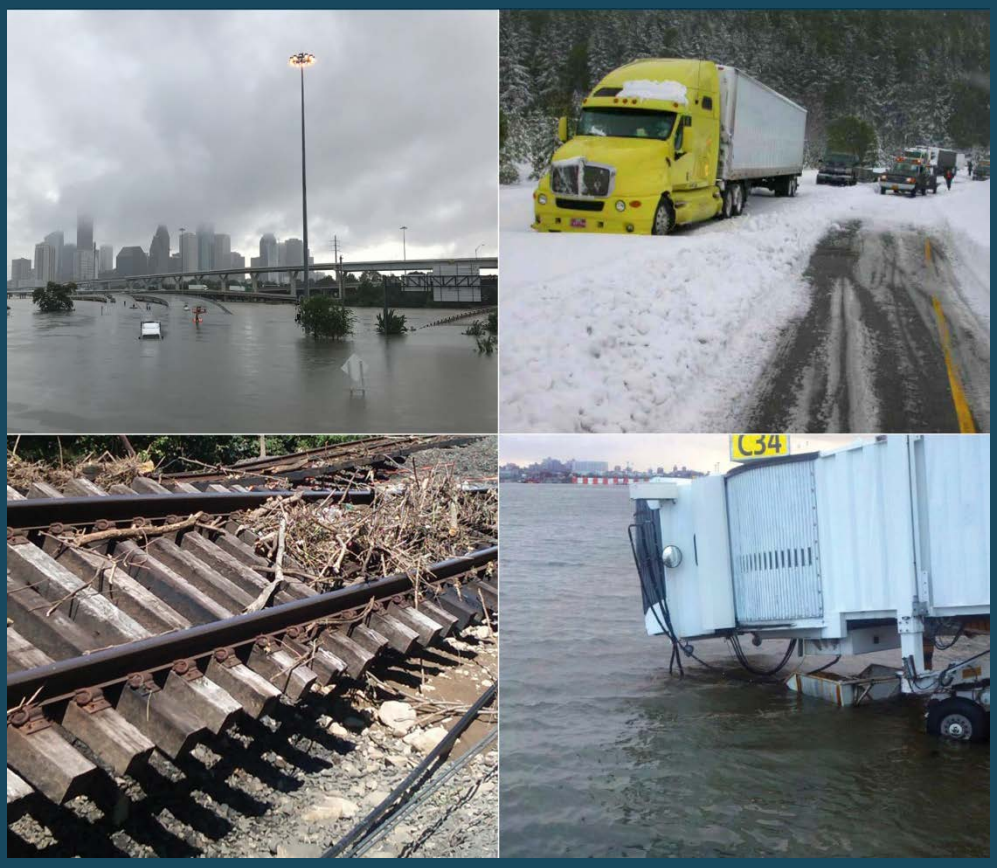
TRB
TRANSPORTATION RESEARCH BOARD

# Investing in Transportation Resilience: A Framework for Informed Choices Workshop

## June 16-17, 2022

PROGRAM



NATIONAL ACADEMIES *Sciences Engineering Medicine*

Workshop Program

## Workshop Program

| | Day One – Thursday June 16, 2022 |
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| 12:30-1:30 pm | Registration, ***In-person participation is by-invitation only***. |
| 1:30-1:45 pm | **Welcome** (Lecture Room) (Broadcast)<br>• *Joseph Schofer*, Northwestern University<br>• *Shawn Wilson*, Louisiana Department of Transportation and Development<br>• *Shawn Johnson*, US Department of Transportation |
| 1:45-2:30 pm | **Overview of the recommended analytic framework for assessing resilience and IIJA provisions on transportation resilience.** (Lecture Room) (Broadcast)<br>• Overview of findings and recommendations in the TRB Special Report<br>o *Joseph Schofer,* Northwestern University<br>• Resilience provisions in IIJA related to the TRB Special Report<br>o *Shawn Johnson,* US Department of Transportation |
| 2:30-2:45 pm | **Break** |
| 2:45-4:30 pm | **How are transportation agencies making choices about resilience investments?** (Lecture Room) (Broadcast)<br>Panelists will discuss how they are integrating resilience assessments into project selection, the methods they use to inform their resilience investment decisions, and the challenges they face in doing so. A facilitated discussion will follow the panelist's remarks.<br>Moderator: *Susanne DesRoches, NYSERDA*<br>Panelists:<br>• *Charles Sutcliffe*, Office of the Governor of Louisiana<br>• *Nicki Bartelt*, Minnesota Department of Transportation<br>• *Sandy Hertz*, Maryland Department of Transportation<br>Guiding questions:<br>• How is integration of resilience considerations changing the projects your agency is implementing?<br>• What effect is it having on the design of (traditional) projects?<br>• How are process adaptation being received by technical professionals? By decision makers? By the public?<br>• What have you learned from your experience that may help other agencies mainstream resilience investment planning and decision making? |
| 4:30-5:00 pm | **Summary Discussion** (Lecture Room) (Broadcast) |

| | Day Two – Friday June 17, 2022 |
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| 8:30-8:45 am | **Opening Remarks** (Lecture Room) (Broadcast)<br>• *Neil Pedersen*, Transportation Research Board |
| 8:45-10:15 am | **What kinds of data are needed for estimating resilience and resilience benefits and what are the sources?** (Lecture Room)<br>Panelists will describe the natural hazards data they are using in their resilience assessments and the problems they face with regard to data resources. A facilitated discussion will follow the panelist's presentations.<br>Moderator: *Elise Miller-Hooks, George Mason University*<br>Panelists:<br>• *Katherine Chambers*, U.S. Army Corps of Engineers<br>• *Patrick Cowley*, Utah Department of Transportation<br>• *Colin Mellor,* North Carolina Department of Transportation<br>Guiding questions:<br>• What kinds of data have been most difficult to acquire? What specific data limitations have you encountered with securing current and predicted natural hazards data? Coverage? Granularity? Timeliness?<br>• To what extent have you been able to rely on data from your own or sister agencies in your state or region?<br>• What key changes in data types and availability are in progress that will help non-federal agencies in resilience planning?<br>• To what extend are provider agencies able to offer hands-on support to non-federal implementing agencies?<br>• How are the uncertainties associated with climate change being address by both users and providers? |
| 10:15-10:30 am | **Break** |
| 10:30 am-12:00 pm | **How are transportation organizations conducting Benefit-Cost Analyses (BCAs) to inform investment choices? How are agencies estimating resilience benefits?** (Lecture Room) (Broadcast)<br>Panelists will discuss how their agencies are conducting BCA in their investments planning. Again, a facilitated discussion will follow the panelists' presentations.<br>Moderator: *Joseph Schofer*, Northwestern University<br>Panelists:<br>• *Mark Seaman*, New York City Transportation Department<br>• *Elizabeth Kemp Herrera,* Colorado Department of Transportation<br>• *Hannah Walter,* California Transportation Commission<br>Guiding questions: |

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| | • How are you predicting costs and future benefits of resilience investments?<br>• What benefits are routinely measured in monetary terms? In quantitative terms? Are addressed qualitatively?<br>• How are you incorporating non-quantitative benefits in your analyses?<br>• How impactful are benefit cost analyses in guiding investment decisions? What other factors are considered, and how are they considered? |
| 12:00-1:00 pm | **Lunch** |
| 1:00-2:30 pm | **Breakout Groups (THESE SESSIONS WILL NOT BE BROADCASTED)**<br>Workshop participants will be assigned to one of four specific breakout sessions where moderated discussions will explore into particular aspects of developing and deploying processes and tools for informing transportation resilience investment decisions.<br>**A. Integrating resilience into established agency processes such as asset management.**<br>• Moderator: *Shawn Wilson*, LADOTD<br>**B. Securing natural hazards data from multiple sources.**<br>• Moderator: *Elise Miller-Hooks*, George Mason University<br>**C. Tools, models, and best practices for resilience planning and evaluation.**<br>• Moderator: *Paolo Bocchini*, Lehigh University<br>**D. Decision Strategies: trading off immediate need vs. long-term resilience benefits.**<br>• Moderator: *José Ramírez-Márquez*, Stevens Institute of Technology |
| 2:30-3:00 pm | **Break** |
| 3:00-4:00 pm | **Plenary Session—Reports from break out groups on key themes & lessons learned.** (Lecture Room) (Broadcast)<br>Group A: *Shawn Wilson*, LADOTD<br>Group B: *Elise Miller-Hooks*, George Mason University<br>Group C: *Paolo Bocchini*, Lehigh University<br>Group D: *José Ramírez-Márquez*, Stevens Institute of Technology |
| 4:00-4:45pm | **Next steps and concluding remarks.** (Lecture Room) (Broadcast)<br>Facilitated discussion among participants of suggestions to USDOT for key research initiatives, advancing resilience-based transportation investment decision making, including developments in methods, data, and pilot testing.<br>Moderator: *Joseph Schofer*, Northwestern University |

**BIOGRAPHIES**

**IN THIS SECTION**

1. **MODERATORS BIOGRAPHIES**
2. **PANELISTS BIOGRAPHIES**

**MODERATORS BIOGRAPHIES**

### Joseph Schofer, Northwestern University (Emeritus)

*Study Committee Chair*

Joseph L. Schofer is Professor Emeritus of Civil and Environmental Engineering at the Robert R. McCormick School of Engineering and Applied Science at Northwestern University in Evanston, Illinois. At Northwestern, Schofer has served as chairman of his department, Associate Dean and Interim Dean of the engineering school, and Director of the Infrastructure Technology Institute. His research and teaching interests are in transportation policy planning, analysis, evaluation, and decision support for transportation and other infrastructure systems, including needs for and uses of data and information, and learning from natural experiments and disruptions Since 2009, Dr. Schofer has hosted the Infrastructure Show, monthly podcast on which he interviews infrastructure experts on problems, opportunities, and innovations in civil infrastructure systems.

He is a fellow of the Institute of Transportation Engineers and a life Member of the American Society of Civil Engineers, and a member of the American Association for the Advancement of Science. He is actively engaged with the Transportation Research Board (TRB), currently chairing its Standing Committee on Data for Decision Making. In the past he chaired consensus studies on Equity Implications of Evolving Transportation Finance Mechanisms and Strategies for Improved Passenger and Freight Travel Data, and the Committee on Long-Term Stewardship of Safety Data from the Second Strategic Highway Research Program. He received the 2011 Roy W. Crum Distinguished Service Award from the Transportation Research Board. Dr. Schofer earned his B.E. from Yale University and an M.S. and Ph.D. from Northwestern University.

### Paolo Bocchini, Lehigh University

*Study Committee Member*

Paolo Bocchini is a Professor and Director of Graduate Programs in the Department of Civil and Environmental Engineering at Lehigh University. His research focuses on Disaster Resilient Infrastructure Systems, Probabilistic Analysis applied to Civil Engineering, and Computational Mechanics. Dr. Bocchini is the author of more than 80 manuscripts published as book chapters or papers in peer reviewed international scientific journals and professional conference proceedings. One of his papers on infrastructure resilience is among the most read and cited in the ASCE Journal of Infrastructure Systems. His research has been supported by the National Science Foundation, the National Institutes of Health, the Department of Defense, the PA Department of Transportation, and companies in the private sector. Dr. Bocchini serves as Associate Editor of the Journal of Structural Engineering and is a licensed Professional Engineer in Italy. He has been elected to the rank of Fellow of the Structural Engineering Institute of the American Society of Civil Engineers and is a member of the Engineering Mechanics

Institute, Infrastructure Resilience Division, International Association for Bridge Maintenance and Safety, International Association for Life-Cycle Civil Engineering, and American Institute for Sustainable Infrastructure.

**Susanne DesRoches, NYSERDA**
*Study Committee Member*

Susanne DesRoches is NYSERDA's Vice President of Clean and Resilient Buildings leading the Authority's work on building decarbonization, advancing programs and policies to deliver a carbon-neutral building stock. Prior to joining NYSERDA in April 2022, she served as Regulatory Director for Energy Policy at the New York City Mayor's Office of Climate & Sustainability and Mayor's Office of Climate Resiliency. Susanne led the NYC Climate Change Adaptation Task Force, which works to identify climate risks and coordinate adaptation strategies, and oversees the development of the NYC Climate Resiliency Design Guidelines. Ms. DesRoches was previously the Chief of Resilience and Sustainability for the Engineering Department at the Port Authority of New York & New Jersey. She was also a chapter author for the Fourth National Climate Assessment and has testified at the US House of Representatives Committee on Science, Space and Technology panel on the need for resiliency to prepare America's transportation infrastructure for climate change.

**Elise Miller-Hooks, George Mason University**
*Study Committee Member*

Elise Miller-Hooks holds the Bill and Eleanor Hazel Endowed Chair in Infrastructure Engineering in the Sid and Reva Dewberry Department of Civil, Environmental, and Infrastructure Engineering at George Mason University. She is also an advisor to the World Bank Group and the founding Editor-in-Chief of Elsevier's Sustainability Analytics and Modeling journal. Prior to this, Dr. Miller-Hooks served as Program Director of the U.S. National Science Foundation (NSF) Civil Infrastructure Systems Program, lead Program Officer for the Critical Resilient Interdependent Infrastructure Systems and Processes (CRISP) solicitation, and a cognizant program officer on CMMI's Smart and Connected Communities initiative. She served on the faculties of the University of Maryland, Pennsylvania State University and Duke University. Her expertise includes: disaster planning and response, e.g. urban search and rescue, building and regional evacuation and sheltering, and crowd modeling; multi-hazard civil infrastructure resilience quantification and infrastructure protection investment; stochastic and dynamic network algorithms; mathematical modeling and optimization; transportation systems engineering; intermodal passenger and freight transport; maritime transport and port operations; real-time routing and fleet management; paratransit, ridesharing and bikeways; and collaborative and multi-objective decision-making. Miller-Hooks earned Ph.D. and M.S. degrees in Civil Engineering from the University of Texas – Austin and a B.S. in Civil Engineering from Lafayette College.

**José E. Ramírez-Márquez, Stevens Institute of Technology**
*Study Committee Member*

José E. Ramírez-Márquez is Director of the Enterprise Science and Engineering Division and Associate Professor in the School of Systems & Enterprises at Stevens Institute of Technology. A former Fulbright Scholar, he holds degrees from Rutgers University in Industrial Engineering (Ph.D. and M.Sc.) and Statistics (M.Sc.) and from Universidad Nacional Autónoma de México in Actuarial Science. His research efforts focus on the development of mathematical models for the analysis and computation of system operational effectiveness - reliability and vulnerability analysis as the basis for designing system resilience. He also works at the intersection of evolutionary computation for the optimization of complex problems associated with system performance and design. His most recent research explores the interplay between data visualization and analytical decision-making. In these areas, Dr. Ramírez-Márquez has conducted funded research for both private industry and government and, has published over 100 refereed manuscripts in technical journals, book chapters and industry reports. He is an Associate Editor for the Transactions of Institute of Industrial and Systems Engineering. He is a member of the Technical Committee on System Reliability for the European Safety and Reliability Association.

**Shawn Wilson, *Louisiana Department of Transportation and Development***
*Study Committee Member*

Shawn Wilson was appointed Secretary of the Louisiana Department of Transportation and Development (DOTD) by Governor John Bel Edwards in January of 2016 and is now serving as Secretary for a second term. He has more than 15 years of executive service at DOTD. Under his leadership thus far, DOTD has ushered in project finance and project innovations, including Public Private Partnerships and Construction Manager at Risk projects. During his tenure as Secretary, DOTD has awarded more than $4.6 billion in construction projects.

Dr. Wilson is Vice-Chair of the Transportation Research Board (TRB) Executive Committee and is the President of the American Association of State Highway and Transportation Officials (AASHTO).

Dr. Wilson earned a B.A. in Urban and Regional Planning from the University of Louisiana and holds a Master of Public Administration degree, as well as a Ph.D. in Public Policy from the Nelson Mandela School of Public Policy at Southern University.

**PANELISTS BIOGRAPHIES**

**Nicole Bartelt, *Bridge Planning and Hydraulics Engineer***
***Minnesota Department of Transportation***

Nicole Bartelt graduated from Michigan State University with a BSCE in 2002 and MS ENE (Environmental) in 2004, with an emphasis in water resources. She worked for the Michigan Department of Transportation before coming to the Minnesota Department of Transportation in 2006. At MnDOT, Nicole has worked in Bridge Hydraulics, Project Management, STEM Outreach, Environmental Stewardship, and is currently the Bridge Planning and Hydraulics Engineer. She is particularly interested in how resiliency efforts now will impact transportation projects and funding decisions into the future.

**Katherine Chambers, *Research Physical Scientists***
***U.S. Army Corps of Engineers***

Katherine Chambers is a research scientist with expertise in analytical approaches to resilience and the marine transportation system. For the past 7 years, she has focused on studying the concepts of resilience as they pertain to the marine transportation and emergency response business lines of the U.S. Army Corps of Engineers. She is an active member of several international working groups on the marine and inland transportation system and a young member of the Transportation Research Board Ports and Harbors Committee, Extreme Weather and Climate Change Committee, and co-leads an interagency team entitled the Resilience Integrated Action Team as a part of the U.S. Committee on the Marine Transportation System. Presently, she is doing a developmental assignment with USACE Headquarters Asset Management Program. Katherine has an MS from Purdue University's Ecological Science and Engineering Interdisciplinary Program and a BS from Wittenberg University.

**Patrick Cowley, *Director of Transportation Performance Management***
***Utah Department of Transportation***

Patrick Cowley is the Director of Transportation Performance Management at the Utah Department of Transportation. His division oversees and sup ports the areas of Asset Management, Performance Management, Organizational Management, and Enterprise Risk Management within the department. His position has given him the opportunity to present many times on the department's efforts related to environmental hazard risk to assets as well as implementation of enterprise risk management within the agency. Patrick has 20 years of civil engineering experience in the public sector ranging from geotechnical investigation and design to transportation engineering to transportation performance management. He is a graduate of

Utah State University earning both his Bachelor's and Master's degrees in Civil Engineering and is a licensed professional engineer in Utah and California.

**Shawn Johnson, *Program Analyst***
***U.S. Department of Transportation***

Shawn, a native Ohioan, started her career with the U.S. Department of Transportation working as a contractor in 1995. Most of her contracting tenure was spent working with the Pipeline and Hazardous Material Safety Administration's Pipeline Safety State Grant Program. She is currently a program analyst for Research, Development and Technology office, in the Office of the Assistant Secretary for Research and Technology. She has led three major program areas Alternative Energy Program, Biobased Research Program and the Department's Center for Climate Change and Environmental Forecasting. She is currently representing the Department on the White House NSTC Subcommittee on Resilience Science and Technology as well as co-lead on a transportation resiliency research project titled Resilience and Disaster Recovery. Ms. Johnson is a graduate from Ohio University where she earned a degree in Environmental Health Science and a proud member of Zeta Phi Beta Sorority, Incorporated. She prides herself being the public voice by assuring research contributes to practical application that benefits of the taxpayer.

**Elizabeth Kemp-Herrera, *Resiliency Program Manager***
***Colorado Department of Transportation***

Elizabeth Kemp currently serves as the Colorado Department of Transportation's Resiliency Program Manager. Lizzie earned her Master's Degree in city and regional planning from the University of California at Berkeley. She has worked for over 25 years as a transportation planner in the San Francisco Bay Area and in Metro Denver, focusing on multimodal planning, funding and policy.

**Sandy Hertz, *Director, Office of Climate Change and Adaptation***
***Maryland Department of Transportation***

Sandy Hertz is the Director for the Office of Climate Change Resilience and Adaptation within the Maryland Department of Transportation's (MDOT) Secretary's Office. She has been with MDOT since 2004 and brings over 25 years of experience in environmental protection to this position. Prior to working for MDOT, Sandy worked for the Maryland Department of Natural Resources in the Watershed Restoration Division and spent five years with a private environmental consulting firm. In her current role, she coordinates climate resilience and adaptation efforts across all five MDOT transportation business units and the Maryland Transportation Authority. Sandy represents MDOT on several multi-agency workgroups and councils, including the Chesapeake Bay Cabinet, Chesapeake Bay Workgroup, Critical Area Commission, Coast Smart Council, and the Maryland Commission on Climate Change.

**Colin Mellor, *Environmental Policy Advisor***
***North Carolina Department of Transportation***

Colin began his career at NCDOT in 1994. Since then he has worked as a public servant and in private industry as a geologist and a geophysicist, gradually changing paths through environmental coordination and permitting roles to NEPA analysis and environmental policy. Currently with NCDOT's Environmental Policy Unit he oversees NEPA project compliance for the eastern half of the state and is one of NCDOT's technical leads on Governor Cooper's Climate Change-focused Executive Order 80. He earned a Bachelor's degree in Geology from the University of Wollongong, Australia, and a Master's degree in Geology from UNC Chapel Hill. He is a North Carolina Licensed Geologist.

**Mark Seaman, *Senior Economist***
***New York City Department of Transportation***

As Senior Economist in the Commissioner's Office at New York City DOT, Mark leads the agency's efforts to use benefit-cost analysis for internal decision-making on projects as diverse as bike lanes, ferry terminal improvements, and new bridges. To assist in the agency's asset management, Mark is developing deterioration models to forecast capital budget needs and better understand the factors determining asset life. Mark previously served as an economist in the Planning Department of the Port Authority of New York and New Jersey, where he developed the agency's benefit-cost analysis framework and used it to assess expansion and resilience investments for airports, marine ports, rail transit, and bridges.

**Charles Sutcliffe, *Chief Resilience Officer***
***Louisiana Governor's Office, Coastal Activities***

Charles Sutcliffe is in his eleventh year in the Governor's Office Coastal Activities. He began with a strict policy focus related to the implementation of the Coastal Master Plan and now seeks to integrate an understanding of coastal change into other departments across state government. He coordinates closely with other state agencies, non-governmental organizations, and other partners as the State of Louisiana broadens its approach to adapting to the many implications of coastal change. Charles is also one of three members of the Governor's Office team who worked with the Climate Initiatives Task Force to develop the state's first Climate Action Plan in February of 2022. The plan, now in its implementation phase, contains recommendations for how Louisiana can reach net zero greenhouse gas emissions by 2050. Mr. Sutcliffe has a Master of Arts (M.A.) in Humanities and Social Thought from New York University, a Bachelor of Arts (B.A.) in History and a Bachelor of Science (B.S.) in Animal Sciences from Louisiana State University. Before coming to the Governor's Office he worked as a science teacher in Baton Rouge and Pittsburgh; with the Allegheny County Department of Human Services; and with Louisiana State University's Economics & Policy Research Group.

**Hannah Walter, Associate Deputy Director**
***California Transportation Commission***

Hannah Walter has worked as an Associate Deputy Director for the California Transportation Commission (Commission) since 2019. Mrs. Walter manages a freight funding program called the Trade Corridor Enhancement Program that provides about $400 million a year to California freight infrastructure projects. In 2020 and 2021, Mrs. Walter led the development of a Performance Metrics Guidebook that provides calculation methodologies for required performance metrics in Commission funding programs. Mrs. Walter led the update of freight funding targets, an effort that used various data sources such as truck volume, customs data, and emissions information to measure freight need in each California region. Mrs. Walter is now leading the development of a statewide assessment of zero-emission freight corridors and potential infrastructure projects for the Legislature. Prior to her work at the Commission, Mrs. Walter worked as an Executive Policy Advisor for the Department of Water Resources and held several other State positions. Mrs. Walter has her Bachelor of Arts degree in Intercultural Studies from Prairie College, Canada.

**LIST OF PARTICIPANTS**

**MEMBERS OF THE STUDY COMMITTEE**

Joseph Schofer, Chair, *Northwestern University*

Paolo Bocchini, *Lehigh University*

Susann DesRoches, *NYSERDA*

Elise Miller-Hooks, *George Mason University*

José Ramírez Márquez, *Stevens Institute of Technology*

Shawn Wilson, *Louisiana Department of Transportation and Development*

**INVITED PARTICIPANTS**

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Chris Baglin, *Consultant*

Rachael Barlock, *Southeast Michigan Council of Governments (SEMCOG)*

Nicki Bartelt, *Minnesota DOT*

Susan Binder, *Cambridge Systematics*

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Howard Stronach, *FEMA*

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Darren Timothy, *USDOT*

Cristina Torres-Machi, *University of Colorado*

Michael Walsh, *M-Walsh Group, LLC*

Hannah Water, *California Transportation Commission*

William "Billy" Williamson, *LADOTD*

Laura Zale*, Southeastern Pennsylvania Transportation Authority (SEPTA)*

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