OUR MISSION: CTS IS A CATALYST FOR TRANSPORTATION INNOVATION THROUGH RESEARCH, EDUCATION, AND ENGAGEMENT.

At the University of Minnesota, we’re working from every angle to make transportation better. We hope you enjoy this report of CTS highlights from fiscal year 2018. And as always, our deepest thanks to our supporters.

Sincerely,
Laurie G. McGinnis, Director

FY18 BY THE NUMBERS

RESEARCH

- 5 patents/licenses applied for; 3 granted
- 106 peer-reviewed publications and conference proceedings
- 166 active projects
- 46 research reports published

EDUCATION

- 26 Ph.D. and master’s graduates
- 562 K-12 students in CTS activities
- 5,605 participants in customized training and technical assistance programs

ENGAGEMENT

- 183 media stories referencing transportation research
- 3,715 participants at events
- 24,065 subscribers to publications and social media

REVENUES: $15,490,000

Federal 16%
State of Minnesota 43%
Regional/Local 15%
University of Minnesota 12%
Other 12%
Miscellaneous 2%

Read the annual impacts report online for links to these stories and much more:
cts.umn.edu/2018annualreport
Creating Knowledge and Finding Answers

Spotlight: RESEARCH OUTCOMES

Testbed for connected vehicles
Researchers transformed a high-crash stretch of interstate in Minnesota into a testbed for connected vehicles. The close-to-campus testbed has high-resolution radar sensors covering two-thirds of a mile on I-94. The sensors give nearly continuous coverage of the trajectories of 85,000 vehicles a day, while cameras provide real-time verification of that information. The data-collection infrastructure is supported by a comprehensive data warehousing and dissemination software architecture. Lead researcher: John Hourdos, Minnesota Traffic Observatory. Sponsors: USDOT’s Roadway Safety Institute, MnDOT.

Pavement design package
A series of research projects under way since the early 2000s culminated in a pavement design package that allows for the improved use of gneiss. This work—which will enable cities, counties, and the state to build more financially effective roadways—was honored with the 2018 CTS Research Partnership Award. Lead researchers: Andrew Owen, Accessibility Observatory. Sponsor: National Accessibility Evaluation Pooled-Fund Study.

Bus operator scheduling tool
As part of a multiyear partnership, researchers developed a tool that assists to help Metro Transit schedule and manage its bus operator workforce. The tool recommends how many reserve operators are needed for the next day’s service; the goal is to balance the number of reserves with the number of regular operators who are asked to work overtime. Lead researchers: Qie He and Diwakar Gupta, Department of Industrial and Systems Engineering. Sponsors: USDOT. Lead researcher: Steven Frederick, Department of Industrial and Systems Engineering. Sponsors: USDOT. Lead researchers: Qie He and Diwakar Gupta, Department of Industrial and Systems Engineering. Sponsors: USDOT. Lead researchers: Qie He and Diwakar Gupta, Department of Industrial and Systems Engineering. Sponsors: USDOT.

Healthy roadside turfgrass
Keeping Minnesota’s roadways green is about more than just aesthetics—healthy turfgrass can improve water quality, reduce erosion and road noise, and provide natural habitat. However, harsh conditions such as heat, drought, and salt use can make it difficult for roadside turfgrass to thrive. Researchers developed best management practices for installing and establishing a salt-tolerant turfgrass mixture they developed in previous research. Lead researcher: Eric Watkins, Department of Horticulture. Sponsor: MnDOT. Minnesota Local Road Research Board.

More-efficient engines
The Thomas C. Murphy Engine Research Laboratory received a 14 million to research ways to boost the energy efficiency of cloud-connected delivery vehicles. As part of the project, researchers are partnering with UPS and an electric vehicle manufacturing company to improve the energy efficiency of medium-duty delivery vehicles. Lead researcher: Wil Nordling, Department of Mechanical Engineering. Sponsor: U.S. Department of Transportation.

Job accessibility data and analysis
The University’s Accessibility Observatory published reports illustrating the accessibility to jobs by transit and by auto in U.S. cities. The DOI in Florida, Maryland, and the District of Columbia are using Observatory data for their planning. Lead researcher: Andrew Owen, Accessibility Observatory. Sponsor: National Accessibility Evaluation Pooled-Fund Study.

App for high-risk curves
A new system uses a smartphone app to warn drivers of high-risk curves. The system uses in-vehicle technology to display dynamic curve-speed warnings to the driver based on the driver’s real-time behavior and position relative to the curve. Lead researchers: Brian Davis, Department of Mechanical Engineering; Nicholas Morris, HumanFIRST Lab. Sponsors: Minnesota Local Road Research Board. Lead researchers: Brian Davis, Department of Mechanical Engineering; Nicholas Morris, HumanFIRST Lab. Sponsors: Minnesota Local Road Research Board.

Smartphone app for collecting trip data
DiaLoguem™, a smartphone app designed to log activities and trips, was patented. The app makes it easier and less costly to collect travel behavior information and provides richer, more accurate data than traditional methods. A start-up company was launched to commercialise the app. Lead researchers: Yingying Fan, Humphrey School of Public Affairs; Amanjot Singh, Department of Soil, Water, Climate. Sponsors: MnDOT, Minnesota Local Road Research Board. Healthy roadside turfgrass

What CTS does:
Manage a broad research program funded by diverse sources. Engage multidisciplinary teams to tackle pressing issues. Develop and disseminate new knowledge.
### Camps and exhibits
Middle schoolers participated in CTS’s National Summer Transportation Institute, a two-week program featuring classroom activities, lab sessions, and field trips around the Twin Cities. The summer camp attracts a diverse range of students to education and career opportunities in transportation.

Other activities to spark students’ interest included Tech Fest, an annual event held at The Works Museum in Bloomington, geared toward kids ages four and up, and TransportationYou, a mentoring program of the Minnesota Chapter of the Women’s Transportation Seminar (WTS) that encourages girls ages 13-18 to pursue transportation careers.

### Summer interns on the job
University students put their skills to work on real-world transportation projects in internships at MnDOT and Ramsey County. Thirteen civil engineering undergrads participated in various MnDOT offices, and four students worked in several Ramsey County departments. The new partnership with the county built on the longstanding success of the MnDOT program, which completed its eighth year.

**Sponsors:** MnDOT, Ramsey County.

### Education Awards

#### Matthew J. Huber Award (students in engineering, science, and technology fields)
- William Stinemates, Doctoral candidate, mechanical engineering, advisor: Joseph Bajewski
- Jacqueline Nowak, Master’s degree, urban and regional planning, and master’s, civil engineering, advisor: Amin Khani

#### John S. Adams Award (honoring students in policy and planning fields)
- Xinyi Wu, Doctoral candidate, urban planning, advisor: Jason Cao
- Travis Freil, Master of GIS, advisor: Susan Kasser Title

### Braun Transportation Scholarship
In 2017 the children of Richard P. Braun established a scholarship to honor his memory and legacy. Richard P. Braun Transportation Scholarship is now awarded annually to a University of Minnesota undergraduate student who is pursuing a degree in a transportation-related field of study. The first recipient of this scholarship is Elia Bag, an urban studies major, advised by Paula Pentel. Braun was CTS’s founding director.

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### Hands-on training for airport staff
Airport managers, maintenance staff, and others from around Minnesota gathered for Fall Fly-Around events at the Morris, Eveleth, and Fairmont airports. The training allowed attendees to learn about airport operations topics in a more casual, hands-on environment from MnDOT Aeronautics representatives. The Airport Technical Assistance Program (ATAP), housed within CTS, offered the training.

### Developing the Transportation Workforce
A skilled and diverse workforce is needed to plan and manage transportation systems—today’s and tomorrow’s.

What CTS does:

- Attract K-12 students to transportation careers.
- Enhance University transportation education.
- Transfer research results and best practices to practitioners.

### Spotlight: Education Activities

**Accessible-design training for practitioners**

The Minnesota Local Technical Assistance Program (LTAP), housed within CTS, held a series of customized training courses about accessible design. The training, offered in locations across Minnesota, gave attendees an understanding of how to provide accessibility in the public right-of-way from scoping through final design. Minnesota LTAP also posted video recordings of the workshop sessions. **Sponsors:** Minnesota Local Road Research Board, MnDOT, Minnesota LTAP.

**International student exchanges**

The Global Transit Innovations (GTI) program coordinated a study-abroad course in spring semester 2018. The course—PA: Planning for China’s Urban Billion—was offered by the Humphrey School of Public Affairs; 11 students visited four Chinese cities. In turn, 16 students from Chinese universities spent six weeks in Minnesota learning about American transportation and culture as part of a GTI summer training program. In addition, 16 professionals from the Shanxi Urban Transportation Planning Center came to Minnesota in fall 2017 for a four-week course. **Sponsors:** GTI, CTS, China Center’s Mingda Institute.

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Annual research conference

CTS’s 2017 research conference featured two plenary presentations. Joung Lee, policy director at the American Association of State Highway and Transportation Officials, examined the latest directions in infrastructure funding at the federal and state levels; L.A. Metro’s Chief Innovation Officer, Joshua Schank, described the creation of the Office of Extraordinary Innovation, designed to invite new ideas for doing business and manage strategic planning for the agency. The event also included a range of concurrent sessions.

Automated vehicles: equity task force

Researchers in the U’s Transportation Policy and Economic Competitiveness Program formed a task force on automated and self-driving vehicles. Their goal was to identify how various deployment strategies could improve mobility and access for transportation-dependent Minnesotans: seniors, people with disabilities, and others who are not able to drive themselves. Stakeholder meetings were held across the state.

Annual meeting of research centers

CTS hosted the annual summer meeting of the Council of University Transportation Centers. More than 130 attendees from university centers and institutes focused on transportation research, education, and outreach gathered in Minneapolis for the event. In the event keynote, Carissa Slottebak, associate dean of the Humphrey School of Public Affairs, discussed the importance of collaborative engagement in transportation research.

Leaders who made an impact:

Richard P. Braun

Distinguished Service Award (outstanding leadership, mentorship, and support for the profession)

Amy Vennewitz

Distinguished Service Award (outstanding leadership, mentorship, and support for the profession)

William K. Smith

Distinguished Service Award (leadership, mentorship, and education of future leaders in private-sector freight transportation)

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Ray L. Lappagard

Distinguished Service Award (outstanding leadership, mentorship, and support for the profession)

Jenney Wynnott

Distinguished Service Award (outstanding leadership, mentorship, and support for the profession)

George Schember

Distinguished Service Award (outstanding leadership, mentorship, and support for the profession)

Jim McDonough

Distinguished Public Leadership Award (public leaders who have influenced innovative transportation policy directions)

Spotlight: Engagement Highlights

Freight & logistics symposium

Participants at the annual Freight and Logistics Symposium explored freight’s integral role in the on-demand revolution. New trends and emerging technologies are driving consumer expectations for shortened, lower-cost, more flexible delivery options. Carriers and logistics service providers are facing pressure to increase their own pace of change, adapt to new distribution and delivery models, and provide higher service levels.

Blowing Snow Control Tools website

New webinars were added to the Blowing Snow Control Tools website. The site is the home for tools and resources that can help agencies keep roads clear of blowing and drifting snow and ice. It includes a snow-fence design module and a cost-benefit tool to estimate the return on investment of various practices. The site is developed and maintained by CTS. Sponsor: MnDOT

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