentiate some freight projects from others?

Answer by Shoshana Lew: An asset management system should be able to categorize and differentiate freight projects internally.

Question: Regarding the idea of megaregion asset management, are you engaged in conversations with other state DOTs?

Answer by Shoshana Lew: RIDOT is somewhat engaged in conversations with other state DOTs. It is about a year out from the plan approval, so it is using the plan to start the conversation.

Comment made by Catherine Ross: Alabama and Georgia DOTs have been working collaboratively on looking at freight corridors to examine freight assets.

Question: As part of starting the conversation and identifying key assets, would you identify assets with megaregion significance?

Answer by Shoshana Lew: Yes, we would.

IDENTIFYING PRIORITY NEEDS AND POTENTIAL ACTIONS FOR THE MEGAREGION

Catherine Ross facilitated discussion among small groups to identify common needs across the megaregion, and brainstorm priority needs, action items, and coordination approaches. Discussion topics include:

1. What projects or programs could be implemented or improved through megaregion partnerships or joint activity?
2. What partnerships currently exist that we can build on?
3. What are the common interests and common needs we discussed today?
4. What are possible actions this group can address?
5. Who can serve as leader or champion for megaregion planning?
6. What are the immediate activities that can be taken to implement megaregion?

REPORT-OUTS AND KEEPING THE CONVERSATIONGOING – DISCUSSION OF NEXT STEPS/ACTION ITEMS

In this session, each of the three formed sub-groups reported their ideas corresponding to the previously asked discussion questions. The following are the summary of the three groups' thoughts and findings regarding each of the six questions.

1. What projects or programs could be implemented or improved through megaregion partnerships or joint activity?
    a. Formula funds for ports
    b. Tolls
    c. Railroad and bridges
    d. More protection for the freight networks
    e. Megaregion finance instrument
    f. Metropolitan Area Planning (MAP) Forum
    g. Expand one DOT beyond safety
    h. Megaregion approach to grants (e.g., "INFRA")
    i. CV/AV coordinated approach on I-95
2. What partnerships currently exist that we can build on?
    a. Multi-MPO group

b. Multi-state group
c. MPO + State
d. Technical effort
e. I-95 coalition
f. MAP Forum
g. NE Governors
h. NETC
i. NERF
j. AASHTO

3. What are the common interests and common needs we discussed today?
    a. Funding
    b. Bottlenecks
    c. Throughput and last mile
    d. Balance production and consumption
    e. Critical urban freight corridors
    f. Improved branding to engage interest
    g. Economic development
    h. Reliable infrastructure
    i. Agriculture
    j. Groups thinking about tourism
    k. Rail connectivity
    l. Sustaining through disruptions, resiliency
    m. Data sharing
    n. Transparency around port investment, rail, pipelines, airports
    o. E-commerce

4. What are possible actions this group can address?
    a. Geographical analysis
    b. Develop a stakeholder list
    c. Megaregion infrastructure project inventory list
    d. Model optimization (on a megaregion basis)
    e. Quarterly webinars (information exchange)
    f. Defining systems
    g. Branding for broader interest/appeal
    h. Site visits (interact with private sectors)
    i. Similar events to this on regular basis (annual summit)
    j. More conversations on mode shift
    k. Goal: see if a better mix of rail, sea, and trucks is feasible
    l. Continue private sector engagement
    m. Megaregion corridor plan

5. Who can serve as leader or champion for megaregion planning?
    a. I-95 coalition
    b. Selected technical efforts
    c. NASTO
    d. Recruit stakeholders to become involved in megaregion work

6. What are the immediate activities that can be taken to implement megaregion?
    a. Consider megaregion finance instrument
    b. Relate to megaregion project inventory
    c. Expand geographical analysis
    d. Tie state-level plans into megaregion-level plans ("Multiple plans into one")
    e. Examine STIPS of different states at the megaregion level.

CONCLUSION AND CLOSING REMARKS

Amy Jackson-Grove, Division Administrator, Connecticut Division, FHWA

There is common and continuing interest in doing this sort of collaboration-enhancing work more often. The private sector is important to the effort's success, and the private sector is excited to be involved. The more deeply that the private sector involvement can become, the more the effort will benefit. Moreover, the discussion from this meeting illustrates the growing interest that exists in the integration of transportation and land use planning. They are closely connected with each other functionally, so an integrated approach promises to account for these functional links and produce more successful outcomes. Data is important to almost any effort or subject area. Many kinds of data exist at lower or higher levels, but its availability needs to be improved at the megaregion level as well. Many parts of the megaregion are employing freight advisory committees. The evidence from this workshop shows them to be succeeding in many places. Still, some issues might be even better addressed by sub-megaregion groups. Therefore, we need to keep this conversationgoing. We can accomplish so much when we all come together.

APPENDIX A: WORKSHOP AGENDA

Freight and the Economy in the Northeast Megaregion

Northeast Megaregion Workshop Agenda
August 8 – 9, 2017
Paff Auditorium
University of Rhode Island
80 Washington Street
Providence, RI 02903

DAY 1 – Tuesday, August 8, 2017

Part 1 – Background / Setting the Stage

Purpose Statement: This workshop brings together members of the public and private sector to discuss how we can better connect and collaboratively address common transportation and economic issues and opportunities in the Northeast Megaregion (CT, MA, ME, NH, NJ, NY, PA, RI, and VT), and identify next steps for doing so.

1:00-1:15 **Welcome/Introductions**

- Amy Jackson-Grove, Division Administrator-FHWA Connecticut Division (confirmed)
- Peter Alviti, Rhode Island DOT Director (confirmed)
- Robert (Bob) Arnold, FHWA Director of Field Services-North (confirmed)

1:15–2:00 **Starting the Megaregion Conversation: The Northeast Economy and Transportation's Role**
Overview of Workshop goals.

Facilitated by: James Garland, FHWA Office of Planning (confirmed)
Introductions by: Renee Sigel, Division Administrator-FHWA Pennsylvania Division (confirmed)

Speakers:

- Catherine Ross, Georgia Tech
- Barry Seymour, Delaware Valley Regional Planning Commission (confirmed)

2:00-3:00 **Existing Megaregional Collaboration and Studies in the Northeast**
Examine past, current, and future collaboration activities to build upon.

Facilitated by: Scott Allen, FHWA Office of Planning (confirmed)
Introductions by: Ken Miller, Assistant Division Administrator-FHWA Massachusetts Division (confirmed)

Speakers:

- Marygrace Parker, I-95 Coalition (confirmed)
- Donnie Maley, Northeast Corridor Commission (confirmed)
- Rebecca Reyes-Alicea, Federal Railroad Administration (confirmed)

3:00-3:15 **BREAK**

3:15-4:15 **Focus on Freight and Economic Development in the Northeast – Private Sector Perspectives**
Explore freight trends, market shifts, technology deployment, and challenges.

Facilitated by: Brandon Buckner, FHWA Office of Planning (confirmed)
Introductions by: Robert Clark, Division Administrator-FHWA New Jersey Division (confirmed)

Speakers:

- Logistics: Chris Haynes, Nestle Waters (confirmed)
- Rail: David Fink, Pan Am Railways (confirmed)
- Ports: Pease International Tradeport, Geno Marconi (invited)

4:15-4:45 **Megaregional Collaboration and Implementation in Northern California**

Facilitated by: James Garland, FHWA Office of Planning (confirmed)
Introductions by: Larry Dwyer, Assistant Division Administrator-FHWA Vermont Division (confirmed)

Speaker:

- Vikrant Sood, Metropolitan Transportation Commission (San Francisco Bay Area MPO – confirmed)

4:45-5:00 **Summary of Day 1 and Preview of Day 2**
Facilitated by: Catherine Ross, Georgia Tech

5:00 **ADJOURN**

DAY 2 – Wednesday, August 9, 2017

Part 2 – Current and Near-Term Initiatives

8:30-8:45 **Recap of Day 1 and Overview of Day 2**
Facilitated by: Catherine Ross, Georgia Tech

8:45-10:00 **Transportation and Economic Development: Public Sector Perspectives**
Transportation, freight, and economic development activities that have benefits across the Megaregion.

Facilitated by: Scott Allen, FHWA Office of Planning (confirmed)
Introductions by: Todd Jorgensen, Division Administrator-FHWA Maine Division (confirmed)

Speakers:

- Port Authority of New York and New Jersey, Steve Brown (confirmed)
- Connecticut DOT Economic Analysis, Tom Maziarz (confirmed)

- Maine Port Authority, John Henshaw (confirmed)
- Massachusetts Port Authority, Lisa Wieland (invited)

10:00-10:15 BREAK

10:15-11:30 State Perspectives on Freight, Economic Development, and Megaregional Coordination

State DOTs discuss freight and economic development activities.

Facilitated by: Brandon Buckner, FHWA Office of Planning (confirmed)
Introductions by: Patrick Bauer, Division Administrator-FHWA New Hampshire Division (confirmed)

Speakers:

- State DOTs

11:30-1:00 LUNCH (On your own)

1:00-2:15 Metropolitan Freight Activities and Megaregional Coordination Objectives

MPO participants discuss freight and economic development activities and challenges.

Facilitated by: Scott Allen, FHWA Office of Planning (confirmed)
Introductions by: Peter Osborn, Division Administrator-FHWA New York Division (confirmed)

Speakers:

- CT: Capitol Region COG (Hartford)
- MA: Pioneer Valley MPO (Springfield)
- NJ: North Jersey TPA
- NY: NYMTC
- PA: Lehigh Valley MPO
- RI: Statewide MPO coordinator
- VT: Chittenden County RPC

Part 3 – Moving Forward

2:15-2:45 Panel Discussion – Managing Megaregional Assets through Asset Management

Identifying and managing transportation assets with Megaregional significance.

Facilitated by: James Garland, FHWA Office of Planning (confirmed)
Introductions by: Carlos Machado, Division Administrator-FHWA Rhode Island Division (confirmed)

Speaker:

- Shoshana Lew, Rhode Island DOT (confirmed)

2:45-3:00 BREAK

3:00-3:45 Identifying Priority Needs and Potential Actions for the Megaregion

Small group discussion to identify common needs across the Megaregion and brainstorm priorities and coordination approaches.

Facilitated by: Catherine Ross, Georgia Tech

3:45-4:15 **Report Outs and Keeping the Conversationgoing – Discussion of Next Steps/Action Items**

Develop concrete action items to carry forward.

Facilitated by: Catherine Ross, Georgia Tech

4:15–4:30 **Final Comments and Closing Remarks**

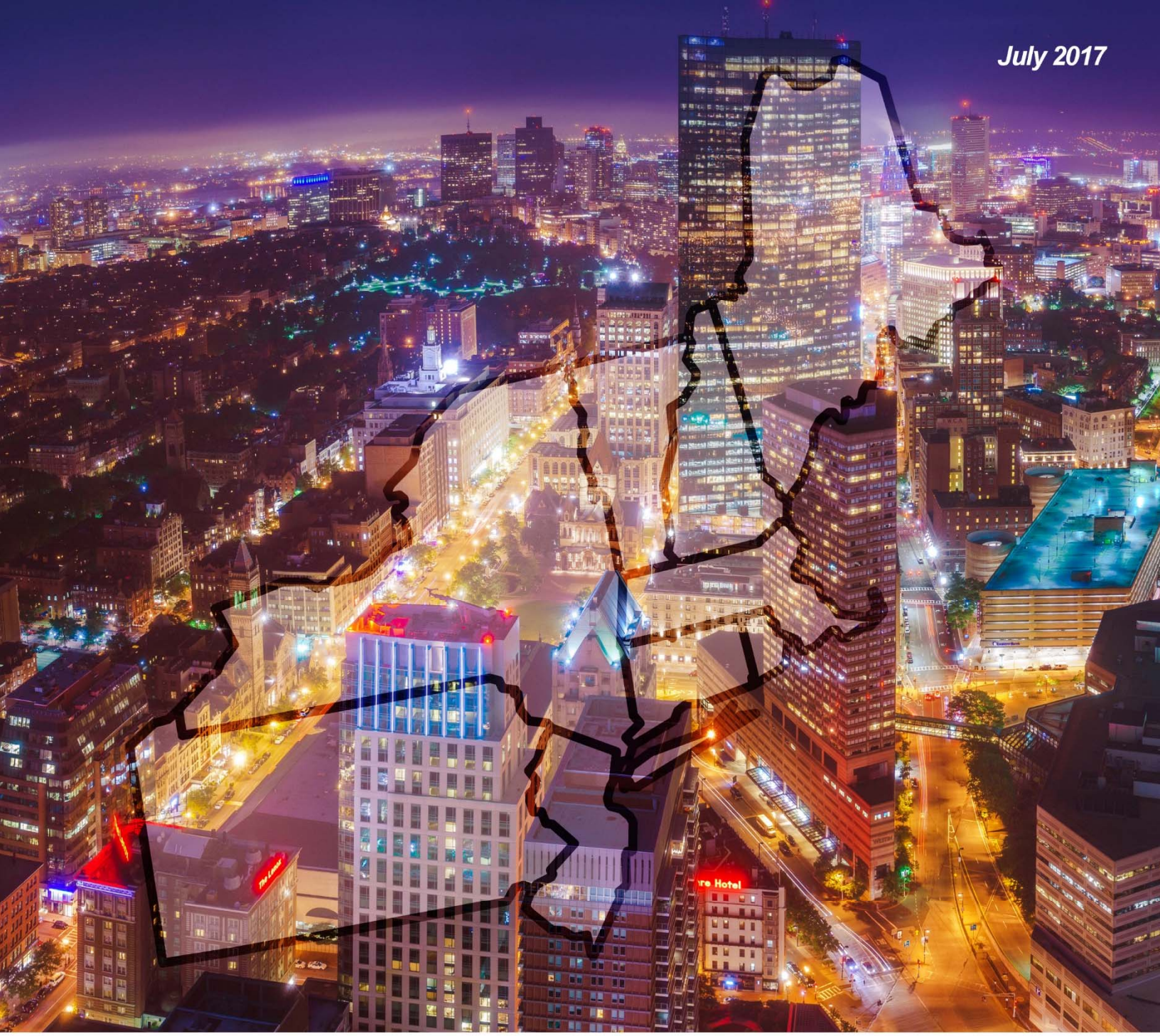
- Amy Jackson-Grove, Division Administrator-FHWA Connecticut Division (confirmed)
- Carlos Machado, Division Administrator-FHWA Rhode Island Division (confirmed)
- Shoshana Lew, Rhode Island DOT (confirmed)

4:30 **ADJOURN**

APPENDIX B: NORTHEAST WHITE PAPER

The Northeast White Paper is included in the following pages.

July 2017



Northeast MEGAREGION

U.S. Department of Transportation
Federal Highway Administration

Northeast Megaregion

July 2017

INTRODUCTION

This paper provides an overview of the Northeast Megaregion and highlights key characteristics, including population, employment, transportation infrastructure, freight trends, challenges, and opportunities. For the purposes of this overview, the Northeast Megaregion includes Connecticut (CT), Massachusetts (MA), Maine (ME), New Hampshire (NH), New Jersey (NJ), New York (NY), Pennsylvania (PA), Rhode Island (RI), and Vermont (VT). Past multi-state initiatives in the Northeast Megaregion have shown the benefits and challenges of coordination at the megaregion level. Some efforts have been explicitly transportation focused, while others have addressed different topics with a similar cooperative approach. Several examples are summarized in the final section, including the Northeast Corridor (NEC) plan that involves thirteen states, the United States Department of Transportation (U.S. DOT) and Amtrak, the Regional Greenhouse Gas Initiative (RGGI), and the Transportation and Climate Initiative (TCI).

The Northeast Megaregion is perhaps the most conspicuous megaregion in terms of density and economic output in North America. Including major cities like New York, Boston, and Philadelphia, the unique network of metropolitan areas was first recognized by Jean Gottmann in his 1957 study called “Megalopolis or the Urbanization of the Northeastern Seaboard.” Each metropolitan area in the Northeast Megaregion has its own economic focus, with different regions exhibiting characteristics of financial, commercial, educational, government, tourism, manufacturing, pharmaceutical, logistics, military, or other economic specializations. When the megaregion’s metropolitan areas are examined by economic size alone, many rank among the largest U.S. metropolitan areas, as shown in Table 1. The New York-Newark-Jersey City Metropolitan Statistical Area (MSA) generated a Gross Metropolitan Product (GMP) of over $1.6 trillion in 2015, ranking first nationally and accounting for about eight percent of the national Gross Domestic Product (GDP). Philadelphia is the sixth most populous city in the nation and functions as an economic and cultural anchor of the Delaware Valley region. The Philadelphia – Camden – Wilmington MSA ranked 8th regarding GMP nationally. Philadelphia contains large clusters of economic activity in information technology, manufacturing, oil refining, food processing, and other clusters with financial activities accounting for the largest share of employment in the metropolitan area. Boston is the state capital and most populous city in Massachusetts and encompasses several of the world’s top universities, which exert a significant impact on the regional economy, especially for innovative industries. The city is home to several technology companies and is a hub for biotechnology and life science clusters. Several other notable Northeastern cities with their own economic focuses include Newark, NJ; Hartford, CT; Providence, RI; Portland, ME; Manchester, NH; Buffalo, NY; and Burlington, VT. Many metropolitan areas stand out by their size and specialties, and the megaregion concept focuses on the connections among them that make each better off.

Table 1: GDP for each State and GMP for the Largest MSAs in Northeast Megaregion, 2015

State	2015 State GDP (million $)	Share
NY	1,445,611	8.1%
PA	708,402	4.0%
NJ	564,360	3.1%
MA	488,100	2.7%
CT	256,306	1.4%
NH	74,269	0.4%
ME	57,332	0.3%
RI	55,650	0.3%
VT	30,300	0.2%
U.S. Total	17,925,143	100.0%

Largest MSA	2015 GMP (million $)	Share
New York-Newark-Jersey City, NY-NJ-PA	1,602,705	9.8%
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	411,161	2.5%
Boston-Cambridge-Newton, MA-NH	396,549	2.4%
Hartford-West Hartford-East Hartford, CT	86,113	0.5%
Providence-Warwick, RI-MA	78,694	0.5%
Buffalo-Cheektowaga-Niagara Falls, NY	56456	0.3%
Portland-South Portland, ME	28,876	0.2%
Manchester-Nashua, NH	25,442	0.2%
Burlington-South Burlington, VT	12,891	0.1%
U.S. Total	16,280,446	100.0%

Data Source: U.S. Department of Commerce, Bureau of Economic Analysis, 2015

The Northeast Megaregion is endowed with abundant transportation assets, including seaports, highways, airports, rail lines, and transit infrastructure. The Port of New York and New Jersey, one of the world's largest natural harbors, ranked 3rd in the United States in 2014 in cargo tonnage, and is the busiest port on the eastern seaboard. The nine states in the Northeast Megaregion generated about 15 percent of the national vehicles miles traveled (VMT) in 2013, as summarized in Table 2. Though the region generates a large amount of VMT, the average VMT per capita in the Northeast Megaregion is much lower than the national average, mainly due to the higher mode share of public transportation. The Northeast Corridor is the busiest rail line nationally and had annual ridership of more than eleven million in 2013, according to Amtrak. The megaregion's airports host 13 percent of the nation's commercial flights.[1]

Table 2: Total VMT and VMT per capita by State in the Northeast Megaregion in 2013.

State	Total VMT 2013 (millions)	VMT share	VMT per capita
CT	30,941	1.0%	8,596
ME	14,129	0.5%	10,634
MA	56,311	1.9%	8,394
NH	12,903	0.4%	9,756
NJ	74,530	2.5%	8,363
NY	129,737	4.3%	6,587
PA	98,628	3.3%	7,717
RI	7,775	0.3%	7,381
VT	7,116	0.2%	11,352
Northeast Megaregion, total	432,070	14.5%	7,712
United States, total	2,988,323	100.0%	9,442

Data Source: Bureau of Transportation Statistics 2013

[1] Calculated based on National Transportation Atlas Database 2015. Retrieved from https://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_atlas_database/2015/index.html.

IMPORTANCE OF MEGAREGIONS

Megaregions are characterized as networks of urban centers and their surrounding areas, connected by existing economic, social, and infrastructure relationships.[2] In an increasingly competitive global economy, it is critical to understand these economic ties and the transportation infrastructure that serves as the link within and between regions, and that provide access and linkages across the United States and beyond. To better understand the impact of megaregions and to facilitate cooperation and coordination accordingly, the Federal Highway Administration (FHWA) is sponsoring several workshops in megaregions across the country. These workshops convene local, regional, state, and Federal transportation officials with the private sector to connect and discuss multimodal freight transportation, effective and efficient transportation infrastructure investment and operations, and corresponding shared economic success at the megaregion scale. The importance of this collaborative effort is underscored by the current and rising significance of these regions both nationally and globally. Megaregions are economic engines and are also major destinations and originators of travel.

Transportation infrastructure provides for mobility within and between cities and metropolitan areas, and is the means for the movement of goods within and beyond the megaregion. The region's ports, highways, railroads, airports, pipelines, and intermodal connectors will need continued investment to transport agricultural products, manufactured products, and raw materials to their final destinations. Coordinated, comprehensive transportation planning activities are necessary to ensure that the megaregion can effectively compete in the global economy.

POPULATION

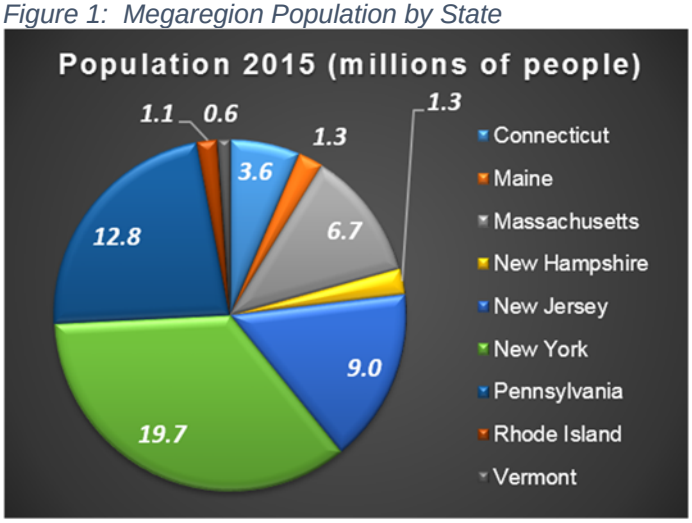
The total population of the Northeast Megaregion was estimated at 56 million in 2015, or 17 percent of U.S. population.[3] New York is the most populous state, followed by Pennsylvania, New Jersey, and Massachusetts (Figure 1). The New York metropolitan statistical area (MSA) is not only the most populous region nationally but is also one of the fastest growing MSAs. The five fastest-growing MSAs by growth rate in the Northeast Megaregion from 2009 to 2015 are Claremont-Lebanon (NH), State College (PA), Chambersburg-Waynesboro (PA), Lock Haven (PA), and New York-Newark-Jersey City (NY).[4]

[2] Ross, C. L. et al. (2009). *Megaregions: Planning for global competitiveness*. Island Press.

[3] American Community Survey (ACS) 5-year estimate 2011-2015.

[4] American Community Survey (ACS) 5-year estimate 2005-2009 and 2011-2015.

Figure 1: Megaregion Population by State



Data Source: American Census Survey 5-year Estimate 2011-2015

EMPLOYMENT

The Northeast Megaregion's most concentrated employment sectors are education and health services, financial activities, and professional and business employment. Table 3 summarizes the total employment by sector and their location quotients. The location quotient quantifies a region's concentration of a given economic activity based on national averages, and a value greater than one indicates that the activity is more concentrated in the region than the rest of the nation. When the location quotient exceeds one, a region can often be assumed to export related products or services. Education and health is the largest sector, following by trade, transportation, and utilities. Moreover, education and health is one of the exporting sectors for whom the location quotient exceeds one, along with financial services, and professional and business services. The megaregion also has a great number of jobs in government, and leisure and hospitality. Concentration of industries in a region implies a comparative advantage relative to other regions in attracting the resources needed for development of those industries.

Table 3: Megaregion Employment by Sector

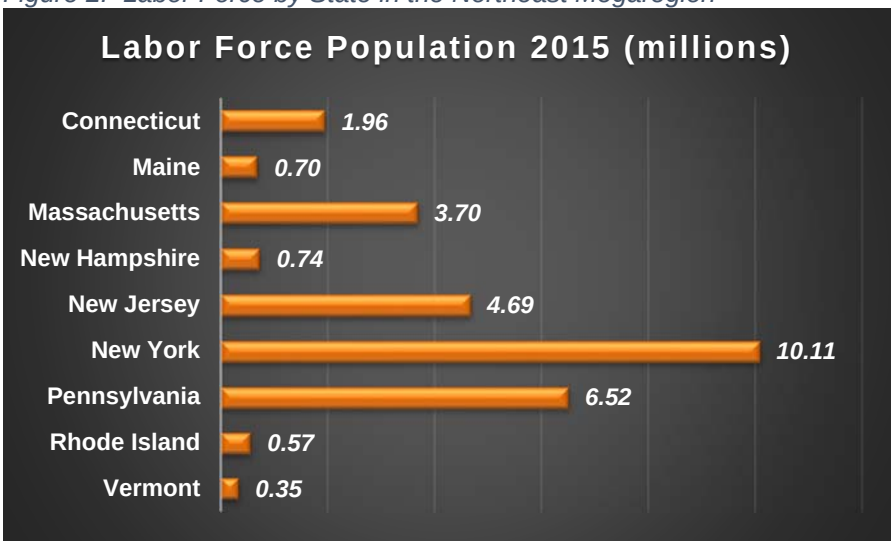
Northeast Megaregion	Construction	Manufacturing	Trade, transportation, and utilities	Financial	Professional & business	Education & health	Leisure & hospitality	Government	Total
Employment (thousands)	1,084	1,831	4,856	1,756	3,809	5,475	2,613	3,765	26,925
Location Quotients (LQ)	0.85	0.80	0.96	**1.15**	**1.01**	**1.29**	0.90	0.90	n/a

Data Source: Bureau of Labor Statistics, State and Metro Area Employment, Hours, and Earnings (March 2017)

The Northeast Megaregion is equipped with considerable physical infrastructure and an architectural heritage that attracts employers and employees. The abundance of research and distinguished institutions of higher education attract innovative industries and highly-skilled workers. The nine states in the megaregion hold about 18.4 percent of the nation's labor force. The labor force break down for each state is shown in Figure 2. It is believed that with continuously lowered transportation costs, economic agglomeration effects are happening at

larger scales. The effect of labor pooling may gradually strengthen at the megaregion level and megaregion level planning can play a critical role in optimizing economic output while reducing conflicts in the region.

Figure 2: Labor Force by State in the Northeast Megaregion



Data Source: American Census Survey 5-year Estimate 2011-2015

MEGAREGION INFRASTRUCTURE

The Northeast Megaregion has a large and developed system of freight and passenger transportation infrastructure across all modes. Each mode is discussed in more detail in the following sections. Table 4 summarizes key megaregion transportation facilities.

Table 4: Partial List of Key Megaregion Transportation Facilities

Partial List of Key Megaregion Transportation Facilities		
HIGHWAYS		I-70, I-76, I-78, I-80, I-81, I- 83, I-84, I-86, I-87, I-88, I-89, I-90, I-91, I-93, I-95, I-99. Auxiliary (3-digit) Interstates omitted for brevity.
RAILROADS		Freight: CSX, Canadian Pacific, Norfolk Southern Passenger: Amtrak, Long Island Railroad, NJ Transit, SEPTA, Metro-North Railroad
AIRPORTS		ABE, ACY, ALB, AUG, BDL, BOS, BTV, BUF, ELM, EWR, HPN, HVN, ISP, JFK, LGA, MDT, MHT, PBG, PHL, PVD, PWM, ROC, SWF, SYR
WATERBORNE		Ports of: Albany-Rensselaer, Boston, Camden-Gloucester City, Newark, New York and New Jersey, Paulsboro, Philadelphia, Portland, Portsmouth, Providence,

MAJOR TRANSPORTATION FREIGHT FLOWS

The Northeast Megaregion produces approximately 15 percent of the freight value and 11 percent of the freight volume that moves through the U.S., with even more passing through on

its way from other origins.[5] The megaregion consumes slightly more freight by value than it produces. Truck movement accounts for 92 percent of the weight that is moved to or from the megaregion, followed in decreasing order by rail, water, and air. The value of goods moved per ton varies by mode as depicted in Table 5.

Table 5: Freight Movement into and out of the Northeast Megaregion (2015)

	Northeast Megaregion (destination)				Northeast Megaregion (origin)			
	Truck	**Rail**	**Water**	**Air**	**Truck**	**Rail**	**Water**	**Air**
Tonnage (millions)	1,623	119	47	0.94	1,661	74	41	0.65
Value (billion $)	2,195	94	61	88	2,207	58	54	60
$/ton	1,352	787	1,289	94,014	1,329	781	1,305	93,410

Source: Freight Analysis Framework (FAF4)

Freight movement in the Northeast Megaregion is oriented around a large multimodal transportation network with several hubs and intermodal terminals. Interstates and other routes on the National Highway System (NHS) are the foundation of the Northeast road transportation network for both passengers and freight. Freight rail movement is built around three Class 1 providers with the densest network in the southwestern two-thirds of the megaregion; many smaller railroads supplement the Class 1 providers and serve specific regions. The megaregion has several large ports, both seaports and river ports. Air cargo focuses on several main gateways, with New York's JFK airport as the largest by cargo weight. Figure 3 provides an overview of the megaregion's transportation infrastructure.

At the national level, six trends and challenges have been identified in the National Freight Strategic Plan (NFSP) developed by U.S. DOT.[6] These trends guide U.S. DOT's interest and efforts to help improve freight nationally. The trends include: 1) expected growth in freight tonnage; 2) underinvestment in the freight system; 3) difficulty in planning and implementing freight projects; 4) continued need to address safety, security, and resilience; 5) increased global economic competition; and 6) the application and deployment of new technologies. Many of these trends are also present in the Northeast Megaregion's freight profile and can help guide efforts to improve freight systems.

The Fixing America's Surface Transportation (FAST) Act has provided new tools to address freight challenges. The FAST Act establishes a new National Highway Freight Program (NHFP) with the goal of improving freight movement efficiency on the National Highway Freight Network (NHFN).[7] The FAST Act creates a new national policy with specific goals about the freight network's condition, safety, security, efficiency, productivity, resiliency, and reliability. NHFP funds can be used for a wide range of activies and projects that cover freight planning, analysis, and forecasting, infrastructure construction and rehabilitation, intelligent transportation system and technology deployment and so on. The Infrastructure for Rebuilding America (INFRA) discretionary grant program[8] (previously called FASTLANE) also provides funds to repair aging infrastructure, with 25 percent of funds reserved for rural projects.

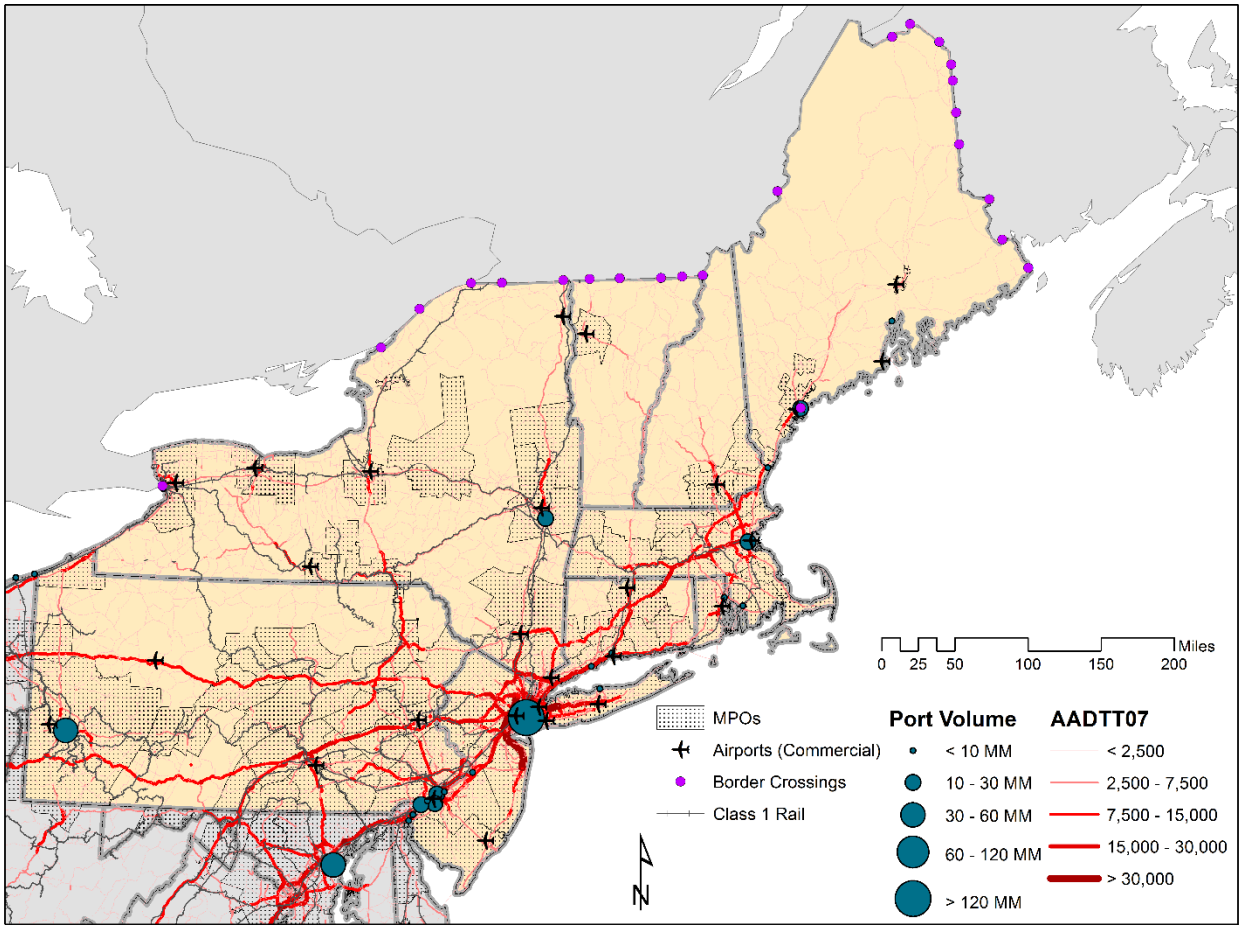
[5] Center for Transportation Analysis in Oak Ridge National Laboratory (2017). Freight Analysis Framework version 4 (FAF4). Retrieved from http://faf.ornl.gov/fafweb/Extraction1.aspx.

[6] U.S. Department of Transportation (2015). National Freight Strategic Plan. Retrieved from https://www.transportation.gov/freight/NFSP

[7] National Highway Freight Program: https://www.fhwa.dot.gov/fastact/factsheets/nhfpfs.cfm

[8] U.S. DOT (2017). Retrieved from https://www.transportation.gov/buildamerica/infragrants.

Figure 3: Northeast Megaregion Transportation Infrastructure. Note: Port volume in tons



Data Source: Bureau of Transportation Statistics 2015 and FAF4 data 2007

Metropolitan areas in the Northeast Megaregion have substantial commodity trade with other parts of the megaregion, and these connections will continue and grow over time. Today the megaregion is tightly interwoven in a network of interregional trade, a pattern which remains when freight flows are forecasted through 2045. To illustrate, let us examine the largest trading partners of the New York, Boston, and Bangor regions, three regions which are illustrative because they are in separate states, have different sizes, and have distinct economic focuses. The majority of their top trading partners will remain inside the megaregion. For example, the New York City region's largest export markets are expected to be the states of New York, Connecticut, Pennsylvania, and New Jersey. Similarly, Bangor, Maine's largest import markets are expected to be Canada, New Hampshire, Massachusetts, Connecticut, and New York, all in or (in the case of Canada) adjacent to the megaregion. These regions' top 5 trading partners for inbound and outbound freight are shown in Table 6.

Table 6. Top Five Trade Partners by State of Selected Metropolitan Areas, Forecasted through 2045

New York, NY				Boston, MA				Bangor, ME			
Outbound		Inbound		Outbound		Inbound		Outbound		Inbound	
NY	31%	**PA**	27%	**CT**	14%	Canada	15%	**NH**	20%	Canada	33%
CT	13%	Canada	9%	**ME**	10%	**CT**	13%	Canada	14%	**NH**	21%
PA	13%	Eastern Asia	8%	SW & Central Asia	9%	**NY**	12%	**NY**	14%	**MA**	11%
NJ	12%	Europe	6%	**NY**	7%	Rest of Americas	8%	**MA**	11%	**CT**	6%
Canada	9%	**NY**	6%	Canada	6%	**ME**	8%	**NJ**	11%	**NY**	4%
Total outbound: 254,561 thousand tons		Total inbound: 427,500 thousand tons		Total outbound: 58,422 thousand tons		Total inbound: 131,618 thousand tons		Total outbound: 34,032 thousand tons		Total outbound: 29,396 thousand tons	

Data Source: FAF4.1 data with base year 2012 and forecasts up to 2045[9] [10] [11]

HIGHWAYS

An extensive highway network serves the Northeast Megaregion, comprised of 50,692 centerline miles of highways as part of the National Highway System, of which 5,670 centerline miles are Interstate Highways.[12] These interstate corridors serve the major cities located in the megaregion. Philadelphia, New York, Providence, and Boston form a line near the coast linked by I-95 and establishing one of the densest megaregion cores in the country; highway truck traffic reflects that density, making I-95 and nearby highways heavily traveled by trucks. For example, many of the megaregion's busiest truck segments are on I-95, with the Cross Bronx Expressway as the busiest truck corridor with over 63,000 daily trucks. However, this is only a portion of a much more extensive network that links the coast with an array of towns and cities further inland. The full network of Interstates, U.S. routes, and state highways is depicted in Figure 4.

Border crossings join America's highway system with Canada's. The United States and Canada have extensive trade, much of it carried by trucks. America's second busiest truck land crossing with Canada is the Buffalo Peace Bridge, carrying nearly a million trucks annually and several thousand annual trains. Other major truck crossings lie in northeastern New York, Vermont, and eastern Maine, as shown in Figure 5. In terms of state-province pairs, 60 percent of trucks between the Northeast Megaregion and Canada move between New York and Ontario, 14 percent between New York and Quebec, 11 percent between Maine and New Brunswick, 11 percent between Vermont and Quebec, and four percent between Maine and Quebec.[13]

[9] Federal Highway Administration (2016). Administrator's roundtable on the freight economy: New York, New York. Retrieved from https://www.fhwa.dot.gov/freighteconomy/newyork.cfm.

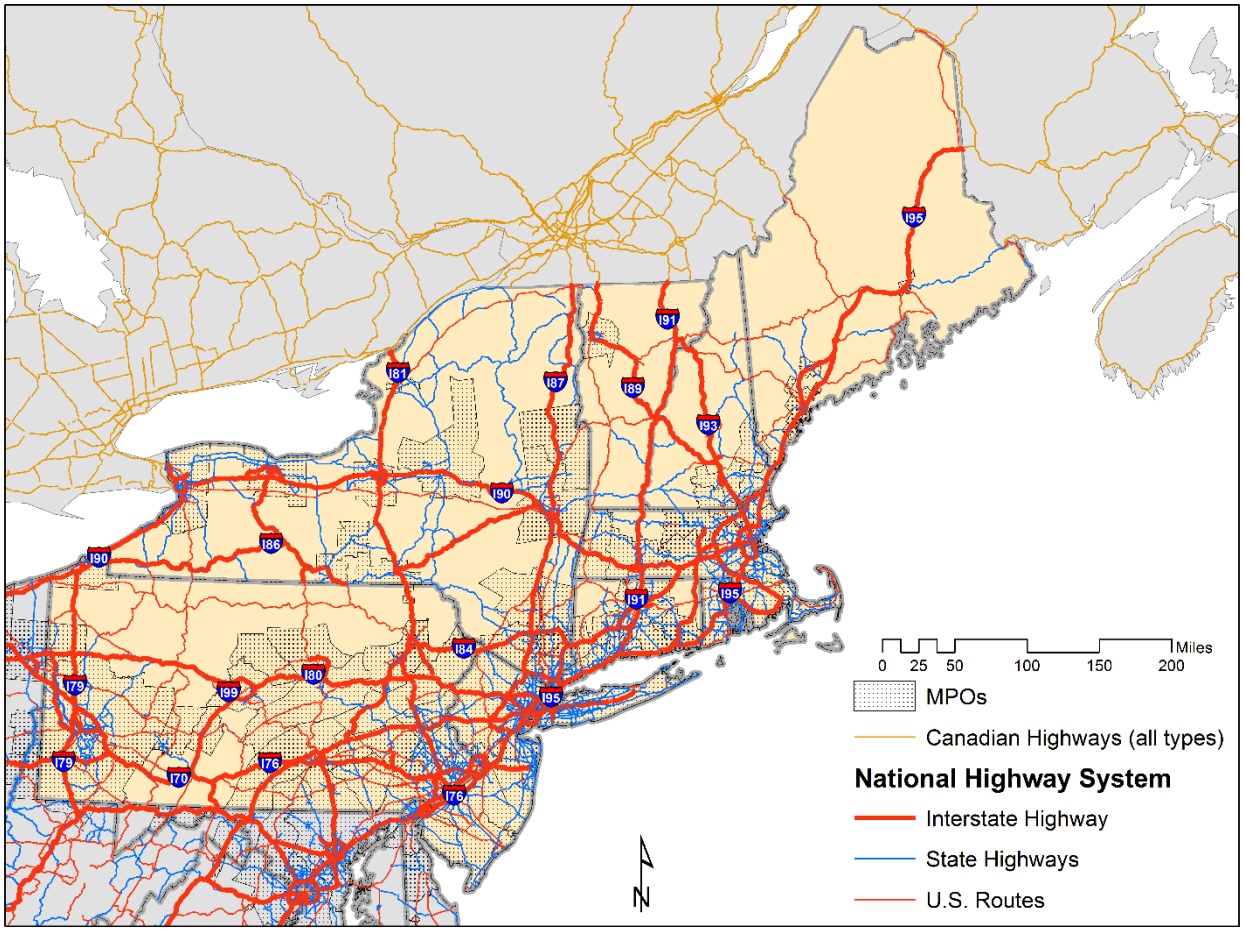
[10] Federal Highway Administration (2016). Administrator's roundtable on the freight economy: Bangor, Maine. Retrieved from https://www.fhwa.dot.gov/freighteconomy/bangor.cfm.

[11] Federal Highway Administration (2016). Administrator's roundtable on the freight economy: Boston, Massachusetts. https://www.fhwa.dot.gov/freighteconomy/boston.cfm.

[12] Calculations based on Freight Analysis Framework version 4 (FAF4). Retrieved from https://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm.

[13] Calculated from the National Transportation Atlas Database (2015). Retrieved from https://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_atlas_database/index.html.

Figure 4: National Highway System



Freight bottlenecks have grown along with truck and passenger VMT. Congestion can be costly as a single bottleneck can cause over half a million annual hours of truck delays[14] at a rough value of about $27 per hour[15]. Nationwide, this equates to $6.5 billion in extra trucking costs due to bottlenecks annually[16]. The Northeast Megaregion contains 21 of the country's top 100 bottlenecks[17], with average peak-hour traffic speeds of just 38 miles per hour (mph). They are heavily concentrated in the New York metropolitan region, especially along I-95 in New York, New Jersey, and Pennsylvania, and on adjacent roads. The bottlenecks are especially impactful because of the international air and sea gateways in the region. Congestion here can slow imports and exports to other parts of the megaregion that travel through the region. Many other metro areas in the Northeast Megaregion also experience similar bottlenecks which not only affect them but also slow freight flowing through the megaregion, including the regions around

[14] Cambridge Systematics (2008). Estimated cost of freight involved in highway bottlenecks. Retrieved from Estimated Cost of Freight Involved in Highway Bottlenecks.

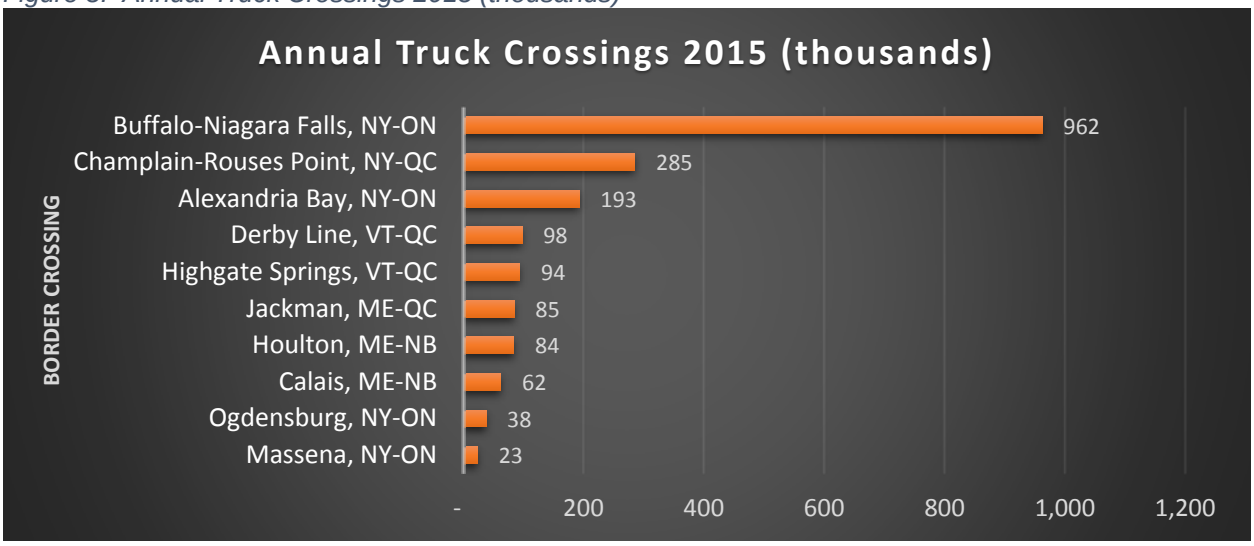
[15] Federal Highway Administration (2017). The economic costs of freight transportation. Retrieved from https://ops.fhwa.dot.gov/freight/freight_analysis/freight_story/costs.htm

[16] Federal Highway Administration (2017). The economic costs of freight transportation. Retrieved from https://ops.fhwa.dot.gov/freight/freight_analysis/freight_story/costs.htm.

[17] American Transportation Research Institute (2017). Top 100 truck bottleneck list. Retrieved from http://atri-online.org/2017/01/17/2017-top-100-truck-bottleneck-list/.

Boston, MA; Providence, RI; Hartford and New Haven, CT; Philadelphia, PA; Camden, NJ; and Buffalo, NY.

Figure 5: Annual Truck Crossings 2015 (thousands)



Source: Calculated from National Transportation Atlas Database (2015)

RAILROADS

The megaregion's rail network intersects with Amtrak's Northeast Corridor, which is the United States' most heavily traveled intercity passenger rail link, connecting Washington DC outside of the megaregion with Boston via Philadelphia, New York, Providence, and other cities. In fact, 55 percent of all Amtrak passengers traveled along the Northeast Corridor in 2015,[18] which also contains six of Amtrak's 10 busiest stations. Including both Amtrak and passenger commuter trains, 750,000 people use the corridor daily.[19] Beyond serving as Amtrak's busiest corridor, the megaregion also contains five of the country's six busiest commuter networks[20] and has some of the nation's most developed public transit networks. Even though the most used passenger rail is concentrated along the northeast corridor, passenger rail also serves other parts of the megaregion. Empire Service links New York City with Buffalo, Rochester, and Albany several times daily, and the Keystone Service connects New York and Philadelphia with Harrisburg.[21] The Northeast Corridor's railroad infrastructure is in need of maintenance and improvements, indicated by $9 billion in deferred maintenance projects. The rail improvements are important to maintain the Northeast Corridor in state of good repair.

Three primary Class 1 railroads serve the region: Canadian Pacific, CSX, and Norfolk Southern. As shown in Figure 6, Class 1 freight rail is most extensive in the southwest portion of the megaregion, with routes by CSX and Norfolk Southern covering much of New York, Pennsylvania, New Jersey, and Massachusetts. Canadian Pacific also provides rail connections

[18] Amtrak (2015). NEC maps & data. Retrieved from https://nec.amtrak.com/resources/.

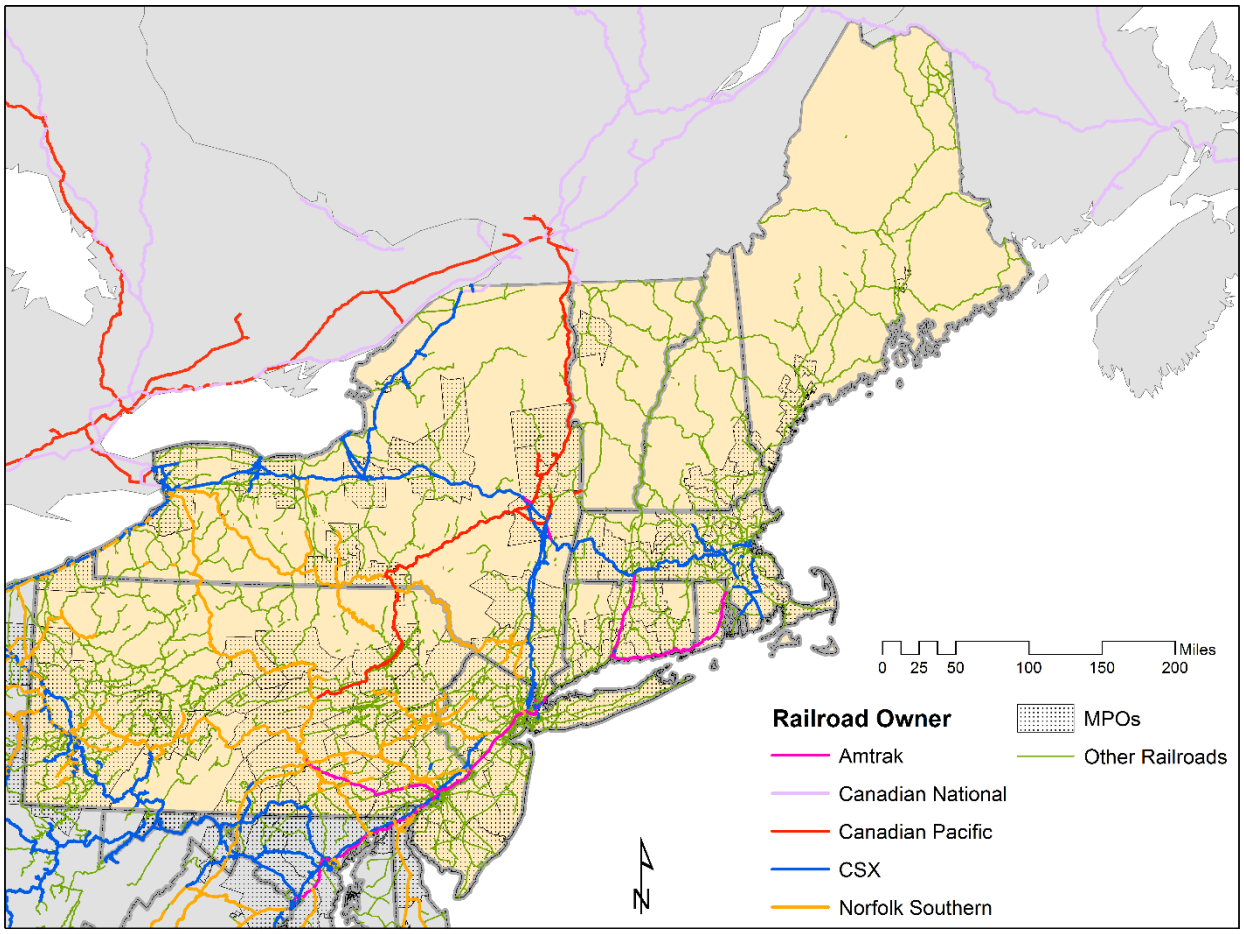
[19] Regional Plan Association (2013). Northeast Corridor now. Retrieved from http://library.rpa.org/pdf/RPA-Northeast-Corridor-Now.pdf.

[20] American Public Transportation Association (2016, Q4). Public transportation ridership report. Retrieved from http://www.apta.com/resources/statistics/Documents/Ridership/2016-q4-ridership-APTA.pdf.

[21] Amtrak (2017). Routes. Retrieved from https://www.amtrak.com/find-train-bus-stations-train-routes.

with Montreal through Albany, upstate New York, and eastern Pennsylvania.[22] Other areas have short-line freight rail connections, specifically in Vermont, New Hampshire, and Maine. Intermodal terminals cluster in the regions with the densest concentration of rail lines, including New Jersey, Pennsylvania, and New York.[23] [24]

Figure 6: Class 1 Railroads



PORTS

The megaregion contains busy container, bulk, and breakbulk ports which processed over 241 million tons of cargo in 2015.[25] The Port of New York and New Jersey (PONYNJ) is the megaregion's largest and processes approximately half of the megaregion's waterborne cargo weight. It is also the country's third busiest container port, after the Port of Los Angeles and the

[22] Canadian Pacific (2017). Rail network map. Retrieved from http://www.cpr.ca/en/choose-rail-site/Documents/cp-network-map-2016.pdf.

[23] Norfolk Southern (2017). Terminals and schedules. Retrieved from http://www.nscorp.com/content/nscorp/en/shipping-options/intermodal/terminals-and-schedules.html.

[24] CSX (2017). Intermodal maps. Retrieved from http://www.intermodal.com/index.cfm/intermodal-maps/.

[25] Bureau of Transportation Statistics (2015). Retrieved from https://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_atlas_database/2015/liner.

Port of Long Beach.[26] PONYNJ has six main facilities including six container terminals and three rail intermodal facilities. Its owner, the Port Authority of NY and NJ, is investing to accommodate growth, and one of its initiatives is raising the Bayonne Bridge by 64 feet to accommodate even larger ships.[27] The second busiest port is the Port of Philadelphia, which processes 26 million tons of goods annually. Managed by the Philadelphia Regional Port Authority (PhilaPort), it includes several terminals along the Delaware River to handle containers, bulk and breakbulk cargo, automobiles, and other goods. The third busiest port in the megaregion is the Port of Paulsboro, managed by the South Jersey Port Corporation. It sits across the Delaware River near PhilaPort terminals. Paulsboro has terminals that focus on perishables, breakbulk, and dry bulk such as cocoa beans and furnace slag.[28] Boston's seaports, managed by the Massachusetts Port Authority (Massport), process 17 million tons annually across several facilities, including the Conley Terminal for containers and the Boston Autoport, which handles more than 50 thousand vehicles annually.[29] Other busy ports in the megaregion include Portland (ME), which combines nine terminals, of which seven can process petroleum;[30] the Port of Albany (NY), which is over 100 miles north of New York Harbor;[31] and the port of New Haven (CT), which is Connecticut's busiest deep-water port with approximately 8 million annual tons of cargo.[32] The largest ports of the megaregion and their associated cargo throughput are listed in Figure 7.

[26] American Association of Port Authorities (2015). NARTA region container traffic (2015). Retrieved from http://aapa.files.cms-plus.com/Statistics/NAFTA%20CONTAINER%20PORT%20RANKING%202015%20revised.pdf.

[27] PANYNJ (2017). Capital plan 2017-2026. Retrieved from http://www.panynj.gov/capital-program/.

[28] SJPC (2017). Retrieved from http://southjerseyport.com/facilities/broadway-terminal/.

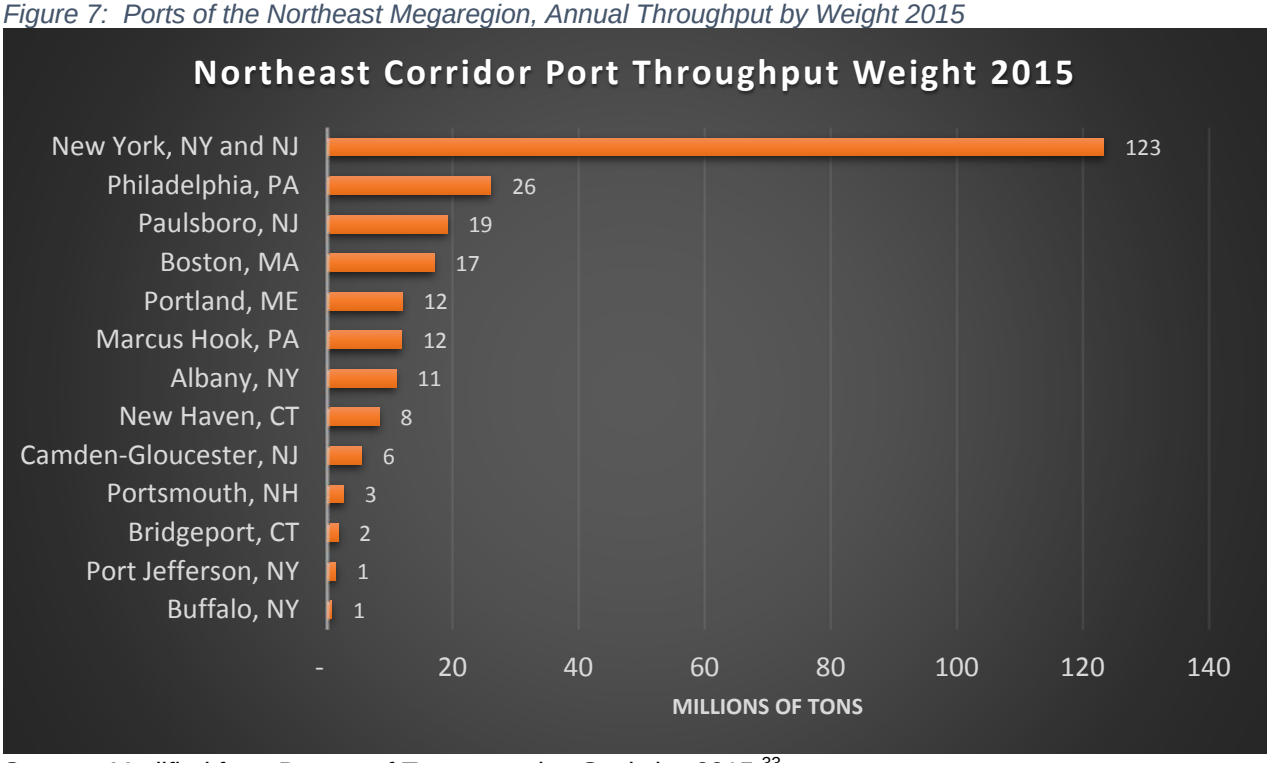
[29] Massport (2017). Retrieved from http://www.massport.com/conley-terminal/about-the-port/port-statistics/.

[30] Maine Port Authority (2015). Retrieved from http://www.maineports.com/portland.

[31] Albany Port District Commission (2017). Retrieved from http://portofalbany.us/index.php/facilities/terminal-description.

[32] City of New Haven (2017). Retrieved from https://www.newhavenct.gov/gov/depts/port_authority/default.htm.

Figure 7: Ports of the Northeast Megaregion, Annual Throughput by Weight 2015



Source: Modified from Bureau of Transportation Statistics 2015 [33]

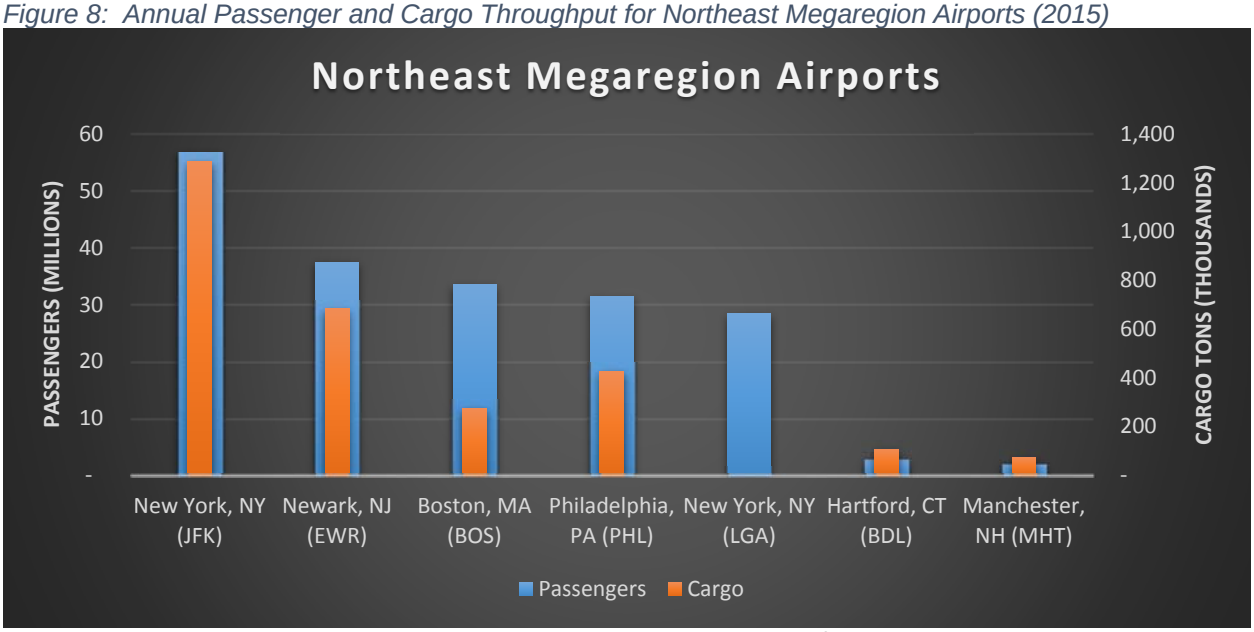
AIRPORTS

Air cargo tends to transport much higher-value and more time-sensitive goods than surface modes, linking a region with other high-tech production or high-income consumer markets. On average, items transported by air domestically in the U.S. are worth 70 times the average value per ton of items transported by truck.[34] Air cargo in the Northeast Megaregion centers on the main population centers. In addition, some airports, especially New York's John F. Kennedy Airport (JFK), have particularly high cargo volumes due in part to their international gateway function. Several of the megaregion's airports serve as hubs for cargo integrators, with Newark Liberty International Airport (EWR) as a major FedEx hub and Philadelphia International Airport (PHL) as a major UPS hub. Figure shows the megaregion's largest airports based on annual number of passengers and cargo throughput.

[33] Bureau of Transportation Statistics (2015). National Transportation Atlas Database 2015. Retrieved from https://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_atlas_database/2015/index.html.

[34] Oak Ridge National Laboratory (2017). Freight Analysis Framework data tabulation tool (FAF4). Retrieved from http://faf.ornl.gov/fafweb/Extraction2.aspx.

Figure 8: Annual Passenger and Cargo Throughput for Northeast Megaregion Airports (2015)



Source: Modified from Airports Council International – North America[35]

INFRASTRUCTURE CHALLENGES

The megaregion's infrastructure faces challenges related to maintenance, asset management, and capacity. The Northeast was the first U.S. megaregion identified because its development occurred earlier and more densely than most other parts of the country. Due to its history, some of the Megaregion's infrastructure is aging and in need of repair to avoid travel delays and serious accidents. Preserving state of good repair is a priority across modes. For example, a railroad swing bridge that failed in 2012, causing a train derailment, was built in 1881.[36] Several Northeastern states have seen an outsized number of bridges classified as structurally deficient.[37] The need to maintain infrastructure also affects airports, with 75 percent of the New York City-area programmed airport funds going towards maintenance.[38] State of good repair matters not just for operations but also for budgets since it is "the condition state of the system that can be maintained in perpetuity at the lowest annual cost."

Asset management faces twin challenges of having the data, methods, and decision processes in place to prevent infrastructure condition from falling below standards, and raising sufficient maintenance funds. Much progress has been made in terms of data management and availability. Beyond the sheer quantity of data and infrastructure, the further challenge will be funding, especially in places that have had to defer maintenance, during which time costs have compounded. Meeting maintenance needs called for by asset management programs will be

[35] Airports Council International (2015). Airport traffic reports. Retrieved from http://www.aci-na.org/content/airport-traffic-reports.

[36] Warner, D. (2012). New Jersey railroad swing bridge that failed in 2012, causing a train derailment, was built in 1881. Retrieved from http://www.reuters.com/article/us-usa-train-derailment-idUSBRE8AT0PF20121130.

[37] ASCE (2017). 2017 infrastructure report card. Retrieved from http://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Bridges-Final.pdf.

[38] ASCE (2017). 2017 infrastructure report card: State by state. Retrieved from http://www.infrastructurereportcard.org/state-by-state/

very difficult since many states in the megaregion have insufficient funds to maintain infrastructure when all funding sources (Federal, state and local) are combined.[39]

Capacity is another challenge. The busiest truck corridors already experience very high congestion as indicated by volume-to-capacity ratios at or exceeding one, as shown in Table 7.[40] Moving from trucks to rail does not necessarily solve the problem since even with the modest increases in rail capacity proposed by the Northeast Corridor (NEC) Infrastructure Master Plan in 2010, demand on 186 miles of the 457-mile NEC is expected to exceed 100 percent of available track space by 2030. The demand for transportation will continue to rise, which will raise congestion and decrease travel time reliability. As VMT keeps pace with population growth, the megaregion will require new highway improvements to maintain today's ratio of travel demand to available roadway space. These improvements do not necessarily have to be new infrastructure or expansions of existing infrastructure, but can also be Intelligent Transportation System (ITS) projects that allow for better operations on the infrastructure. The I-95 Corridor Coalition estimates that, without capacity and operational improvements, the number of highway miles operating at 27 mph or less during peak periods will nearly triple by 2035. Much of this infrastructure will be the responsibility of the local jurisdictions. Additionally, the megaregion's highway bridges and tunnels also experience strain. Many support large volumes of truck traffic and experience congestion due to the limited number of alternatives and difficulties of expanding capacity. The connections are such that some key infrastructure limitations will affect jurisdictions far away (e.g., major bridges, tunnels, rail lines).

[39] ASCE (2017). 2017 infrastructure report card: State by state. Retrieved from http://www.infrastructurereportcard.org/state-by-state/

[40] Calculations based on Freight Analysis Framework version 4 (FAF4). Retrieved from https://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm.

Table 7: Busiest Truck Routes in Megaregion

Route	Interstate	State	Annual Average Daily Truck Traffic (2007)	Volume-to-Capacity Ratio (2007)
Cross Bronx Expressway	I-95	NY	63,126	0.97
Garden State Parkway (Ft. Monmouth to Newark)	S-444	NJ	45,425	1.33
Lincoln Tunnel	S-495	NJ-NY	36,608	1.39
George Washington Bridge	I-95	NJ-NY	35,968	1.26
Vietnam Veterans Memorial Highway	I-95	PA	35,881	1.67

Data Source: FAF4 (2007)

Restricted capacity has led to severe highway congestion in many parts of the megaregion. The metro areas around New York, NY; Boston, MA; Bridgeport-Stamford, CT, and Philadelphia, PA are exceptionally congested in national rankings, with the four together generating nearly a billion hours of annual delays. New York and Bridgeport-Stamford experience exceptionally widespread congestion, with nearly 40 percent of their lane-miles experiencing congestion, compared with a national metropolitan average of 24 percent. Other parts of the megaregion also experience congestion that ranks them among the top 100 congested American regions, including Buffalo, NY; Pittsburgh, PA; Providence, RI; Rochester, NY; and New Haven, CT.[41] Congestion is forecasted to become both more severe and more widespread. While the megaregion's average Interstate volume-to-capacity ratio in 2007 was 0.70, which already indicates some restriction of free flow traffic, by 2040 the average Interstate volume-to-capacity ratio is forecasted to be 1.1, which indicates extremely volatile traffic flow and restricted access. Some corridors will have much worse.[42]

Throughout the megaregion there are examples of states, local governments, and MPOs overcoming infrastructure challenges through new programs, cooperative approaches, or expedited decision-making. An example is the response to Tropical Storm Irene. After Tropical Storm Irene swelled rivers, damaged 200 bridges and 500 miles of state roads, and isolated 13 communities, the Vermont Agency of Transportation (VTrans) implemented Expedited Project Delivery and Accelerated Bridge Construction on many of the damaged bridges and other spans pre-programmed for replacement. The programs expedited replacement and reduced road closures which could disrupt access to communities; many bridges were still delivered ahead of schedule.[43] Similarly, the Maine Department of Transportation (MaineDOT) is addressing freight capacity at the International Marine Terminal in Portland with the Maine Intermodal Port Productivity Project, which aims not only to expand port and rail capacity, but also divert some freight coming by truck from Canadian ports and reduce freight demand at roads and border crossings.[44] States, local jurisdictions, and MPOs are also adding or fine-tuning asset management plans with the analysis-based realization that it is "far more cost effective to keep assets in higher condition states than to postpone treatment until assets deteriorate."[45]

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[41] Texas A&M Transportation Institute (2015). 2015 urban mobility scorecard. Retrieved from https://mobility.tamu.edu/ums/

[42] Calculations based on Freight Analysis Framework version 4 (FAF4). Retrieved from https://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm.

[43] Fitch, J., Burbank, S., and Goodrich, G. Fast 4 on VT 73. VTrans. Retrieved from http://vtrans.vermont.gov/sites/aot/files/highway/documents/structures/Fast%204%20on%20VT%2073%20White%20Paper.pdf.

[44] MaineDOT (2016). Maine intermodal port productivity project "Fastlane" grant application. Retrieved from http://www.equipmentworld.com/maine-dot-awarded-7-7-million-in-fastlane-grants-for-terminal/.

[45] NYSDOT (2013). New York State DOT Transportation Asset Management Plan. Retrieved from http://www.tamptemplate.org/wp-content/uploads/tamps/023_newyorkstatedot.pdf.

MEGAREGION CHALLENGES AND OPPORTUNITIES

The megaregion concept provides a new focus for identifying, prioritizing, and addressing mobility and economic development challenges and opportunities across jurisdictional lines. Planning across these boundaries is a major challenge, which is receiving renewed attention at state, local, and Federal levels. Ideally, megaregions should be defined with a balance of multi-jurisdictional planning and political boundaries along with the economic, environmental, and cultural links within and between regions.

A major challenge facing the Northeast Megaregion is constraints on infrastructure capacity. Growing freight movement is making highways increasingly congested, and augmenting the capacity of the freight system requires improvements not only to the highway system but also to intermodal connections. Infrastructure capacity constraints and the need to operate and maintain existing infrastructure call for the careful evaluation, inventory, and strategic decision-making that emerge from multi-jurisdictional collaboration and coordination.

Sustainability is another challenge in the Northeast Megaregion. The high development density and large population concentrations in the Northeast Megaregion inevitably bring about impacts on the natural, human, and social environments. Since the 1980s, employment opportunities in the New York-Northern New Jersey region have become increasingly polarized, contributing to increased wage inequality and enlarging wage gaps.[46] Social equity challenges are complex and ineradicable problems that resist solution, but the megaregion scale provides new insights and opportunities regarding increased economic benefit, and innovative finance strategies to mitigate negative impacts.

One of the areas of opportunity to overcome capacity constraints is Intelligent Transportation Systems (ITS). ITS technologies such as traffic signal control systems or variable message signs can address some of the problems that come with overcrowded infrastructure, such as congestion and safety. Moreover, they may even help make more efficient use of existing infrastructure through such measures as better traffic light sequencing or driver communication, effectively increasing capacity without pouring concrete.

On the topic of freight, another area of opportunity that has been observed in the megaregion is to create multimodal freight terminals to spur economic development. An example is the Quonset Business Park on Narragansett Bay in Rhode Island. Decommissioned as a naval construction battalion in the 1990s, it has since leveraged and improved its transportation endowments across four modes (sea, air, rail, and road) to become an economic development engine. It generates nearly $3 billion annually for the economy, and adds $113 million in annual tax revenues through the 200 companies operating there. Although its position today results from many years of growth and development, it is passing new milestones, such as the arrival of its first neo-Panamax ship last year.[47]

Similarly, other seaports are upgrading their infrastructure with the prospect of the Panama Canal's expansion spurring traffic to east coast ports. The port of Albany, NY is investing $50

[46] Abel, Jaison R. and Deitz, Richard, Job Polarization and Rising Inequality in the Nation and the New York-Northern New Jersey Region (October 1, 2012). Current Issues in Economics and Finance, Vol. 18, No. 7, 2012. Available at SSRN: https://ssrn.com/abstract=2163765 or http://dx.doi.org/10.2139/ssrn.2163765

[47] Vickers, J. (2017). Logistics leaders. *Business Facilities*. Retrieved from https://businessfacilities.com/2017/05/logistics-leaders/

million to prepare for the expected traffic and hopes for warehousing space.[48] Port expansions are occurring for other reasons such as spurring port growth and minimizing traffic in the Northeast. The International Marine Terminal's project in Portland, ME is intended to double of its freight capacity and improve rail connection.[49]

On the other side of the megaregion is another example of recent multimodal freight infrastructure. Norfolk Southern is one of the three largest freight railroads serving the megaregion, and it is improving infrastructure along its Crescent Corridor, linking New York City, Philadelphia, and Mechanicsville, NY with east-central Pennsylvania (Bethlehem and Harrisburg) and the southeastern U.S. In 2013, it opened a new intermodal center on this corridor in Greencastle, PA in part to access south-central Pennsylvania's logistics sites. The state of Pennsylvania joined with the railroad in a public-private partnership to fund terminal construction in roughly equal shares.[50] Although it is still early in the life of this intermodal terminal, similar facilities are associated with thousands of jobs and many millions of dollars of new nearby investment.[51]

Passenger rail has received attention as the Northeast Megaregion contains several of the busiest passenger rail lines in the country. There has been substantial investment to keep the corridor's passenger rails functioning well. Amtrak is upgrading its Acela rolling stock within a $2.45 billion modernization program to renew and expand the Acela Express service.[52] State and Federal agencies are involved in preparing for higher-speed intercity passenger rail in other parts of the megaregion. For example, the Northern New England Intercity Rail Initiative is a collaboration between transportation agencies in Massachusetts, Connecticut, New Hampshire, Quebec, and the Federal Railroad Administration (FRA), and it is studying the Boston-to-Montreal corridor.[53] One of the challenges that the partners are seeking to overcome is ownership of the existing tracks by four railroads and one state (Massachusetts).

The Northeast Megaregion's transit and inter-city infrastructures can help it sustain economic opportunities while minimizing congestion and congestion-related pollution.[54] States are investing in transit to avoid the costs and quality of life degradations that accompany sprawl. Rhode Island's first statewide transit ballot measure in 2014 issued $35 million in bonds to invest in the state's transit infrastructure. The transit bonds would largely be invested in building and modernizing existing and new transit hubs and bus service statewide.[55] Throughout the megaregion, a well-developed foundation of transit and inter-city (rail and bus) infrastructure

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[48] Anderson, E. (2017). Albany port is ready for cargo influx. *Times Union*. Retrieved from http://www.timesunion.com/tuplus-business/article/Albany-port-is-ready-for-cargo-influx-11227593.php#item-38491.

[49] Overton, P. (2016). Port of Portland approved for Federal grant that will double freight capacity. *Press Herald*. Retrieved from http://www.pressherald.com/2016/07/06/port-of-portland-approved-for-7-million-grant/.

[50] Norfolk Southern (2013). Norfolk Southern's new Pennsylvania rail-truck terminal speeds freight and benefits the environment. Retrieved from http://www.nscorp.com/content/nscorp/en/news/norfolk-southerns-new-pennsylvania-rail-truck-terminal-speeds-freight-and-benefits-the-environment.html

[51] Norfolk Southern. Franklin County Regional Intermodal Facility. Retrieved from http://www.thefutureneedsus.com/images/uploads/franklin-co-factsheet.pdf.

[52] Amtrak. (2016, August 26). Amtrak Invests $2.4 Billion for Next-Gen High-Speed Trainsets and Infrastructure Upgrades. Retrieved June 29, 2017, from https://media.amtrak.com/2016/08/1610/

[53] Northern New England Intercity Rail Initiative: http://www.massdot.state.ma.us/northernnewenglandrail/Home.aspx

[54] The City of New York (2014) Inventory of New York City Greenhouse Gas Emissions in 2014. https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/NYC_GHG_Inventory_2014.pdf

[55] Transportation for America. (2014, October 28). Rhode Island's first statewide ballot measure to support transit. Retrieved June 29, 2017, from http://t4america.org/2014/10/28/rhode-islands-first-statewide-ballot-measure-to-support-transit/

provides a base upon which to add future investment in a rational and coordinated planning approach.

Public action has also helped attract new international air service to the megaregion's gateways. As an example, Norwegian Air Shuttle, a fast-growing low-cost airline, recently announced transatlantic passenger service between three northeastern cities (Hartford, CT; Providence, RI; Newburgh, NY) and three Irish cities (Dublin, Cork, Shannon), the capital of Scotland (Edinburgh), and the capital of Northern Ireland (Belfast). In the case of Hartford, Norwegian Air Shuttle is the second European carrier to serve the city. The first was Aer Lingus, to which the state offered revenue guarantees in 2016 to open the market. This is an example of a trend that is still in its early stages of international airlines seeking non-traditional gateways to tap previously neglected markets, and it offers many cities that have not traditionally been international air gateways an opportunity to forge new linkages.

The Northeast Megaregion experiences the same local economic challenges due to military base closure and industrial realignments as the rest of the country. They are never easy, but there are ways to redevelop and build new industrial bases. A recent example is found in New Jersey where the closing of Fort Monmouth due to Base Realignment and Closure (BRAC) in 2011 saw the departure of many employees, including those specialized in research, electronics, and communications technology. The state's Fort Monmouth Economic Revitalization Act laid the groundwork for redeveloping the site, and it has attracted private investment. Just this year a developer committed $130 million for mixed-use development at the site.[56]

MULTI-STATE ORGANIZATIONS AND INITIATIVES IN THE NORTHEAST MEGAREGION

Traditionally, the megaregion concept has not been explicitly incorporated into infrastructure decision-making processes, but past experience has shown the value of multi-state cooperation in large-scale infrastructure planning. This section traces several of the times when megaregion-style collaboration has been employed. The resulting initiatives addressed different functions, but each is united by a recognition of cross-border effects of cities' or states' actions, and seeks better outcomes for all concerned by coordinating.

The Northeast Corridor (NEC) Master Plan Working Group is charged with developing the NEC Infrastructure Master Plan. As it must consider the corridor's scale, the working group includes twelve northeast states and the District of Columbia. Moreover, the group collaborates closely with Amtrak and the Federal Railroad Administration (FRA). The working group comprehensively considers all infrastructure needs of all the NEC users. The fact that the groups have reached out to members of the business community in addition to other governments is a great example of organizational collaboration on initiatives that affect a megaregion.

The I-95 Corridor Coalition is another well-known example of multi-state infrastructure planning and operations. The coalition brings together key decision-makers related to corridor operations, including state and local departments of transportation, transportation authorities, transit and rail agencies, public safety, intercity transportation providers, industry associations, and U.S. and

[56] U.S. News and World Report. $130 million deal reached on town center at Fort Monmouth. Retrieved from https://www.usnews.com/news/new-jersey/articles/2017-02-19/130-million-deal-reached-on-town-center-at-fort-monmouth.

Canadian transportation agencies. The coalition coordinates corridor operations with three specialized committees focusing on intermodal movement, innovation, and operations.[57]

Air pollution and climate change effects do not stop at state boundaries either. The Regional Greenhouse Gas Initiative (RGGI), composed of states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont is the country's first cap-and-trade program to reduce the power sector's carbon dioxide (CO2) emissions.[58] Proceeds from the RGGI cap-and-trade program go towards energy conservation and renewable energy efforts. RGGI serves as a strong example of states working together to support actions for a sustainable future of a megaregion, with the Transportation and Climate Initiative (TCI) as a similar, collaborative example reducing greenhouse gas emissions in the transportation sector.[59]

The Regional Plan Association (RPA) is an independent, not-for-profit regional planning organization that focuses on the New York-New Jersey-Connecticut metropolitan region. Some of the region's significant public works involved RPA's initiatives and support. RPA represents a great example of delivering large scale projects and plans via collaborative work and joint efforts across the three states.

Northeastern University was recently named a Beyond Traffic Innovation Center by U.S. DOT to help address the nation's transportation challenges. The effort is a response to a recent U.S. DOT report, "Beyond Traffic 2045,"[60] that identifies national transportation challenges in the context of continuing population growth, new technology, and climate change. The center will be focusing on the Northeast Megaregion and will work across academia as well as public and private sectors. The designation of the center presents new opportunities to improve decision-making in infrastructure and transit planning via megaregion-level collaborative research and practice.

Several more initiatives exemplify the region's tradition of collaboration. The New England Regional Council (NERC) seeks to build partnerships and programs to address the needs of the regional community through communication, planning, policy-making, coordination, advocacy, and technical assistance.[61] The New England Economic Partnership (NEEP) develops strategies to support its members' joint economic vitality.[62] These and other organizations, initiatives, and activities, provide valuable lessons that can be learned for forming megaregion-level planning framework for the next steps.

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[57] http://i95coalition.org/the-coalition-2/organizational-structure-and-committees/

[58] "Program Overview," RGGI (2017). Available at: https://www.rggi.org/design/overview

[59] "About Us," Transportation and Climate Initiative (2017). Available at: http://www.transportationandclimate.org/content/about-us

[60] "Beyond Traffic 2045," U.S. Department of Transportation. Available at: https://www.transportation.gov/policy-initiatives/beyond-traffic-2045-final-report

[61] New England Regional Council – NAHRO: http://nercnahro.org/

[62] New England Economic Partnership: https://neepecon.org/

APPENDIX

LIST OF MEGAREGION STUDIES, PLANS, AND RESOURCES

1. Metropolitan Planning Organizations and Transportation Planning for Megaregions, by Volpe, 2014. https://rosap.ntl.bts.gov/view/dot/12158.
2. Megaregions: Literature Review of Organizational Structures and Finance of Multi-jurisdictional Initiatives and the Implications for Megaregion Transportation Planning in the U.S. by Ross C. L., 2011. https://www.fhwa.dot.gov/planning/megaregions/reports/megaregions_report_2011/megaregions2011.pdf
3. The Northeast Corridor Infrastructure Master Plan, by Amtrak, 2010. https://nec.amtrak.com/wp-content/uploads/2017/08/Northeast-Corridor-Infrastructure-Master-Plan.pdf
4. Northeast Megaregion 2050, by Regional Plan Association, 2007. http://www.rpa.org/article/northeast-megaregion-2050-common-future
5. Regional Impact of Public Transportation Infrastructure in the U.S. Northeast Megaregion: a Spatial Econometric Computable General Equilibrium Assessment, by Chen, Z., 2014, (Doctoral dissertation). http://digilib.gmu.edu/jspui/bitstream/handle/1920/8902/Chen_gmu_0883E_10550.pdf?sequence=1
6. The I-95 Corridor Coalition http://i95coalition.org/

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2. CTDOT 2012-2016 Connecticut State Rail Plan (2012) http://www.ct.gov/dot/lib/dot/documents/dplansprojectsstudies/plans/state_rail_plan/State_Rail_Plan_Final_Draft_8-24-12.pdf
3. Maine Integrated Freight Strategy (2014) http://www.maine.gov/mdot/ofbs/docs/FreightStrat.pdf
4. Maine State Rail Plan (2014) http://www.maine.gov/mdot/ofbs/docs/Rail_Plan_7-9-2015.pdf
5. The Northeast Alliance for Rail http://www.northeastallianceforrail.org/about/
6. MassDOT Freight Plan (2010) http://www.massdot.state.ma.us/portals/17/docs/freightplan/MAFreightPlanSeptember2010v2.pdf
7. MassDOT Rail Plan (2010) http://www.massdot.state.ma.us/portals/12/docs/RailPlan/MAStateRailPlanSeptember2010v4.pdf
8. New Hampshire DOT Rail Plan (2012) https://www.nh.gov/dot/org/aerorailtransit/railandtransit/documents/FinalStateRailPlan.pdf
9. NJDOT Comprehensive Statewide Freight Plan (2007) http://www.state.nj.us/transportation/freight/plan/pdf/2007statewidefreightplan.pdf
10. NJDOT and NJ Transit New Jersey State Rail Plan (2015) https://www.njtransit.com/pdf/NJStateRailPlan.pdf
11. New York Metropolitan Transportation Council (NYMTC) Freight Planning (2014) https://www.nymtc.org/portals/0/pdf/Freight%20planning/Interim_plan_summary.pdf

12. New York State DOT Freight Transportation Plan (2015) https://www.dot.ny.gov/freight-plan/reports
13. New York State DOT State Rail Plan (2009) https://www.dot.ny.gov/divisions/policy-and-strategy/planning-bureau/state-rail-plan
14. Pennsylvania DOT Pennsylvania Intercity Passenger and Freight Rail Plan (2010) http://www.penndot.gov/Doing-Business/RailFreightAndPorts/Planning/Documents/Pennsylvania%20Intercity%20Passenger%20and%20Rail%20Freight%20Plan%20-%20Low%20Res.pdf
15. Southwestern Pennsylvania Commission – Southwestern Pennsylvania Regional Freight Plan (2016) http://www.spcregion.org/pdf/freight16/SWPA%20RgFP%20-%202016%20FINAL%20PLAN.pdf
16. Rhode Island DOT Freight and Goods Movement Plan (2016) http://www.planning.ri.gov/documents/trans/freight/freight-plan.pdf
17. Rhode Island DOT Rhode Island State Rail Plan (2014) http://www.planning.ri.gov/documents/trans/Rail_Plan_12_18_13.pdf
18. Vermont Agency of Transportation Vermont Freight Plan (2012) http://vtrans.vermont.gov/sites/aot/files/planning/documents/planning/Vermont_Freight_Plan_Update_June2017_Final%20%281%29.pdf
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20. Making High-speed Rail Work in the Northeast Megaregion, by University of Pennsylvania, (2011) http://www.america2050.org/upload/2010/05/00%20-%20Executive%20Summary.pdf
21. A Vision for the High-Speed Rail in the Northeast Corridor, by Amtrak, (2010) http://www.america2050.org/upload/2011/04/Amtrak_NECHSRReport92810RLR.pdf
22. High-Speed Rail International Lessons for U.S. Policy-makers, by Todorovich, P., Schned, D., & Lane, R., (2011) https://www.lincolninst.edu/sites/default/files/pubfiles/high-speed-rail-full_0.pdf
23. The high-speed rail development in the northeast megaregion of the United States: a conceptual analysis, by Chen, X. Theoretical and Empirical Researches in Urban Management 17 (2010):30.
24. Port of New York and New Jersey 30-Year Port Master Plan (2017). http://www.panynj.gov/port/port-master-plan.html
25. Port of New York and New Jersey Council on Port Performance. http://www.panynj.gov/port/council-on-port-performance.html
26. Goods Movement Action Program for the New York-New Jersey Metropolitan Region (PANYNJ, NYSDOT, NJDOT). http://www.panynj.gov/gmap/

APPENDIX C: KEY CONTACTS

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APPENDIX D: EVENT PARTICIPANTS

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