

CTS Catalyst

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Accelerating the pace of transportation innovation

PEDESTRIAN CROSSINGS

page 2

RESILIENT TRANSPORTATION

page 3

GREEN LINE & REAL ESTATE

page 6

TRANSITWAY RESEARCH

page 7



The Green Line is here

The Green Line officially began service on June 14, linking downtown St. Paul to downtown Minneapolis and running through the heart of the University of Minnesota campus along Washington Avenue—and right by the CTS offices.

There are three stops on campus: the Stadium Village Station (just east of TCF Bank Stadium), the East Bank Station (on Washington Avenue between Harvard and Union Streets), and the West Bank Station (on Washington Avenue between 19th and Cedar Avenues).

Overall, there are 18 stations on the Green Line, plus 5 stations it shares with the Blue Line in

LRT continued on page 7

Changing demographics and travel choices may shape a very different future

Though no one can predict the future, thinking about how today's changes may shape the future of transportation in our country is more important now than ever before. "It's critical that we understand the significance of things that are taking place and prepare for what may come," said former Utah Department of Transportation CEO John Njord in the opening session of the 25th Annual CTS Transportation Research Conference. "For us to be relevant in the transportation business, at a minimum we have to be adaptable to change, and ideally we want to be leading change in the transportation industry."

Demographics continued on page 4



New guidebook aims to **make pedestrian crossings safer**

Pedestrian crossings are an important feature of the multimodal transportation system, enabling pedestrians and bicyclists to safely access destinations on either side of streets or highways.

To help Minnesota transportation agencies evaluate pedestrian crossings and determine where improvements are warranted, the Minnesota Local Road Research Board funded the

development of a new guidebook for practitioners. The guidebook focuses specifically on uncontrolled pedestrian crossings, which aren't controlled by a stop sign, yield sign, or traffic signal.

The new guidebook recommends when to install marked crosswalks and other enhancements based on a number of factors, including the average daily vehicle count, number of pedestrians, number of lanes, and average vehicle speed. It helps agencies rate a crossing for pedestrian service, and includes a flow chart and several worksheets to assist in data collection and decision making.

Bolton & Menk led the development of the guidebook, based on an evaluation procedure in the 2010 *Highway Capacity Manual*, input from a technical advisory panel, and video data of pedestrian crossings collected by researchers at the U of M's Minnesota Traffic Observatory.

The guidebook is designed around an 11-step evaluation process that engineers can use to evaluate an uncontrolled pedestrian crossing location in a systematic way. Based on the results of the evaluation, users can identify what level of treatment is appropriate for their location, ranging from in-street crossing signs to overhead flashing beacons to traffic calming devices such as curb bump-outs. For each potential treatment option, the guidebook includes information on advantages, disadvantages, recommended locations, and cost.


"The guidebook does a great job of synthesizing three or four other available manuals into one easy-to-use document," says Mitch Bartelt, pavement marking engineer at MnDOT and a member

of the project's technical advisory panel. "It gives engineers one place to go for the information they need when they're trying to decide on the best crossing solution. And because it's Minnesota-specific, it also captures the unique laws that govern pedestrians and crosswalks in our state."

The Minnesota Local Technical Assistance Program (LTAP), a part of CTS, hosted a workshop based on the guidebook on June 5. The workshop provided attendees with an overview of the step-by-step evaluation process. Attendees included city and county engineers, MnDOT staff, and other transportation professionals.

Mark Maloney, public works director for the City of Shoreview and a workshop attendee, says the information presented will be useful for practitioners at the local level.

"It's challenging for local government transportation professionals to consistently apply the definitions and language used in state statutes concerning pedestrians and crosswalks, especially given the emotion that typically accompanies the topic," Maloney says. "The training and the guidebook itself will be especially helpful in guiding fact-based decisions concerning the types and locations of pedestrian crossings on local roadway systems."



**READ
CATALYST
ONLINE**

for links to research reports and other resources.

Resilient transportation systems reduce impacts of extreme weather

During the past decade, a number of major weather events have disrupted or damaged transportation networks. According to staff scientist Joe Casola with the Center for Climate and Energy Solutions, in some cases trends in the frequency or intensity of these events can be linked to longer-term changes in the climate, while in all cases the events demonstrate the vulnerabilities associated with our transportation infrastructure and services.

During the luncheon presentation of the annual CTS research conference, Casola outlined some of the climate trends that will continue to affect our nation's transportation systems in the coming years. "The big picture is that carbon dioxide levels are on a steady march up, and with that the average temperature of the planet is warming," Casola said. "For decision makers on the ground, the more important issue is the increased frequency of the extreme weather events that occur over days or weeks at the local and regional levels."

For example, scientists are very confident that there will be a significant increase in the frequency, severity, and intensity of heat waves during the 21st century. Heat waves can affect transportation in many ways, including limits on construction hours, vehicle overheating, electrical system malfunctions and brownouts, loss of

pavement integrity, rail buckling, and air traffic slowdowns. Scientists also predict continued increases in heavy rainfall events, especially in the East and Midwest; this will likely lead to increased erosion along rivers and coasts, loss of soil integrity and landslides, roadway and rail bed washouts, and sewage overflows.

As weather patterns change in our nation and the world, transportation planners will need to increase their focus on building resilient transportation systems that can anticipate, absorb, adapt to, or rapidly recover from disruptive events. "Looking at how things are changing can lead to a sense of helplessness, but by leveraging existing risk management activities and building resilience we can constructively address these issues," Casola said.

There are a number of ways transportation planners can build resilience into their transportation systems and planning: mapping can help identify vulnerabilities; using natural systems such as wetlands and floating docks can help add flexibility and adaptability; obtaining insurance or catastrophe bonds can help minimize risks; and decisions can be made about whether to re-engineer, redesign, or even abandon assets.

In addition, Casola said

Minnesota's governor declared a state of emergency in

35
COUNTIES

in June because of
RECORD RAINFALL
and related
FLOODING.

transportation planners should be making post-disaster plans before disasters happen. For example, answering questions such as 'At what point should this facility or service be abandoned?' before a disaster can help smooth the way if those tough choices need to be made in the future.

"Climate risks are dynamic, and the bottom line is we need to have an ongoing commitment to reassessing our risks; better information on the costs, effectiveness, and benefits of solutions; better documentation on experiences and best practices; and more cross-sector interaction," Casola said. "By looking at how transportation relates to other sectors like energy, health, the environment, and the economy, we'll naturally begin to build more resilient systems."



Demographics from page 1

In his current position at Tom Warne and Associates, Njord has gained an in-depth understanding of the trends affecting the future of transportation in the United States while spearheading the Transportation Research Board's "Foresight" project—part of the organization's forward-looking NCHRP Report 750 Series. The project addresses a wide range of topics, including: What if the oil-fueled auto era ends and revenue from gas taxes dries up? What if engineering practices must be upgraded to ensure resiliency to natural disasters as global warming continues? What if technology such as self-driving cars eliminates or reduces the need for human drivers? What if tomorrow's economy requires radically different freight patterns?

Perhaps most significantly, the project explores the possibility that Americans are losing their appetite for driving. "Since the 1950s our country has had a love affair with the automobile, but in the past ten years we've seen something different than we've ever seen before," Njord said. "Every other time the number of vehicle-miles traveled per capita has dropped, it has recovered, but it's been dropping since 2004 and now the future is uncertain. It's impossible to know whether that number will start growing again, stay flat, or continue to drop."



According to Njord, other trends make the future outlook equally complex. In 50 years the United States will likely be home to 100 million more people, so even if vehicle-miles traveled (VMT) per person stays flat or declines, it's likely

Foresight for the Minneapolis–St. Paul region

Following John Njord's conference presentation, a group of expert panelists offered their perspectives.

How does the Foresight project relate to what's happening in our region?

"In general, the trends that John described in his presentation are happening in the Twin Cities area," said Arlene McCarthy, director of transportation services with the Metropolitan Council. "The most interesting message coming out of the forecast is the growth of minority populations. Nearly all of our region's net growth between 2010 and 2040—projected at a bit more

than 800,000—will be people of color, primarily immigrants. It's important to look at their preferences and determine how that will impact our transportation and land use."

How do you see technology affecting travel demand?

"One possibility is that driverless cars will make travel less onerous, so people can travel farther and live farther away," said David Levinson, RP Braun/CTS Chair in Transportation in the



total VMT will be larger than it is today. The population is also aging: by 2030, 20 percent of the population will be over 65 and will likely drive less. In addition, more than half of the people living in the country will be non-white, and the number of people in the workforce may continue to decline.

Finally, among the youngest generations, travel behaviors are changing. “The Millennial generation is very technically connected and very different in terms of their choices about travel,” Njord said. “It appears that when they get into the workforce they will travel less. They’re also staying home longer, waiting longer to get married, and waiting longer to have children—which all plays into a changing demographic that should cause us to think differently about how we plan for the future.”

To help transportation planners consider all possible futures, the Foresight project encourages the use of multiple-scenario planning. “We need to begin considering all the possible scenarios and generating plans that are independent and distinct from one another,” Njord advised. “The act of thinking about these things is fundamentally important, because the shift that is now taking place means we’re going to have to do things much differently in the next 50 years than what we’ve done in the past 50 years.”

U’s Department of Civil, Environmental, and Geo- Engineering. “Another possibility is that information technology and the changing nature of work will mean we won’t need to commute five days a week anymore or at peak hours. I think the idea that we will resume our previous [per capita travel] trajectory is extremely unlikely.”

How can the area adapt to these changes to attract talented workers and be economically competitive?

“We need to think about cost,” said Peter Frosch, director of

In 2011,
67%
**OF AMERICANS
AGED 16 TO 24**
had driver’s licenses,
the lowest level in almost a
HALF CENTURY.
—USDOT and Census Bureau

Catalyst Year in Review

During the past year, these were our top three most-read stories online:

#1: I-35W ‘SMART’ BRIDGE STANDS THE TESTS OF TIME

#2: NEW COMPLETE STREETS MATERIALS HIGHLIGHT BEST PRACTICES, ASSIST PRACTITIONERS

#3: SMART SIGNAL INSTALLATION HELPS MNDOT MONITOR TIMING PLANS

If you missed them, the stories are available online in the *Catalyst* archive.



strategic partnerships with Greater MSP. “What happens if driving becomes much more expensive? How will that affect transportation users’ preference and need for multimodal transit? Greater MSP surveyed Millennials in the region to ask what they want and need in the future. The strongest data was about transit. When you combine student debt with recession, owning a car becomes very difficult, and transit access becomes extremely important. We want to be better, smarter, quicker, and more efficient than other regions, and that’s how we’re going to win and build the economy.”

How can the Foresight model help practitioners?

“The planning tool we’ve developed with this project—called Impacts 2050—helps transportation practitioners illustrate future scenarios,” said Keith Lawton, transportation modeling consultant with the project. “The software is in the public domain, and transportation planners can use it to view the scenarios we’ve already set or change the parameters to make up [their] own future.”



Is LRT a magnet for economic development?

Evidence from the Green Line

The Minneapolis–St. Paul region is getting on board with light-rail transit. Many policymakers expect the investments to stimulate economic growth and often cite this impact to help justify network expansion. Despite these expectations, a limited number of studies have explored the impacts of LRT on real estate development.

To help fill this gap, University of Minnesota researchers investigated the effects of two key announcements in the development of the Green Line—the preliminary engineering (PE) and the Full Funding Grant Agreement (FFGA)—to compare building activity in the LRT corridor with control corridors.

“We found that the announcement of preliminary engineering had no impacts on the count and overall value of building permits, but the announcement of the Full Funding Grant Agreement tended to increase the number of building permits by about 30 percent and the value by 80 percent,” says Jason Cao, associate professor in the Humphrey School of Public Affairs and the study’s principal investigator.

The PE announcement on December 13, 2006, indicated that the Federal Transit Administration (FTA) had started to fund the line’s planning. However, it was still uncertain whether and when the Green Line would be approved and constructed, Cao explains.

The FFGA announcement in April 2011 indicated that the FTA was committed to fund half of the Green Line and specified a 2014 service launch. “We assumed that the different levels of certainty associated with each of these two dates produced different impacts on building activities in the Central [Green Line] Corridor,” he says.

The research was based on building permit data from the City of St. Paul and tax parcel data from Ramsey County.



A new housing development along the Green Line

The team—including graduate student Dan Porter—defined quarter-mile buffers for the Central Corridor and the four control corridors (all with frequent transit service in St. Paul). The data span from January 2003 to January 2014.

The researchers found that the PE announcement had no impact on the overall number and value of building permits. The value of residential permits went up, while that of commercial permits actually went down. “The negative impact on commercial property permit values reflects developers’ hesitance to make new investments under uncertainty,” Cao says.

The FFGA announcement increased the number and value of commercial property permits. For residential properties, it increased the number of permits but decreased the value. “This implies that there were a larger number of lower-value building activities,” Cao says, “which may mean that building activities occurred in low-cost housing.”

Cao warns that the research cannot prove whether the building activities represent a net growth or a redistribution of growth within the region.

“Nevertheless,” he says, “the Green Line seems to revitalize neighborhoods in the Central Corridor and creates

The Metropolitan Council recently highlighted

**\$2.5
BILLION**

in planned or completed
**DEVELOPMENT
PROJECTS**
along the
GREEN LINE.

location-efficient neighborhoods. This is helpful for the City of St. Paul and the region as a whole.”

The researchers add that changes in St. Paul’s land-use planning and zoning policies, public housing subsidies, and publicly funded projects such as the Union Depot also contributed to private-sector building activity along the line.

“Public infrastructure can create the framework in which private development can happen,” said Donna Drummond, director of planning with the City of St. Paul, at the CTS research conference. “The true impact must be measured over time—10 and 20 years after LRT operation.”

The study was funded by CTS.

Transitway research is focus of conference track

One of the highlights of the 25th Annual CTS Transportation Research Conference was a half-day track about the impacts of transitway expansion in the Minneapolis–St. Paul region. Two sessions showcased findings from the Transitway Impacts Research Program (TIRP), a program launched in 2006 by the Hennepin County-University of Minnesota partnership.

In the first session, three researchers from the Humphrey School of Public Affairs—associate professors Yingling Fan and Jason Cao and research fellow Andrew Guthrie—shared findings from their transit-related studies. Peter McLaughlin, chair of the Counties Transit Improvement Board, praised TIRP research for its role in informing

transitway planning and decision making, noting that TIRP research results were used in the successful application for a federal grant for the Target Field transit station in Minneapolis.

The second session was a dynamically flowing conversation about policy implications related to the continued build-out of the network. Participants from a range of organizations discussed funding, economic competitiveness, job accessibility, business needs, equity, socio-demographics, and other issues.

More about TIRP, including a synthesis of the research completed to date, is at cts.umn.edu/Research/featured/transitways.



Yingling Fan and John Doan, director of housing, community work and transit at Hennepin County, participated during the policy conversation.

LRT from page 1

downtown Minneapolis before reaching the western terminus at the new Target Field Station. More than 225 light-rail trains will glide through campus each weekday.

“The Green Line will make the University of Minnesota very accessible to visitors, sports fans, concert-goers, patients in our clinics, and countless others,” said Vice President Pam

Wheelock, the U of M’s chief operations officer, in a recent e-mail to staff and students.

Washington Avenue between Pleasant and Walnut Streets on the Minneapolis east bank campus is now a transit-pedestrian mall reserved for trains, buses, pedestrians, cyclists, and emergency and service vehicles. With so much activity in a limited space, safety is a paramount concern, Wheelock said. “LRT safety will be emphasized during New Student Orientation and Welcome Week, and a unique safety campaign will be unveiled at the start of fall semester.”

The University of Minnesota worked closely with the Metropolitan Council and other agencies to bring the line to life. In 2010, crews improved roads around the east bank campus to handle cars and trucks permanently routed off Washington. The line’s design includes measures to reduce train vibrations and mitigate train-caused electromagnetic interference into University labs.

CTS has created a short video about the launch: “New Green Line LRT transforms U of M campus.” Watch it at cts.umn.edu/about/news/video.



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SOCIO-DEMOGRAPHICS AND TRAVEL CHOICES

may shape a very different future.
 page 1

PEDESTRIAN CROSSING GUIDEBOOK

aims to improve safety and decision making.
 page 2

EXTREME WEATHER

will increase need for
RESILIENT TRANSPORTATION SYSTEMS.
 page 3



The Green Line is here.