Light rail reduces auto, gasoline use and CO2 emissions

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New study measured the impacts of light rail installation--TRAX University Line--on an existing major traffic thoroughfare in Salt Lake City. Credit: Courtesy UTA

For the first time, researchers have shown that installing light rail on an existing traffic corridor not only gets people out of their cars, but reduces congestion and air pollution.

In the study, planners at the University of Utah measured impacts of a new light rail line in Salt Lake City (University Line) on an existing major thoroughfare (400/500 South). Their analysis showed that traffic near the University has fallen to levels not seen since the 1980s, even as the number of students, faculty and staff at the U has increased, and the commercial district along the corridor has expanded.

"This is the first study to document important effects of light rail transit on traffic volumes," said Reid Ewing, professor of city and metropolitan planning at the University of Utah and lead author on the study. "Since the University TRAX line opened, there has been increased development in the 400/500 South travel corridor, yet traffic on the street has actually declined. Our calculations show that without the University TRAX line, there would be at least 9,300 more cars per day on 400/500 South, and possibly as many as 21,700 additional cars. The line avoids gridlock, as well as saves an additional 13 tons of toxic air pollutants. This is important knowledge for shaping future transportation policies."

Andrew Gruber, executive director of the Wasatch Front Regional Council, which has been responsible for coordinating transportation planning in the Salt Lake and Ogden areas since 1973 said, "This study further demonstrates the value of public transportation in helping people reach their destinations, reduce traffic and spur economic development. The findings are significant for local governments across our region as they consider the future of transit in their community."

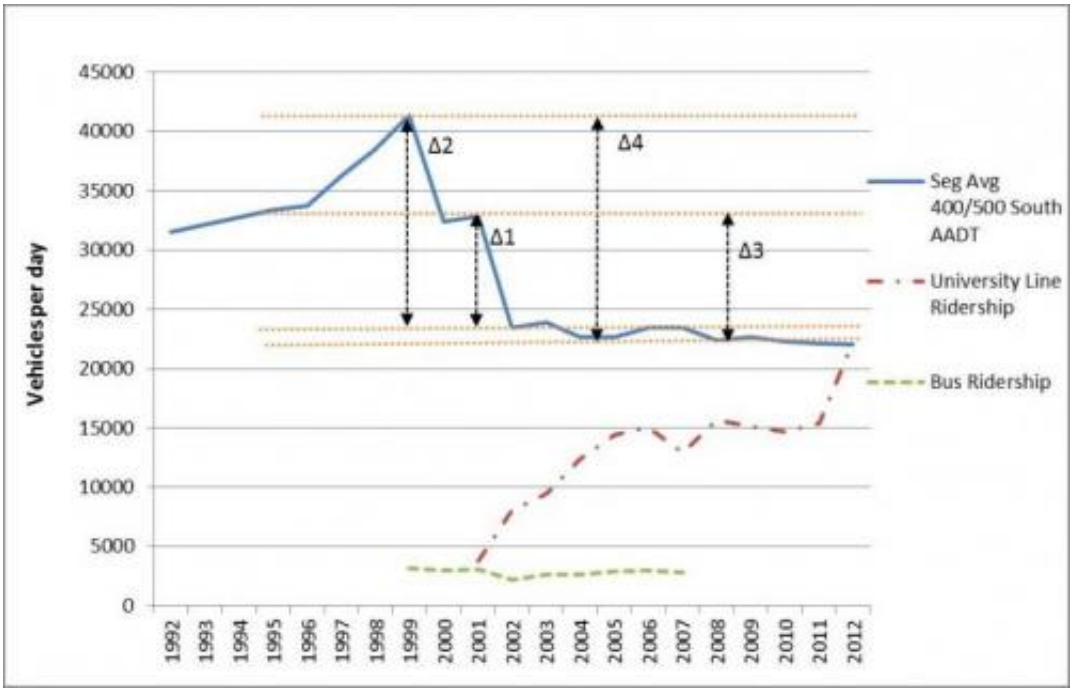
The report—which validates assumptions widely used in travel demand models used in community planning—was issued recently by the National Institute for Transportation and Communities, and has been

accepted for publication in the "Journal of Public Transportation" later this year. The report is available for download here.

Ewing worked with Guang Tian, a doctoral student in city and metropolitan planning at the U.

How the study was conducted

A "quasi-experimental" research design was used for the study, which is different from a traditional research design because it is not possible to randomly assign subjects to a treatment or control group in this setting. To compensate for lack of randomization, a variety of matched samples—traffic on parallel streets in the corridor, transit ridership, development and related traffic—was used to confirm the results.



Annual Average Daily Traffic on 400/500 South, TRAX Ridership along 400/500 South, and Bus Ridership along 400/500 South Credit: Guang Tian

In this case, the first treatment is a 2.3 mile extension of TRAX from downtown Salt Lake City to the University of Utah stadium built in 2001. Comparing data from 2001 and 2002 provided a way to study impacts on the travel corridor before and after construction. Likewise, the 1.5 mile extension from the stadium to the University Medical Center, begun in 2002 and completed in 2003, provided another comparison—before treatment in 2003 and after in 2004.

Annual average daily traffic (AADT) on 400/500 South decreased by 9,300 vehicles as net transit ridership increased 7,200 in 2002 over 2001 before the TRAX line was built. Researchers attributed the changes to the TRAX extension because AADT increased only slightly on two parallel streets, it stayed essentially flat on others.

Considering growth in the area and coincident traffic impacts produced a surprising finding.

"We assumed that without TRAX, traffic on 400 South would have increased as a function of development in the area," said Ewing. "Instead, we found just the opposite. As the corridor became more developed over the decade—concurrent with the opening of TRAX—traffic actually declined."

Total development, as measured by building floor area, increased by nearly 13 percent between 1999 and 2009, from 50.6 million square feet to 57.0 million square feet. Comparing the estimated traffic volume that would be associated with that growth, and the actual traffic volumes measured in 2009 showed an estimated decrease in average daily traffic by 21,700 trips.

Applying Environmental Protection Agency calculations for fuel consumption and average emissions for passenger cars to that number of trips, TRAX contributes to saving 1,300 gallons gasoline and avoiding

26,100 pounds CO2 emissions daily. On an annual basis, this means saving 487,700 gallons of gasoline and 9.5 million pounds of CO2.

"An important caveat is that while the results of this study are revealing and important for future planning, we cannot guarantee that light rail transit would have the same effect on traffic at other locations," Ewing concluded. "The study area in Salt Lake City is unique, with the university as a major employer is the area and students and staff having free access to transit. The comparison group in this study is not identical to the experimental group, but we believe the estimates established to test our hypotheses support the results."

	AADT on 400 South	Net Transit Ridership
Δ1	-9,300	7,200
Δ2	-17,900	7,100
Δ3	-10,100	12,800
Δ4	-18,700	12,000

Credit: Guang Tian

The study was done in coordination with the Utah Transit Authority (UTA) and the Utah Department of Transportation (UDOT), and is available for download athttp://otrec.us/project/611/.

""UDOT found the results from the 'Report on the Effect of University TRAX on traffic along 400/500 South' interesting," said Jeff Harris, planning director for UDOT. "While it is difficult to make direct causal connections from the results of one study, these results, along with the ridership on the University TRAX line and the UTA reported transit mode share to the University, do indicate that TRAX is having a positive

impact. UDOT believes in the importance of and is committed to developing an integrated transportation system. We look forward to working with our partners in the future to conduct this type of research and help build a body of knowledge about the positive effects of implementing integrated transportation solutions."

Making TRAX in Utah

The first light rail line in Salt Lake was opened in 1999, and an extension from the downtown to the University of Utah was completed in 2001with a further expansion to the University Medical Center in 2003. Several additions have been made system-wide since that time. The current study focused on the University extension because ample time has passed to measure its full effect, and because it has the highest ridership in the system.

"The University LRT Line was developed through a strong partnership between Utah Department of Transportation, Utah Transit Authority, Salt Lake City, University of Utah, Wasatch Front Regional Council, Federal Transit Administration, the Salt Lake Chamber and area businesses," noted Michael Allegra, UTA general manager. "The University LRT Line in 2001 has resulted in stabilized traffic flows, increased economic investment in the corridor and significant increases in transit ridership."

The study was supported by the National Institute for Transportation and Communities.

Provided by University of Utah