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As economies become more global, challenges faced by international urban centers like El Paso become more pressing. These challenges drive the innovation and discovery that are at the heart of the work of the Center for International Intelligent Transportation Research (CIITR).

Established by the Texas Legislature in 2006, CIITR seeks to

- maintain and improve mobility in the face of growing traffic and shrinking resources,
- increase border-crossing efficiency while maintaining security, and
- improve air quality to advance public health.

In each of these missions, CIITR is committed to enhancing the quality of life for the Paso Del Norte region and to developing solutions that can be successfully applied in other states and U.S. border environments.
Through new applications of traffic modeling and data management, CIITR researchers are enhancing transportation system efficiency and improving regional mobility.

IN THIS SECTION

• Ranking Transportation Projects with Competing Priorities
  • Integrating Binational Travel Demand Models
• Providing Motorist Information Through Commercial Data Sources
  • Mitigating Exit-Ramp Traffic Backups in El Paso
Commuters using the Ciudad Juarez/El Paso border crossings routinely experience severe traffic congestion, often resulting in wait times of up to three hours. To minimize that congestion today and in the future, planners try to forecast traffic levels on multiple roadways and bridges as growth in the region continues. Virtually all forecasting methods today, however, rely upon daily average traffic levels. With that limitation, planners are unable to predict traffic levels during specific time periods, and how travel patterns shift during those periods. CIITR researchers developed a simulation-based model capable of capturing traffic conditions at any given time during the day, producing the first such model ever for a binational region that is capable of analyzing and forecasting traffic conditions with current and future needs in mind. The new model can take into account the effects of roadway construction as well as road pricing and incident management strategies. This approach helps planners make more informed decisions that will ultimately reduce border wait times for commuters, even as regional growth places greater demand on existing roadways and bridges.

As available resources decline for all levels of government, the need to invest those resources wisely and carefully becomes more urgent. That reality underscores the importance of selecting transportation projects that will do the most good for the greatest number of people. The process of selection, however, can be tedious and time consuming when multiple decision makers and conflicting priorities are involved, and the process can be further complicated as various community interests compete for limited funding. The process can also be especially time consuming. For example, the weights assigned to cost, mobility and safety considerations can vary from one project to another, and the variance can be even greater when considering the needs of diverse groups and interests. To help meet this challenge, CIITR researchers created a web-based tool that applies various performance measures to rank projects objectively, yet also considers the opinions, biases and other subjective factors that play a role in community decisions. The quality of any judgment depends largely on how judgment is made. This new tool will not only help ensure that quality, but will also save time when governing bodies can apply it to a broad array of projects.
Traffic engineers and planners have long known that intelligent transportation systems (ITS) technologies can quickly relay real-time traffic information to motorists and shippers, and that such information can save time and improve mobility and profitability. However, installing ITS equipment in the field requires a huge financial investment — one that is prohibitive for many regions or communities with more urgent priorities in construction and maintenance. In recent years, however, the growing popularity of in-vehicle navigation systems has helped to expand the market for vehicle speed information. As the number of commercial data providers has increased, the cost of the information has decreased, making it more affordable for state departments of transportation to acquire. CIITR researchers concluded through this study that commercially available data can provide a reliable and cost-effective means of providing real-time travel information, lessening the need for substantial hardware and software investments. The study results will also help transportation agencies make the best possible decisions regarding how to procure and use commercially available data for the benefit of motorists and commercial carriers.

When the volume of traffic exiting a freeway exceeds the capacity of the ramp and/or the capacity of the intersection downstream, the bumper-to-bumper backup can often extend so far upstream that it blocks one or more lanes of the freeway. Not only does the result disrupt the free flow of traffic, it also creates a safety hazard, greatly increasing the chances of rear-end collisions. The best strategy to mitigate such backups may vary by location; therefore, CIITR researchers developed a decision-making process that considers a range of factors, including the queue length, delay times and vehicle deceleration speeds based on traffic simulations. A ranking system takes all criteria into consideration, enabling traffic engineers to select the strategy holding the greatest potential for each particular location. Increasingly crowded freeways underscore the need for motorist safety, and constrained budgets demand cost-effective solutions. These mitigation methods developed by CIITR staff help to ensure both safety and cost-effectiveness.
CIITR researchers are overcoming institutional and operational obstacles to provide for the safe, secure and efficient movement of people and goods at one of the busiest border crossings in North America.

IN THIS SECTION

• Measuring Benefits of Trip-Time Reliability at Border Crossings
• Analyzing Northbound Freight Movement Trends
• Determining the Viability of Cross-Border Mass Transit Service
• In-Motion Screening of Border Cargo
Information related to border-crossing efficiency is typically presented in either passive or active form. Passive domain communication consists of research findings and analyses designed to illustrate delay patterns and their economic consequences. Such information has significant value in terms of illustrating trends over time, but not so much for immediate decision making. This project developed a way to more actively communicate in the form of a dashboard — a visual display tool capable of presenting information in near real time, such as the projected delay time at a particular border crossing and a measure of the economic impact of that delay. This type of information is important to a wide variety of regional stakeholders, but particularly those involved in just-in-time trade (such as the maquila firms located near the border) and shippers involved in the transport of perishable cargo. For carriers and shippers, time is money, so being able to quantify and monitor even a small variation in delay at the border can have a measurable impact on the company’s bottom line. In addition to this application, the dashboard also illustrates delay trends and their economic cost over time, so regional stakeholders such as shippers, managers and high-level decision makers can use the historical information to determine which solutions or policies are most effective to maximize efficiency and profitability.

Cross-border freight movement activities are one of the key indicators of the status of the economy, and the efficiency of future freight movement depends on a clear understanding of those trends. Since 2009, CIITR researchers have evaluated trends in freight activities across the U.S.-Mexico border. Their findings illustrate increasing freight activity until 2005, a leveling off from 2005 through early 2008, and a decline near the end of 2008. However, data indicate a sustained increase during 2009. This increase, compared to the typical monthly variations in previous years, suggests that January 2009 was a turning point, and the upward trend in northbound freight traffic had resumed. The analysis was limited to land ports of entry and focused on truck and rail transport, the two major shipment modes of freight across the southern border. The analyses examined northbound freight classified by mode of transport (trucks and rail cars, empty and loaded), commodities (six commodity groups) and freight destinations. The trends identified by this research are helping estimate future freight activities and identify ports of entry where capacity improvement may be needed. They can also help decision makers in resource allocation planning for border-crossing operations and activities.
Cross-border bus and pedestrian traffic into El Paso each year is substantial, as illustrated by the more than 310,000 bus passengers and 7.6 million pedestrians who crossed in 2009. The service often backs up for hours at a time, due in part to inspections required by U.S. Customs and Border Protection. The increasing need for cross-border service calls for a routine that is affordable, efficient and environmentally friendly. In response to this problem, CIITR researchers developed a comprehensive framework to assess options for cross-border mass transit service between El Paso and Ciudad Juarez. Researchers documented lessons learned from international experience and all available transit studies in the region, the advantages and disadvantages of different options (i.e., light rail, bus rapid transit and monorail), potential ridership demand, and the potential alignment of the system (including terminals). Moreover, to address the security and immigration issues, several biometric technologies were explored to assess their feasibility for use in access control at transportation facilities and border crossings. This research provides a starting point to evaluate the technical, financial and institutional viability of cross-border mass transit operations.

Careful inspection of cross-border shipments is essential to ensuring security and preventing the movement of illegal material, but the process can slow the movement of freight, creating congestion that compromises mobility and hinders economic prosperity. CIITR researchers have developed a process for in-motion screening of containers and trucks to address both needs by doing two things. First, it moves the inspection activity outward, away from congested crossing points. Second, it employs a variety of sensor systems (including x-ray, gamma ray and radiological) that allow U.S. Customs and Border Protection personnel to scan cargo as it is in motion. The system, with a capacity of 8,640 cargo moves in each direction per day, permits a “go/no-go” decision to be made before cargo enters the United States. The inspect-in-motion process builds upon a study that demonstrated the commercial feasibility of the Freight Shuttle System, in which transporters operate along a dedicated, elevated and grade-separated guideway between specified locations, eliminating the opportunity to divert shipments for illegal purposes. This new and innovative approach subscribes to the principle that freight at rest is freight at risk, while freight in motion is secure.
INITIATIVES
Air Quality Initiatives

Vehicle emissions testing and data analysis tools are employed by CIITR researchers to better understand regional environmental conditions and improve air quality.

IN THIS SECTION

• Integrating Sustainability Measures in El Paso’s Rapid Transit System Planning
The transportation community is increasingly concerned with sustainability, making it necessary to go beyond conventional cost-benefit analyses in favor of a more holistic approach to decision making. In the case of the City of El Paso’s plan for a bus rapid transit system (BRTS), this approach involves economic, social and environmental factors since revenue and ridership projections for public transportation investments do not offer a complete illustration of the benefits such investments can generate. CIITR researchers have assembled a set of sustainability performance measures relevant to local needs, which can be used to conduct a sustainability analysis of various BRTS implementation options. Using this model, City of El Paso officials can consider such things as the environmental benefit of trip reduction or the economic benefit of job creation as well as other factors, such as accessibility and affordability of transportation for various population segments. This advancement is well timed, given the increased focus on sustainability and livability at all levels of government.
In addition to the many examples of CIITR-based initiatives, Center staff members are also involved in a wide range of externally funded innovations that provide substantial economic and security benefits to the region.

IN THIS SECTION

- El Paso County Secure Border Trade
- Preventing Teen Crashes Through Peer Influence
Border-crossing efficiency and security can be compromised by limited monitoring ability. CIITR researchers introduced new electronic tracking, reporting and monitoring technology that will expand the capabilities of the private and public sectors to monitor the loading of tractor-trailers and track the movement of goods and the operation of vehicles, from origin to destination. The U.S. Department of Transportation-funded El Paso County Secure Border Trade (SBT) Demonstration Project will also verify the identity of drivers and other participants in the cross-border supply chain in real time. In doing so, the project will heighten security, increase participation in trusted shipper programs, promote economic development, and facilitate border trade efficiency by enhancing collaboration between maquiladoras (maquilas), customs brokers, transporters and border security personnel. The CIITR staff is providing technical support to the county for this project by performing technology monitoring based on systems engineering practices. In addition, the staff is assisting the county throughout the life of the project by coordinating with the vendor on behalf of the county for successful completion of the project.
The Teens in the Driver Seat® initiative has steadily continued its growth across Texas, and El Paso-area schools continue to represent one of the strongest concentrations of activity in the state. Teens in the Driver Seat® is the nation’s first peer-to-peer program focusing solely on teen driver safety. The program is different from other teen driver safety initiatives in two ways. First, it focuses on the most common dangers for young drivers: driving at night; distractions such as cell phones, texting and other teen passengers; and speeding. Second, the program relies on the teen audience to both develop and deliver safety messages to their peers, minimizing the “adult fingerprints” that characterize other teen driver safety efforts. During 2011, the Teens in the Driver Seat® program grew to be active in a total of 21 area schools. Teen participants planned and led a wide array of activities that creatively reached thousands of their peers, as well as school administrators and parents. Other examples of the region’s standout status include the appointment of three students — Zaineb Algabban, Christina Jeong and Denise Mayorga — to the program’s statewide advisory board, and the selection of Irvin teacher Susan Wiggs as the recipient of the program’s SponStar Award.
The significant contributions of TTI’s Center for International Intelligent Transportation Research are made possible through the support, dedication and expertise of our many partners.

>> PUBLIC SECTOR

Border Environment Cooperation Commission
City of El Paso
El Paso Metropolitan Planning Organization
El Paso-area Independent School District
Federal Highway Administration
Federal Motor Carrier Safety Administration
Federal Transit Administration
New Mexico State Department of Transportation
Oak Ridge National Laboratory
Texas Department of Public Safety
Texas Department of Transportation
Texas State Energy Conservation Office
The University of Texas at El Paso
U.S. Customs and Border Protection
U.S. Environmental Protection Agency
U.S. Department of Transportation

>> PRIVATE SECTOR

Accenture
Battelle
Booz Allen Hamilton
Clean Air Technologies
Computer Sciences Corporation
Houston Area Research Center
Idle Aire Technologies
Mack Trucks
Mesilla Valley Transportation
Petro Truck Stops
Picarro, Inc.
Modelistica
PTV America
Secure Origins

>> BINATIONAL AND INTERNATIONAL

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