



Annual CTS

TRANSPORTATION RESEARCH CONFERENCE

Curiosity. Discovery. Innovation.

FINAL PROGRAM

November 5, 2020

cts.umn.edu



**CENTER FOR
TRANSPORTATION STUDIES**

UNIVERSITY OF MINNESOTA

Welcome to the Conference

Curiosity. Discovery. Innovation.

The Center for Transportation Studies is pleased to present its first virtual Transportation Research Conference in this year of unusual circumstances. While we regret being unable to gather in person, we have been working hard to design an engaging and informative experience for you using an online platform.

The conference convenes researchers and practitioners to highlight new learning, emerging ideas, and the latest innovations in transportation. Concurrent session topics align with the Center's research emphasis areas: Transportation Safety and Traffic Flow, Transportation Infrastructure, Transportation Planning and the Economy, Environment and Energy in Transportation, and Transportation Education and Engagement.

We look forward to welcoming you back to the University of Minnesota campus next year.



General Information

Virtual Technology Tips

The 2020 CTS Transportation Research Conference is being hosted on the Pathable platform. To streamline your conference experience, we recommend logging onto the platform a few days prior to the conference and adding sessions you wish to attend to "My Agenda." Visit the virtual conference FAQs at www.cts.umn.edu/conference/FAQ for more information and tips!

After the conference, Pathable will host video recordings of all sessions for six months. You will be able to listen to the sessions you missed or would like to listen to again.

Join Our Networking Session!

Immediately following the conference, CTS will host an informal networking session from 4:00–4:30 p.m.

This virtual session will allow attendees to connect in small groups without an agenda or presentation. Catch up with colleagues, discuss hot topics in transportation, and make new connections! Registration is not required.

Professional Development Hours (PDHs)

This conference awards up to 5.5 PDHs. A credit form is available in Pathable and at www.cts.umn.edu/events/conference/2020.

AICP Maintenance Credits

This conference has been approved for 5.5 AICP maintenance credits. A complete list of sessions approved for credit is available in Pathable and at www.cts.umn.edu/events/conference/2020.

Social Media

To participate in Twitter conversations around this year's Research Conference, please add the hashtag #ctsresconf to your tweets. For the latest news and events from the Center for Transportation Studies, follow @UMNCTS on Twitter and like us on Facebook at facebook.com/UMNCTS.



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Ingrid Schneider
Department of Forest Resources,
University of Minnesota

Richard Storm
HDR Inc.

Jim McCarthy
Federal Highway Administration

Keynote Presentations

Opening Plenary: Addressing Minnesota's Transportation Inequities and Disparities
Thursday, November 5, 2020: 9:00–10:15 a.m.

Panelists



Tawanna Black,
Founder and Chief
Executive Officer,
Center for Economic
Inclusion



Yingling Fan,
Professor,
Humphrey School
of Public Affairs,
University of
Minnesota



Jason Hollinday,
Co-chair, Advocacy
Council for Tribal
Transportation and
Director of Planning,
Fond du Lac
Reservation



***Theresa Thompson
Nix,*** Field Manager,
Move Minnesota



Charlie Zelle,
Chair, Metropolitan
Council

Moderators

Gina Baas, Associate Director, Engagement and Education, CTS

Kathy Quick, Associate Professor, Humphrey School of Public Affairs

The COVID-19 pandemic and the death of George Floyd have brought new attention to racial inequities and disparities in many sectors of our society, including transportation. The transportation system helps provide connection (to family, friends, colleagues, faith) and access (to jobs, health care, education, food), but it does not meet these critical needs equally for all people.

Before we discuss how transportation can and should transform to address these disparities, we must first acknowledge where we have been and where we are today. What are our values and hopes for what will change about the transportation system and what will stay the same? This panel discussion aims to bring those values and hopes to the forefront, so they may guide us as we strive to make Minnesota's transportation system more equitable for all.

The University of Minnesota's Vice President for Research Chris Cramer will offer opening remarks.



Keynote Presentations

Afternoon Plenary: Where Do We Go from Here?
Thursday, November 5, 2020: 1:00–2:15 p.m.



Tim Papandreou, Founder and
CEO, Emerging Transport Advisors

2020 started off like a nightmare of biblical proportions—droughts, fires, floods, and a pandemic that has gripped the planet. The response from governments, companies, and communities to the COVID-19 pandemic has impacted our way of life as well our local, regional, and global transportation systems with sudden and extraordinary speed. Transportation system providers have experienced free-fall declines in customers, revenues, and support. The resulting pressure to reduce service, delay repairs, or even shut down operations altogether has thrown these systems into worst-case scenarios and uncharted territory against a backdrop of rising social equity concerns.

In this session, Timothy Papandreou will discuss how these combined forces are compelling us to reexamine the status quo. Papandreou will also explore how current circumstances are offering us a once-in-a-lifetime window to reimagine the transportation system and use practical and proven innovation to move it towards a more resilient, equitable, and seamless experience.

Timothy Papandreou is the founder and CEO of Emerging Transport Advisors, which provides strategic guidance to companies, investors, startups, and governments on the active, shared, electric, connected, and automated transport transition. He is a trusted thought leader in both technology and government, with extensive global experience in the movement of people and things.

MnDOT Commissioner Margaret Anderson Kelliher will offer opening remarks.



Program at a Glance

Thursday, November 5, 2020

8:30 a.m.	Conference opens for log-on and technology checks			
9:00–10:15 a.m.	Welcome <i>Laurie McGinnis</i> , Director, Center for Transportation Studies, University of Minnesota <i>Chris Cramer</i> , Vice President for Research, University of Minnesota Keynote Panel Discussion: Addressing Minnesota’s Transportation Inequities and Disparities <i>Tawanna Black</i> , Founder and Chief Executive Officer, Center for Economic Inclusion <i>Yingling Fan</i> , Professor, Humphrey School of Public Affairs <i>Jason Holliday</i> , Co-chair, Advocacy Council for Tribal Transportation and Director of Planning, Fond du Lac Reservation <i>Theresa Thompson Nix</i> , Field Manager, Move Minnesota <i>Charlie Zelle</i> , Chair, Metropolitan Council			
10:15–10:30 a.m.	Transition to Concurrent Sessions			
10:30 a.m.–noon	Concurrent Sessions			
	1 Will Connected and Autonomous Vehicles Change Our Roadways for the Better?	2 Traffic Safety and Vulnerable Users	3 Accessibility and Access: Transit Planning for Today’s User	4 Hear from the Experts! Latest Results in Winter Maintenance Research
noon–1:00 p.m.	Lunch Break			
1:00–2:15 p.m.	Afternoon Plenary Session Opening Comments <i>Margaret Anderson Kelliher</i> , Commissioner, MnDOT Keynote Presentation: Where Do We Go From Here? Speaker <i>Tim Papandreou</i> , Founder and CEO, Emerging Transport Advisors			
2:15–2:30 p.m.	Transition to Concurrent Sessions			
2:30–4:00 p.m.	Concurrent Sessions			
	5 Understanding the Intersection of COVID-19 and Transportation	6 Analyzing Crash Elements on Minnesota Roadways	7 Are CAVs Part of the Answer for Eliminating Inequities Experienced by Transportation Users?	8 On Solid Ground: Recent Innovations in Pavement Material Research
4:00–4:30 p.m.	Networking Session			

Program Schedule

Thursday, November 5, 2020

8:30 a.m.	Conference opens for log-on and technology checks
9:00–10:15 a.m.	<p>Welcome <i>Laurie McGinnis</i>, Director, Center for Transportation Studies, University of Minnesota <i>Chris Cramer</i>, Vice President for Research, University of Minnesota</p> <hr/> <p>Keynote Panel Discussion: Addressing Minnesota's Transportation Inequities and Disparities</p> <hr/> <p>Moderators <i>Gina Baas</i>, Associate Director, Engagement and Education, Center for Transportation Studies, University of Minnesota <i>Kathy Quick</i>, Associate Professor, Humphrey School of Public Affairs, University of Minnesota</p> <p>Panelists <i>Tawanna Black</i>, Founder and Chief Executive Officer, Center for Economic Inclusion <i>Yingling Fan</i>, Professor, Humphrey School of Public Affairs, University of Minnesota <i>Jason Hollinday</i>, Co-chair, Advocacy Council for Tribal Transportation and Director of Planning, Fond du Lac Reservation <i>Theresa Thompson Nix</i>, Field Manager, Move Minnesota <i>Charlie Zelle</i>, Chair, Metropolitan Council</p> <p>The COVID-19 pandemic and the death of George Floyd have brought new attention to racial inequities and disparities in many sectors of our society, including transportation. The transportation system helps provide connection (to family, friends, colleagues, faith) and access (to jobs, health care, education, food), but it does not meet these critical needs equally for all people.</p> <p>Before we discuss how transportation can and should transform to address these disparities, we must first acknowledge where we have been and where we are today. What are our values and hopes for what will change about the transportation system and what will stay the same? This panel discussion aims to bring those values and hopes to the forefront, so they may guide us as we strive to make Minnesota's transportation system more equitable for all.</p>
10:15–10:30 a.m.	Transition to Concurrent Sessions
10:30 a.m.–noon	<p>Concurrent Sessions</p> <div><div>1</div><div><p>Will Connected and Autonomous Vehicles Change Our Roadways for the Better?</p><p>Moderator: <i>Tammy Meehan Russell</i>, The Plum Catalyst</p><p>Impacts of Commercially Available Adaptive Cruise Control Vehicles on Highway Stability and Throughput <i>Raphael Stern</i>, Department of Civil, Environmental, and Geo- Engineering, University of Minnesota Co-author: <i>Mingfeng Shang</i>, Department of Civil, Environmental, and Geo- Engineering, University of Minnesota</p><p>Predicting the Impact of Induced Traffic by Empty Autonomous Vehicle Trips <i>Di Kang</i>, Department of Civil, Environmental, and Geo- Engineering, University of Minnesota Co-author: <i>Michael Levin</i>, Department of Civil, Environmental, and Geo- Engineering, University of Minnesota</p><p>Max-Pressure Intersection Control with Routing Guidance in Traffic Networks <i>Rongshen Chen</i>, Department of Civil, Environmental, and Geo- Engineering, University of Minnesota Co-author: <i>Michael Levin</i>, Department of Civil, Environmental, and Geo- Engineering, University of Minnesota</p><p>Future Streets: The Impact of Autonomous Vehicles on Road Design and Infrastructure <i>Tom Fisher</i>, Minnesota Design Center, College of Design, University of Minnesota Co-author: <i>Joseph Hang</i>, Minnesota Design Center, University of Minnesota</p></div></div>

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Traffic Safety and Vulnerable Users**Moderator:** *Brian Sorenson*, MnDOT**Field Operational Test of a Bicycle Collision Warning System***Nichole Morris*, HumanFIRST Laboratory, Department of Mechanical Engineering, University of MinnesotaCo-authors: *Katelyn Schwieters*, HumanFIRST Laboratory, Department of Mechanical Engineering, University of Minnesota**Vision Zero Traffic Safety Approach with Lessons from Minneapolis***Ethan Fawley*, City of Minneapolis**Assessing the Relationship Between Complete Streets and Individual and Community Outcomes in Richfield, Minnesota***Robin Phinney*, Rise Research LLCCo-authors: *Camila Fonseca*, *Nathan Bean*, and *Jerry Zhirong Zhao*, Humphrey School of Public Affairs, University of Minnesota**Using Demonstration Projects to Improve State Highways for Walking***Jacob Rueter*, MnDOT

3

Accessibility and Access: Transit Planning for Today's User**Moderator:** *Mary Karlsson*, Kimley-Horn**Dedicated Bus Lanes Improve Travel Time and Reliability, But Could Be Better***Joseph Reid*, Metro Transit**Transit Improvements and Land-Use Changes: Disentangling the Accessibility Impacts***Brendan Murphy*, Accessibility Observatory, Center for Transportation Studies, University of MinnesotaCo-author: *Andrew Owen*, Accessibility Observatory, Center for Transportation Studies, University of Minnesota**Impacts of Planned Transitways on Access to Non-Work Destinations***Kristin Carlson*, Accessibility Observatory, Center for Transportation Studies, University of MinnesotaCo-author: *Andrew Owen*, Accessibility Observatory, Center for Transportation Studies, University of Minnesota**Natural Language Processing of Feedback and Social Media for Real-Time Customer Satisfaction at Metro Transit***Brandon Whited*, Metro Transit

4

Hear from the Experts! Latest Results in Winter Maintenance Research**Moderator:** *Mark Maloney*, City of Shoreview**Winter Benefits of Permeable Pavement for Road Salt Reduction***Andy Erickson*, St. Anthony Falls Laboratory, University of MinnesotaCo-authors: *John Gulliver*, St. Anthony Falls Laboratory, University of Minnesota, and *Peter Weiss*, College of Engineering, Valparaiso University**Impacts of Pavement Ice Thickness on Its Spectral Signature: Automation in Pavement Black Ice Detection***Eshan Dave*, Department of Civil and Environmental Engineering, University of New HampshireCo-author: *Adam Hunsaker*, Department of Civil and Environmental Engineering, University of New Hampshire**Hot Shots for Cold Climes: Evaluating Treatment of The Hardest Icy Spots***Stephen Druschel*, Department of Mechanical and Civil Engineering, Minnesota State University, Mankato**Reducing Winter Maintenance Equipment Fuel Consumption Using Advanced Vehicle Data Analytics***Will Northrop*, Department of Mechanical Engineering, University of MinnesotaCo-authors: *Shashi Shekhar*, Department of Computer Science and Engineering, University of Minnesota, and *Peter Wiringa*, U-Spatial, University of Minnesota

noon–1:00 p.m. **Lunch Break**

Afternoon Plenary Session

1:00–2:15 p.m. **Opening Comments**

Margaret Anderson Kelliher, Commissioner, MnDOT

Keynote Presentation: Where Do We Go From Here?

Speaker: *Tim Papandreou, Founder and CEO, Emerging Transport Advisors*

2020 started off like a nightmare of biblical proportions—droughts, fires, floods, and a pandemic that has gripped the planet. The response from governments, companies, and communities to the COVID-19 pandemic has impacted our way of life as well our local, regional, and global transportation systems with sudden and extraordinary speed. Transportation system providers have experienced free-fall declines in customers, revenues, and support. The resulting pressure to reduce service, delay repairs, or even shut down operations altogether has thrown these systems into worst-case scenarios and uncharted territory against a backdrop of rising social equity concerns.

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2:15–2:30 p.m. **Transition to Concurrent Sessions**

2:30–4:00 p.m. **Concurrent Sessions**

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Understanding the Intersection of COVID-19 and Transportation

Moderator: *Tony Fischer, Metropolitan Council*

Travel Impacts of the COVID-19 Outbreak in Minnesota: Evidence from Continuous Count Traffic Volume Data

Michael Iacono, MnDOT

Using Data to Understand the Effects of Transportation on the Spread of COVID-19

Raphael Stern, Department of Civil, Environmental, and Geo- Engineering, University of Minnesota

Co-authors: *Michael Levin and Mingfeng Shang, Department of Civil, Environmental, and Geo- Engineering, University of Minnesota; Philip Paré, Department of Electrical and Computer Engineering, Purdue University; and Damir Vrabac, KTH Royal Technical University*

Mobility Impacts of COVID-19 Policy Interventions

Yan Li, Department of Computer Science and Engineering, University of Minnesota

Co-authors: *Arun Sharma and Shashi Shekhar, Department of Computer Science and Engineering, University of Minnesota*

Telecommuting and COVID-19 Stay-at-Home Order: Benefits and Equity Concerns

Adeel Lari, Humphrey School of Public Affairs, University of Minnesota

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Analyzing Crash Elements on Minnesota Roadways**Moderator:** *Steve Misgen*, MnDOT**Crash Modification Factors in Minnesota***Derek Leuer*, MnDOT**Evaluation and Refinement of the Minnesota Queue Warning System***John Hourdos*, Minnesota Traffic Observatory, Department of Civil, Environmental, and Geo- Engineering, University of MinnesotaCo-author: *Melissa Duhn*, Minnesota Traffic Observatory, Department of Civil, Environmental, and Geo- Engineering, University of Minnesota**Estimating of Drivers' Gap Selections and Reaction Times in Intersection Crashes Using Event Data Recorder Pre-Crash Data***Jingru Gao*, Department of Civil, Environmental, and Geo- Engineering, University of MinnesotaCo-author: *Gary Davis*, Department of Civil, Environmental, and Geo- Engineering, University of Minnesota**Extraction of Accurate Road Reference from Past Trajectories for Accurate Lane-Departure Detection***Shahnewaz Chowdhury*, Department of Mechanical Engineering, University of Minnesota DuluthCo-authors: *Md Touhid Hossain* and *Imran Hayee*, Department of Electrical Engineering, University of Minnesota Duluth

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Are CAVs Part of the Answer for Eliminating Inequities Experienced by Transportation Users?**Moderator:** *Kristin White*, MnDOT**Potential Implications of Connected and Automated Vehicles in Transportation-Disadvantaged Urban Areas***Kim Napoline*, Humphrey School of Public Affairs, University of MinnesotaCo-authors: *Erika Shepard*, *Adeel Lari*, and *Frank Douma*, Humphrey School of Public Affairs, University of Minnesota**Impacts of Vehicle Automation on Transport-Disadvantaged People***Frank Douma*, Humphrey School of Public Affairs, University of MinnesotaCo-authors: *Xinyi Wu* and *Jason Cao*, Humphrey School of Public Affairs, University of Minnesota**Shared Autonomous Vehicles in the Twin Cities: Understanding Feasibility and Equity Considerations***Noah Wexler*, Humphrey School of Public Affairs, University of MinnesotaCo-authors: *Yingling Fan*, *Frank Douma*, *Thalya Reyes*, and *Galen Ryan*, Humphrey School of Public Affairs, University of Minnesota**Transportation Equity: Are CAVs the Answer or Just a Fairy Tale?***Tara Olds*, MnDOT

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On Solid Ground: Recent Innovations in Pavement Material Research**Moderator:** *Kristy Morter*, Hennepin County**The National Road Research Alliance: Successful Cooperative Research***Glenn Engstrom*, MnDOTCo-authors: *George Chang*, Transtec; *Dan Schellhammer*, Midstate Reclamation; *Mike Rief*, WSB; *Amy Beise*, North Dakota DOT; *Susan Listenberger*, Cargill; and *Buzz Powell*, NCAT**Innovative Pavement Repair with Taconite and Microwave Technology***Larry Zanko*, Natural Resources Research Institute, University of Minnesota DuluthCo-author: *Sara Post*, Natural Resources Research Institute, University of Minnesota Duluth**Contribution of Structural Fibers in Reducing Faulting in Thin Concrete Pavements and Overlays***Manik Barman*, Department of Civil Engineering, University of Minnesota DuluthCo-authors: *Souvik Roy* and *Amarjeet Tiwari*, Department of Civil Engineering, University of Minnesota Duluth, and *Tom Burnham*, Minnesota Department of Transportation**Influence of Creep of Structural Synthetic Fibers on the Joint Performance Behavior of Concrete Pavements***Corey Crick*, Lake Superior ConsultingCo-author: *Manik Barman*, Department of Civil Engineering, University of Minnesota Duluth



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