variety of traffic problems occur when driveways and intersections are too close to interchange ramps. Signalized intersections too close to interchange ramps can cause heavy volumes of weaving traffic on the crossroad, traffic back-ups onto the freeway, and a corresponding increase in crashes and congestion. Avoiding access in the functional area of freeway interchanges through effective planning and access control will help preserve traffic safety and operations on the freeway, the interchange, and connecting surface streets.

Although the safety and operational benefits of managing interchange area access have been documented, the cost-effectiveness of strategically acquiring additional limited access right-of-way has not been examined. The Center for Urban Transportation Research, under a grant from the Florida Department of Transportation (FDOT), recently examined this important policy issue.

The study sought to determine whether acquiring additional limited access right-of-way at the time an interchange is built and before the surrounding area is subdivided and developed is cost effective in light of potential costs and benefits. A key consideration was the potential for additional access control to extend the functional life of the interchange.

“The proximity of cross street access has a direct impact on interchange operations,” said FDOT project manager Waddah Farah. “This study helps demonstrate the potential

Continued on next page
The AASHTO publication, “A Policy on Design Standards – Interstate System”, recommends that access control lines for interchanges “should extend beyond the ramp terminal at least 100 feet in urban areas and 300 feet in rural areas. However, in areas where the potential exists for traffic problems, it may be appropriate to consider longer lengths of access control.” Therefore, state interchange access control policies are still limited primarily to the immediate area of the interchange.

However, state practice is beginning to shift in response to contemporary guidance emerging from AASHTO and the Transportation Research Board. The 2001 edition of the AASHTO Policy on Geometric Design of Highways and Streets (“Greenbook”) provides more extensive treatment of the subject of interchange area access control than previous editions. It addresses the importance of access control on interchange crossroads and mentions techniques to control access. The TRB Access Management Manual includes guidelines for interchange area access spacing ranging from 750 feet to ½ mile, depending upon the geometric characteristics of the interchange and crossroads, and whether the access is signalized.

**Methodology and Findings**

The study methodology included the following basic steps:

1) traffic operations analysis of the study interchange with varying configurations of signalized access spacing using CORSIM,
2) safety analysis of a sample of Florida interchanges with varied access spacing, and
3) cost/benefit analysis of acquiring varying amounts of limited access right-of-way.

For the operational analysis, CORSIM files were obtained from FDOT for an actual interchange in the Tampa Bay area. The interchange configuration was modified to an average urban diamond design, including the elimination of a free flow right-turn opportunity. Next, the traffic flowing through the interchange area was increased at increments of 200 feet of spacing between the freeway ramp and the first signalized intersection on the arterial until the interchange
failed operationally (i.e., the off-ramp traffic queue was observed backing onto the interstate). A three percent annual growth rate in all traffic was assumed. The simulations continued until the intersection was approximately one-quarter mile downstream.

Two measures of effectiveness were used to evaluate the effects of the various limited access right-of-way lengths on interchange operations: 1) Queue Length on the interchange off-ramp, and 2) Vehicle Hours of Delay for the entire network. Variables other than signalized access spacing certainly would effect interchange operations but could also confound the analysis by obscuring the operational effects of access changes. Therefore, to simplify and focus the analysis, the following variables were considered to be constants:

1) distribution of traffic volumes on the freeway mainline and off ramp,
2) percentage of turning movement counts at the intersections,
3) proportion of weaving vehicles,
4) heavy vehicle percentage, and
5) signal progression effects.

Figure 1 illustrates the impact of increasing signalized access spacing on traffic volumes that the off-ramp can accommodate before interchange failure. As seen in Figure 1, increasing access spacing from 200 feet to 600 feet resulted in the most significant capacity gains, with an increase in the off-ramp volume of approximately 400 vph. These capacity gains began to level off between 600 feet to 1320 feet, with an increase in the off-ramp volume of approximately 100 vph. At that point, the off-ramp reached its capacity under the assumed geometrics.

Given the study assumptions, the increase of access spacing from 200 feet to 600 feet would postpone interchange failure for approximately eight years. Acquiring one-quarter mile of limited access right-of-way could potentially extend the operational life of the interchange for approximately ten years.

The safety analysis involved evaluation of crashes in the vicinity of exit ramps at 11 interchanges. The study sites, selected in coordination with FDOT, were interchanges characterized by traffic back-ups onto the freeway mainline due to insufficient separation of signalized access on the crossroad. The objective of the safety analysis was to evaluate the relationship between crash frequency and length of access controlled frontage, and thereby to provide an approximate measure of potential crash reduction for the benefit and cost analysis.

Crash data for the study sites were obtained from FDOT for a one-mile freeway section before the off-ramp over a five-year period (1999 to 2003). Figure 2 illustrates the relationship between actual number of crashes in five years and signalized access spacing. It indicates the potential number of crashes that could be reduced when signalized access spacing is increased.

The final step was to conduct a cost/benefit analysis for purchasing different lengths...
of limited access right-of-way (LA ROW), with 200 feet. representing standard practice. The benefit-cost ratio was calculated for urban and rural conditions for two comparisons: 200' vs. 600' and 200' vs. 1320', using the following equation: B/C = (B1+B2+B3)/C1. B1 represented the $ savings of not purchasing LA ROW on developed land, assuming 400 feet as the minimum length of LA ROW that would later be needed to reconstruct the freeway off-ramp area. B2 represented anticipated decreases in delay and travel time, and B3 indicated the potential crash reductions. C1 represented the initial cost of acquiring the additional LA ROW on undeveloped land.

Future benefits were converted into present values using the federally recommended discount factor of 7 percent. The value of benefits was determined as follows:

- an average cost of time of $13.25 per person hour for two PM peak hours (TTI Urban Mobility Study),
- average cost of crashes based on crash type from the National Safety Council (Death: $1,120,000, Nonfatal Disability Injury: $45,500, PDO: $8,200), and
- average cost of LA ROW from FDOT District 7, ranging from $500 per front foot for rural unimproved conditions to $15,000 per front foot for urban improved conditions.

The results of the benefit-cost analysis are provided in Tables 1-2.

**Conclusions and Recommendations**

Although FDOT regulates access spacing in interchange areas, managing interchange area access through police power alone has certain limitations. Pressure tends to be high for interchange area access, development is rapid but incremental making coordinated planning difficult, and land ownership patterns and subdivision practices can limit the effectiveness of state policies. Access permits are not usually denied to individual properties when the result would be to deny all access, unless the property is acquired by the government agency or alternative access is provided—both at considerable cost to the agency.

Given these limitations, it is advisable for state transportation agencies to acquire additional limited access right-of-way (beyond the standard 100 or 300 feet) when an interchange is being planned and before the adjacent land is subdivided and developed. This would help redirect access to more appropriate locations for safety and traffic operations and promote internal street and circulation networks for interchange area development. Those who own businesses or homes in the interchange area would benefit from improved access design and a lower likelihood that their property would be damaged or needed for interchange expansion. Policy measures would help accomplish the desired outcomes.

This study indicates that the long-term safety, operational, and fiscal benefits of purchasing additional LA ROW at

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**Table 1. Benefit-Cost Ratio 200' vs. 600' of LA ROW**

<table>
<thead>
<tr>
<th></th>
<th>Urban Benefit</th>
<th>Urban Cost</th>
<th>Rural Benefit</th>
<th>Rural Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROW (B1)</td>
<td>$1,550,514</td>
<td>$650,000</td>
<td>$103,358</td>
<td>$200,000</td>
</tr>
<tr>
<td>Delay (B2)</td>
<td>$28,280,906</td>
<td>$1</td>
<td>$28,280,906</td>
<td>$1</td>
</tr>
<tr>
<td>Crashes (B3)</td>
<td>$1,809,178</td>
<td>$1</td>
<td>$1,809,178</td>
<td>$1</td>
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<tr>
<td>Total</td>
<td>$31,640,598</td>
<td>$650,000</td>
<td>$30,193,452</td>
<td>$200,000</td>
</tr>
<tr>
<td>B/C Ratio</td>
<td>49</td>
<td>151</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Table 2. Benefit-Cost Ratio of 200' vs. 1320' of LA ROW**

<table>
<thead>
<tr>
<th></th>
<th>Urban Benefit</th>
<th>Urban Cost</th>
<th>Rural Benefit</th>
<th>Rural Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROW (B1)</td>
<td>$1,550,514</td>
<td>$1,820,000</td>
<td>$103,358</td>
<td>$560,000</td>
</tr>
<tr>
<td>Delay (B2)</td>
<td>$31,256,063</td>
<td>$1</td>
<td>$31,256,063</td>
<td>$1</td>
</tr>
<tr>
<td>Crashes (B3)</td>
<td>$5,065,698</td>
<td>$1</td>
<td>$5,065,698</td>
<td>$1</td>
</tr>
<tr>
<td>Total</td>
<td>$37,872,276</td>
<td>$1,820,000</td>
<td>$36,425,129</td>
<td>$560,000</td>
</tr>
<tr>
<td>B/C Ratio</td>
<td>21</td>
<td>65</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*cont'd on p.19*
The RAPTS Program
Florida’s Resource for Advanced Public Transportation Systems

Throughout Florida, public transportation agencies are continuously seeking opportunities to increase ridership and improve operational efficiencies and quality of service. Increasingly, these agencies are looking to APTS technologies as effective tools to address a full range of operating, planning and customer service issues including providing advanced traveler information, reducing the cost per passenger trip, providing better customer demand information, enhancing the amount and quality of data available for planning analysis, and improving system safety and security.

The Resource for Advanced Public Transportation Systems (RAPTS) was established by the Florida Department of Transportation (FDOT) in the fall of 2002 to provide technical expertise, facilitate information exchange, and foster statewide coordination to ensure successful and cost effective deployment of APTS technologies throughout Florida.

Under contract to FDOT, CUTR conducts a variety of RAPTS activities:
- creation and maintenance of a statewide public transportation agency APTS technology inventory,
- production of resource services (brochure, website and outreach activities),
- development of technology case studies for specific APTS technologies, and
- implementation of a direct technical assistance program for Florida fixed route public transportation agencies.

Meeting transit challenges
Some of the challenges for public transportation operators include developing an APTS needs assessment, defining objectives and performance measures, evaluating and prioritizing APTS projects, conducting procurement activities, and implementing and monitoring APTS applications. Additionally, many agencies discover institutional barriers that impact a smooth implementation of APTS. Senior management endorsement, internal communications, procurement and implementation involvement of operating staff, and proper training are key elements for successful APTS implementation.

The RAPTS program was developed to help meet these challenges and provide public transportation operators with a free resource they could draw upon to expand their APTS knowledge. Based on the response to a request for technical assistance proposals issued by FDOT/CUTR, Florida transit properties’ common areas of interest for APTS development include automatic passenger counter (APCs) implementation, communication system enhancements, and database management.

FDOT has awarded technical assistance to nine agencies: Broward County Transit, HARTline (Hillsborough County), Jacksonville Transportation Authority, LYNX (Orange, Osceola, and Seminole counties), Palm Tran (Palm Beach County), Polk County Transit, Sarasota County Area Transit, RTS (Gainesville), and VOTRAN (Volusia County). Two types of assistance will be provided: planning assistance provided directly by CUTR, and IT/ITS Engineering assistance provided by FDOT’s ITS general consultant with CUTR responsible for project management activities.

“...This program was a revelation for our agency,” said Darrell Smith, JTA Planning Manager when the project began. “It assisted us in the development and utilization of AVL technology for our paratransit service and further enhancements to our fixed route APC program, which is already the most advanced in the state.” Smith added that the technical assistance the
agency received was extremely helpful and timely. CUTR will continue to assist JTA with the automation of its stop and station inventory database.

**RAPTS website**

An integral component of RAPTS is the program website, www.rapts.cutr.usf.edu, which contains valuable information about APTS technologies, applications, benefits, research, case studies, descriptions of technical assistance provided, and an APTS e-library of relevant ITS and APTS related documents.

Additionally, the website enables access to the public transportation agency APTS inventory database, which provides comprehensive and detailed information about APTS technologies in operation or in future plans for all Florida public transpor-

tation agencies. This information is essential for FDOT to assess the current state of the APTS industry and plan for future development of the RAPTS program. The inventory is also a useful tool for individual agencies to examine the APTS technologies that other Florida peer agencies are utilizing as well as learn about costs, installation issues, and satisfaction levels.

The RAPTS program continues to expand on the types of information and assistance provided, and is developing a statewide APTS framework, an APTS data mining and analysis, and the formation of a APTS training course curriculum.

For additional information, contact Rob Gregg at CUTR, (813) 974-8383, gregg@cutr.usf.edu, or FDOT project manager Ike Ubaka, (850) 414-4532, ike.ubaka@dot.state.fl.us.

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**Spring 2005 transportation classes**

CUTR and the USF College of Engineering are offering the following transportation classes in the Spring 2005 semester:

- Transportation and Society, Mondays and Wednesdays, 4:00-5:15pm, Dr. Ward
- Transportation Engineering II, Mondays and Fridays, 2:00-3:15pm, Dr. Pendyala
- Transportation Safety, Tuesdays, 6:00-8:50pm, Dr. Lu
- Public Transportation, Wednesdays, 5:00-7:50pm, Dr. Polzin
- Travel Demand Modeling, Mondays and Fridays, 4:30-5:45pm, Dr. Pestyala
- Graduate Transportation Seminar, Mondays, 11:00-11:50am, Dr. Chang

For further information, contact USF Civil & Environmental Engineering at (813) 974-2275.
Message from the Director

Since its inception in 1999, NCTR has completed 50 research projects that cover a wide range of public transportation topics of interest to transit agencies, commuter assistance programs, MPOs, and departments of transportation. The fundamental mission of sharing the information gained through our research is given very high priority. All of the reports produced are available on our website (www.nctr.usf.edu), which is continually updated and improved. In the course of an average year, more than 30 presentations are made at state and national conferences by NCTR researchers, who also share their research results as they participate as leaders of various committees in professional associations. Active listservs now connect almost 2,000 professionals from around the country and the world.

Housed in the Center for Urban Transportation Research in the College of Engineering at the University of South Florida, NCTR has the opportunity to provide practical research experience for students who wish to supplement their coursework with real world challenges. Students from the College of Engineering and many other disciplines at the university have been inspired to join the ranks of transportation professionals at least in part through their experience gained in working on NCTR projects.

Descriptions of the various projects completed this past year are provided in this report. We hope you enjoy what you discover through this report, and look forward to adding to transportation’s body of knowledge, sharing all that we learn, and developing new professionals to advance the state of the art.

Joel Volinski, NCTR Director

Program Overview

In September 1999, the National Center for Transit Research (NCTR) was approved for funding by the U.S. Department of Transportation’s Research and Special Programs Administration. The NCTR program builds on the goals and philosophies of the National Urban Transit Institute, which was established at the Center for Urban Transportation Research (CUTR) at the University of South Florida in Tampa by the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. NCTR is focusing on helping to promote USDOT’s strategic goals of safety, mobility, economic growth, and community sustainability. Virtually all of the projects undertaken at NCTR are dedicated to improving the ability of operating to provide their services in a manner that is efficient, productive, and attractive to the traveling public, and in a manner that adds value to the communities they serve.

Funding

NCTR has now completed its fifth year. The federal funding for this is matched by the Florida Department of Transportation (FDOT), whose relationship with CUTR and NCTR remains strong, with FDOT remaining committed to providing this match for the duration of the program.
Advisory Committee

The NCTR Advisory Committee consists of 15 experts in the public transportation community with knowledge in the areas of public transportation research and transit planning and operations. The members and their affiliations are as follows:

Gary L. Brosch  
Chair, NCTR
Dr. Lewis Clopton  
Director of Research Management  
Federal Transit Administration
Ed Coven  
State Transit Office Manager  
Florida Department of Transportation
Dr. Wendell Joice  
Director  
International Telework Assoc. & Council
Dr. Minnie Fells-Johnson  
General Manager  
Miami Valley Regional Transit Authority
Ysela Llort  
State Transportation Planner  
Florida Department of Transportation
Richard Long  
Director, Office of Research  
Florida Department of Transportation
Cal Marsella  
General Manager  
Denver Regional Transit District
Perry Maull  
Past President  
Florida Public Transportation Assoc.  
Director, Palm Tran
Bill McCloed  
Senior Vice President & C.O.O.  
ATC
Jose-Luis Mesa  
Director  
Miami-Dade MPO
Louis Sanders  
Director of Research and Technology  
APTA
Eric Schreffler  
Director of Research  
TDM Institute, Association for  
Commuter Transportation
Donna Vlasak  
Senior Program Officer  
Transportation Research Board
Joel Volinski  
Director, NCTR

Research in the Fifth Year

A total of 24 projects was approved by the NCTR Advisory Committee for the fifth year of the program. These projects consist of 6 core programs that will be conducted throughout the life of NCTR and 18 newly-selected research projects that explore methods to accomplish the goals of the Center in enhancing the performance of public transportation.

Core program areas include continued development and maintenance of:

- the National Transportation Demand Management (TDM) and Telework Clearinghouse
- the National Bus Rapid Transit Institute (NBRTI)
- STEP (Student Transportation Education Program), an annual program for developing high school student interest in transportation careers
- ongoing production of teleconferences and webcasting
- graduate student professional development
- the Journal of Public Transportation
Year 5 Newly-Designated NCTR Projects

- Best Practices in Transit Communications Between Transit Management and Rank and File Employees (Volinski)
- Florida Journey to Work Fact Book and Web-Site (Catalá)
- Public Transportation Synthesis Series (Part 3) (Volinski)
- Public Transit in America: Evidence from the 2001 National Household Travel Survey, Phase II, Analysis of Density and Geocoded Data (Polzin)
- Web-Based Bus Accident Reporting, Tracking and Analysis System (Sapper)
- A Guidebook for Start-up Transit Agencies (Goodwill)
- A Return on Investment Analysis of Bikes-on-Bus Program (Hagelin)
- Innovative Approaches to Using Passenger Miles Data for Transit (Chu)
- Standardized On-Board Surveys and Archived On-Board Survey Data (Chu)
- Strategies for an Inter-Urban Circulatory System (Perk)
- Special Event Transportation Service Planning & Operations Strategies for Transit (Volinski)
- Impacts of Transit Oriented Development on Public Transportation Ridership—Phase One (Hendricks)
- Incorporating TDM into the Land Development Process (Hendricks)
- Case Studies in Environmental Justice and Public Transit Title VI Reporting (Ward)
- Update Methodology for ADA Demand Estimates: Lessons Learned (Thole)
- Teenage Attitudes and Perceptions Regarding Transit Use (Perone)
- Enhancing the Rider Experience: The Impact of Real-Time Information on Transit Ridership (Winters)
- Traveling Smart—Increasing Transit Ridership by Automatic Collection (TRAC) of Individual Travel Behavior Data and Personalized Feedback (Winters)

Ongoing NCTR Projects

- Safe Operation of Low Speed Vehicles and Golf Carts (Hardin)
- Public Transportation Synthesis Series (Part 2) (Volinski)
- State Bus Transit Safety Guide (Carapella)
- Benchmark Rankings for Transit Systems in the United States (Perk)
- Impacts of Transfer Fares on Transit Ridership and Revenue (Perk)
- Assessing the Hierarchy of Needs in Levels of Service (Perone)
- Public Transit in America: Evidence from the 2001 National Household Travel Survey (Polzin)
- Analysis of Florida Transit Bus Accidents (Carapella)
- Design Elements of Effective Transit Information Materials (Foreman)
- Developing Bus Transfer Facilities for Maximum Transit Agency and Community Benefit (Volinski)

Education

During the fifth year of NCTR, graduate and undergraduate students were involved in ongoing public transportation research projects and were supported by funding from NCTR. The major areas of study of these students are multidisciplinary in nature, including engineering, economics,
anthropology, business, geography, and public administration. In the 2003-2004 academic year, graduate program productivity jumped dramatically, with 17 transportation graduates at the master’s and PhD levels. Graduate student support packages have been reevaluated to remain competitive, and recruiting has been stepped up. Job placement has remained very strong in spite of a slow economy and uncertainty on reauthorization of federal transportation legislation. The program is proud of its placement record, with numerous students finding increasingly prestigious employment opportunities, several graduates now holding academic teaching positions, and other master’s graduates pursuing PhDs at prestigious universities.

**Enhanced Degree Offerings**

NCTR has supported initiatives to explore additional transportation degree offerings at USF. This has included a specific program to pursue an additional master’s degree program as well as initiatives to enhance course offerings and explore additional teaching strategies. As reported in prior years, a comprehensive assessment of offering an interdisciplinary degree was carried out, and NCTR and USF continue to explore that prospect.

**Transportation Certificate Program**

More recently, attention has turned to offering a graduate transportation certificate as an additional transportation credential. The certificate offering, currently under review by USF administration, is targeted to encouraging working professionals to continue their formal transportation education by pursuing a five-course certificate. This will allow another option to enhance the knowledge and credentials of individuals who do not desire or are not able to enroll in a graduate program. A unique feature of the certificate program is the offering of a full menu of classes that meet the certificate eligibility via USF’s internet-based distance learning program, allowing participants to take the courses without attending classes on campus.

**Graduate Interdisciplinary Transportation Certificate**

A graduate certificate is offered and administered by CUTR/NCTR in cooperation with the USF departments of Civil & Environmental Engineering, Economics, and Public Administration. Eleven students currently are enrolled. Eighteen semester hours are required, and each student is required to take a set of three common courses, one from each program. The remaining hours may be met by selecting one course of interest from each program for a total of six courses. This provides a firm grounding in transportation, meets the degree requirements within the respective departments, and provides students with additional choices to meet their needs and interests.

**Developing Interest in the Field of Public Transportation—STEP 2004**

For the third year, the Summer Transportation Education Program (STEP) was held at CUTR. STEP is a three-day program designed to provide students with the opportunity to learn more about careers in the field of public transportation through discussions with practicing professionals, hands-on activities, and field trips. The 2004 STEP class consisted of primarily freshmen and sophomores students in high school from Hillsborough County who were introduced to public transportation career opportunities related to engineering, safety, operations, and planning, as well as many others.

**Research Experience for Undergraduates Program (REU)**

As an outgrowth of a successful NSF program, USF has implemented a Research Experience for Undergraduates program. This program is intended to expose undergraduates to research
experiences earlier in their education to motivate them to remain interested in the respective topic. CUTR continues to participate in this program.

**NCTR Student Spotlight: Oliver Page**

Oliver Page is an NCTR Graduate Research Assistant currently studying towards a PhD in Civil Engineering with a focus on transportation. He has always had an interest in transportation, earning a bachelor’s degree in Maritime Studies from the University of Wales in 1985, a master’s degree in Transportation Planning and Engineering from the University of Southampton in 1989, and a Certificate in Logistics Management from Rand Afrikaans University in 1999. Prior to joining CUTR, he was a Researcher at the CSIR/Transportek in South Africa, where he published a book, *Crime and Crime Prevention on Public Transport* (Unisa Press).

Oliver’s professional experience of 15 years and academic qualifications have enabled him to bring unique perspectives on a variety of cutting-edge NCTR funded projects, such as studying the community impacts of bus transfer centers. In 2004, he presented “Equity Impacts and Challenges of Highway Access Management in an Emerging Economy: South Africa at the Crossroads” at the 6th Access Management Conference in Kansas City and presented findings to date on the bus transfer center project at the Florida Public Transportation Association’s Professional Development Workshop.

Serving as President of the USF Student Chapter of the Institute of Transportation Engineers, Page recently was awarded the 2004 Georgia Brosch Memorial Transportation Scholarship in recognition of his outstanding contributions to CUTR and USF.

**Technology Transfer**

Excellent research is of limited value if the results are not made available to as many parties as possible that might benefit from the findings. Extensive technology transfer is a key determinant of NCTR’s value; as such, NCTR researchers produced several publications, made numerous presentations at professional meetings, and conducted a wide variety of training classes in FY 2004. Training courses conducted include the following:

- **Commuter Choice Workshops:**
  - Elements of Successful TMAs (*Sobush/Hendricks*)
  - Techniques (*Wambalaba*)
  - Board Effectiveness and Management Issues (*Wambalaba*)
  - Grant Writing
  - Commuter Choice Summit
  - Introduction to Commuter Choice Program (*Wambalaba*)
  - Rideshare Options (*Winters*)
  - Transit Service Options (*Wambalaba*)
  - Parking Management (*Winters*)
  - Bike & Pedestrian Programs (*Hendricks*)
  - Telework/Compressed Work Week (*Hendricks*)
- ITS & Traffic Management (Hagen)
- Access Management (Williams)
- Commuter Choice Tax Benefits (Winters)
- Commuter Choice Support/Smart Commute (Wambalaba)

**CUTRI/FPTA Professional Development Workshop:**
- TSI Bus Collision Prevention/Investigation
- Best Practices in Employee Relations (Daly)
- Old Dogs, New Tricks: How Do They Learn? (Curtin)
- Integrating Bikes & Transit (Hagelin)
- Resource for APTS (Ubaka/Gregg)
- Maintenance Plan Development (Bart)
- Transit Marketing: Art or Science (Languille)
- MPO Planning Process (Robinson/Goodwill)
- Creative Thinking (Winters)
- Substance Abuse Management Day Camp (Byrnes)
- Transit Centers & Stops (Datz/Weidner/Volinski)
- Grant Writing Techniques (Winters/Williams)
- Park and Ride Management (Wambalaba)
- Improving Public Relations (Audino)
- Capital Improvement Program (Gregg)
- Potential of BRT (Baltes/Hinebaugh/Thole)
- Connecting Communities: Safety & Security (Adduci)
- Managing Paratransit (Gregg)
- Defensive Driving, A Way of Life (Roush)
- Transit Development Plan Primer (Polzin/Perk)
- Public Speaking: Clearing Your Hurdles (Dwyer)
- The Learned Skill of MS PowerPoint (Reep)

**Florida Statewide Transit Training Program:**
- Paratransit Drivers Qualifications Course - VOTRAN
- Paratransit Drivers Qualifications Course - SCAT
- NTD Training Seminar
- Public Transportation 101: Transit Fundamentals
- National Transit Data Collection and Reporting Seminar
- Improving Public Relations in Transit Management (Audino)
- Model Plan Amendments/Regulations for Multimodal Transportation Districts (Williams)
Journal of Public Transportation

The Journal of Public Transportation is a respected international journal containing refereed papers on current, original research and case studies associated with public transportation and related policy issues. Topics are approached from disciplines including economics, engineering, planning, BRT, GIS, finance, and safety, and include methodological, technological, and financial perspectives, with emphasis on the identification of innovative solutions to public transportation problems. The Journal has nearly 2,100 subscribers from around the world and boasts a distinguished editorial board. As NCTR strives to maintain excellence in reaching both academics and practitioners, it also attempts to keep abreast of technology in the journal’s distribution. Every issue of the Journal is now available electronically at www.nctr.usf.edu/jpt/journalfulltext.htm and can be downloaded in its entirety or by article.

Net Conferences: Learn More. Travel Less.

In 2003-2004, NCTR sponsored the following three netconferences in partnership with the Association for Commuter Transportation that attracted more than 200 “conference attendees” who participated live from coast-to-coast but never had to leave their home city.

Talk the Talk: Communicating TDM in Business Terms

This one-hour session featured Tad Widby, Vice President of Parsons Brinckerhoff and an ACT TDM Institute Director, and Jim Baetge, former executive officer of the California Water Quality Control Board and the Tahoe Regional Planning Agency. Mr. Widby compared productivity solutions from both the business and transportation fields, contrasting them with capacity solutions. Mr. Baetge discussed asset management, conservation, and other demand side solutions with a water resources and environmental perspective, applying those insights to the transportation field.

Transit-Oriented Development: Possibilities for TDM Professionals

Elizabeth Deakin, Director of the University of California Transportation Center and Associate Professor of City and Regional Planning at UC Berkley, briefed TDM professionals on the when, where, and why of this sustainable development technique.

Using TDM to Manage Traffic at Special Events

This one-hour session featured Peter J. Valk, President of Transportation Management Services, and Catherine Showalter of RIDES for Bay Area Commuters. Mr. Valk discussed how TDM can be used to manage travel demand related to events that draw large numbers of spectators such as entertainment, sporting, college campus activities, etc. Ms. Showalter talked about the transportation information services that RIDES gives to Giants’ fans that are going to baseball games at Pac Bell Park in San Francisco.

On-Demand Streaming Presentations

NCTR continues to develop on-demand streaming presentations to facilitate the transfer of knowledge from research and guest speakers. In usually less than 15 minutes, the public transportation professional can be informed of the key results of a NCTR research project with the expectation that more viewers will download the full report. This technology also is used to record guest speakers giving presentations to students and faculty so others outside of the center can benefit from their knowledge and experience. To respond to a wide range of
browsers and media players, NCTR has acquired a Helix server to allow the center to stream in all the most popular formats.

Website
In addition to the netconferences and on-demand streaming presentations, NCTR provides links to more than 50 completed research projects in HTML and pdf formats.

Discussion Forums and Listservs
NCTR continues to see increases in the number of subscribers across the board from its public transportation-related listservs. These peer-to-peer discussion forums have attracted more than 1,900 current subscribers, providing quick access to information and assistance from across the country. For example, the Bus Rapid Transit discussion group doubled its membership in the past year to 230 active members. The largest listserv, Transportation Demand Management, has 730 active subscribers. The NCTR opt-in e-newsletter has doubled to more than 400 subscribers, including representatives from major media outlets and professional trade groups with their own e-newsletters.

Year 5 Research Program
NCTR recently completed the process to solicit and select research ideas for the FY 2005 program year. The process for submitting research ideas was made available on the NCTR website along with a user-friendly, web-based form. Letters requesting research ideas and proposals were sent to all Florida transit agency directors, MPO directors, and FDOT public transit managers. Idea requests also were sent to all public transportation-related committees of TRB, APTA committee chairs, and national listservs. From the submission of over 120 different research ideas, the NCTR Advisory Committee provided assistance in selecting 6 core program and 11 research projects for funding in FY 2005.

Conclusion
In its fifth year, the National Center for Transit Research continues to produce a large volume of high-quality research of practical value to public transportation agencies throughout the country. The results of the research are being effectively distributed through a variety of means, including new electronic techniques that allow fast and flexible access to the information NCTR is producing. The program is helping to cultivate the next generation of transportation professionals by providing opportunities for students who assist in the research being conducted. The vast majority of them are joining public and private sector transportation agencies upon graduation. NCTR is excited about the possibilities of establishing an interdisciplinary transportation degree program that will attract even more students to the profession.

NCTR continues to enjoy a strong relationship with the Florida Department of Transportation and is leveraging UTC program funds through partnerships and contracts with non-profit foundations and the Federal Transit Administration. The research faculty and students of NCTR look forward to contributing to the rising success of public transportation agencies throughout the nation.

For more information on the NCTR program, contact Joel Volinski, volinski@cutr.usf.edu, (813) 974-9847.
CUTR researchers receive FAPA award

CUTR Planning and Corridor Management Program Director Kristine M. Williams, AICP, and Senior Research Associate Karen Seggerman, AICP, were presented with the Florida American Planning Association’s (FAPA) Award of Excellence on October 16, 2004, during the organization’s annual conference in Gainesville. One of two presented for 2004, the award recognizes outstanding planning projects in Florida and was presented for the innovativeness and quality of their project, “Model Regulations and Plan Amendments for Multimodal Transportation Districts.”

The project, completed in April 2004, involved development of model land development regulations and comprehensive plan amendments that local governments can use and adapt to promote multimodal transportation systems and development patterns, as established by the Florida legislature in 1999. The resulting multimodal transportation districts will help encourage the use of alternative modes of transportation and a more livable built environment, and ultimately will result in a reduction of vehicle miles traveled. The models also provide strategies that could be implemented outside of designated multimodal districts as a broader strategy to create a more sustainable development pattern.

CUTR welcomes new faculty

CUTR is pleased to welcome Dr. Pei-Sung Lin, PE, as a Senior Research Associate in the ITS, Traffic Operations & Safety Program. Before joining CUTR, Dr. Lin was an engineer with Sarasota County (Florida) Public Works. He has a PhD in Civil Engineering from the University of Florida, an MS Civil Engineering from the University of Texas at Austin, and a BS in Civil Engineering from National Chung-Hsing University in Taiwan. Dr. Lin’s specialties include ITS, traffic operations and engineering, traffic impact studies, and traffic safety.

Flynn receives Eisenhower Graduate Fellowship

CUTR Graduate Research Assistant Jennifer Flynn has been named one of 39 recipients of the 2004 Dwight David Eisenhower Graduate Fellowship. The fellowship is administered by the University and Grants Program of the National Highway Institute, the training arm of the Federal Highway Administration.

To be eligible for the fellowship, applicants must be enrolled in a full-time program in a field of study that is directly related to transportation. A selection panel of prominent national transportation professionals made their selection based on class standing, GPA, official transcripts, transportation work experience, and letters of recommendation. Flynn, who is pursuing a master’s degree in Geography from USF, has been a student research assistant in CUTR’s GIS Program since 2002.
Improving service quality in less-than-truckload freight transportation networks

During the last few decades, market changes and intense global competition have brought about major changes in the management philosophies of manufacturing and production industries. These philosophies, including just in time and lean manufacturing, require very low inventory levels. The integration of manufacturing and distribution channels increasingly drives the freight transportation industry to provide full stream logistic support to their customers while quality increasingly focuses on improving supply chain response time, reliability (fast and on-time delivery and pick-up) and flexibility.

In response to the changing trends in production and retail industries towards low inventory levels and a high variety of products, the less-than truckload (LTL) sector has gained a significant market share and constitutes 13 percent of the revenue generated by truck transportation and warehousing industries in 2002.

In LTL freight transportation, for every origin-destination pair of traffic demand, the corresponding freight is shipped either directly or indirectly through intermediate nodes where the traffic is consolidated and re-routed. Most models for freight routing are defined over a network whose nodes represent origins, destinations and intermediate transfer points. The arcs of the network represent channels of transport such as highways. One then distinguishes between local problems involving only a node (terminal) or an arc of the network, and global problems involving multiple entities.

The travel time of freight from its origin to its destination consists of the time spent between the nodes and time spent at the nodes. Although both of these times are random variables, the variance and the duration of time spent at the nodes is considerably higher than the time spent transferring freight between nodes. Since the distances between the nodes are fixed, a substantial decrease in these times is less likely than a decrease in the time spent in the terminals.

In an LTL terminal, freight flows from inbound docks to outbound docks through the terminal in a crossdocking environment without accumulating significant inventory. Material is unloaded from trucks and immediately reloaded onto another vehicle by means of individual transportation units such as forklifts. The number of docks in an LTL terminal typically ranges from 10 to 200 or more. The two types of docks in LTL terminals are strip docks for receiving (unloading), and stack docks for shipping (loading) to destinations as depicted below. The assignment of incoming and outgoing trailers to a dock, the dock assignment problem, is one of the critical decision factors that affect the performance of LTL terminals.

The traditional approaches to the dock assignment problem have focused on developing mathematical optimi-
zation models where the assignment of origins and destinations to docks is made with the objective of minimizing the distance traveled by the packages within the warehouse. While this approach minimizes the cost of operating these terminals by reducing the workforce required to transfer the goods from strip to load doors, it does not consider customer oriented requirements such as on-time delivery of shipments, and fails to consider operational uncertainties associated with truck arrival times and servicing of freight within the terminal.

The overall goal of this research is to develop models that focus on customer oriented metrics and provide solutions that improve these metrics, taking into consideration operational level uncertainties such as delays in truck arrival times and variability in processing times of shipments within terminals.

As a part of this research, a dock assignment model was developed that captures the above-mentioned operational level uncertainties and maximizes the number of shipments that make it to their scheduled departing truck, which facilitates on-time delivery of shipments. The solution approach to increasing robustness stems from the idea that an assignment of trailers, which provides an even distribution of the idle times at strip docks, will tend to absorb the stochastic variability in the arrival and service times. Optimal solutions using mathematical models to the dock assignment problem is NP-complete and requires development of heuristics to solve even the most modest sized problems.

The Dynamic Dock Assignment Heuristic (DDAH) developed as a result of this research performs very well when compared with optimal solutions for small problems. In the test cases that considered various terminal sizes and utilization levels, the heuristic solutions, on the average, are within 4-5 percent of the optimal solutions for small problems. The DDAH is also compared to the existing static dock assignment models (SDAMs) using discrete event simula-

tion. The simulation models were developed using Arena 7.0 by Rockwell Software based on data obtained from a local LTL carrier. The simulation framework is shown below.

The test cases in the simulations consider three sources of uncertainty at varying levels as follows:

- **Variability in Truck Arrival Times:** Represented by standard deviation of the lateness distribution.
- **Variability in Load Distribution:** The distribution of the destination of freight inside a trailer.
- **Variability in Transfer Time:** Time that transportation units inside the terminal need to travel.

The results of the simulations indicate several important advantages of the DDAH over SDAM. In all test cases the number of shipments that made their outbound trucks is significantly higher with DDAH than SDAM. Furthermore, as the amount of variability increased for the three sources, solutions of the DDAH are less affected than the SDAM solutions which indicate that DDAH is more robust than SDAM.
So far, research has focused on activities within a single terminal based on the freight flow to and from that terminal. The next step is to evaluate the effectiveness of the approach when multiple terminals, and finally a complete freight transportation network, are considered. This extension must include not only operational level decisions such as the dock assignment problem, but also tactical level decisions such as generation of truck arrival and departure schedules to improve customer oriented performance measures.

For further information, contact CUTR Faculty Associate Dr. Ali Yalcin of the USF Department of Industrial and Management Systems Engineering at (813) 974-5590, ayalcin@eng.usf.edu.

Mierzejewski elected to ITE International Board of Directors

CUTR Director Dr. Ed Mierzejewski has been elected to serve a three-year term as the District 10 representative to the International Board of Directors of the Institute of Transportation Engineers. District 10 includes Florida and Puerto Rico and has over 1,200 members of the total of 17,000 members of International ITE. As District 10 Representative, his term of service will run from 2005-2007; he participated in Board meetings as a Director-Elect at the 2004 annual meeting of ITE in August.

A registered Professional Engineer with more than 30 years’ professional experience and a member of the Institute since 1971, Dr. Mierzejewski is an ITE Fellow and served as President of District 10 in 2001. The Florida Section of ITE recognized him in 2003 with the Sherwood H. Hiller Distinguished Service Award and in 1995 with the Edward A. Mueller District 10 Transportation Engineer of the Year Award.

Mierzejewski has been with CUTR since 1988 and has served as Director since 2001.

CUTR Advisory Board 2005 meeting schedule

The CUTR Advisory Board will meet on the following dates. All meetings will be held in the Board Room at CUTR on the USF-Tampa campus from 1:30-4:00pm.

- Thursday, January 27, 2005
- Thursday, April 28, 2005
- Thursday, July 28, 2005
- Thursday, October 27, 2005 (tentative)

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interchange areas greatly exceed the up front costs. The increase of access spacing could extend the operational life of the interchange as much as 8 to 10 years, fewer backups would enhance driver safety, and right-of-way could be acquired in advance of development when it is much less costly. The findings are preliminary, given the limited data set and limitations of CORSIM. Nonetheless, the research suggests that state transportation agencies and the traveling public may benefit greatly by an increase in the amount of limited access right-of-way at interchange areas to a minimum 600 feet and a desirable ¼ mile.

For further information or a copy of the final report, contact Kristine Williams, AICP, at 813-974-9807, kwilliams@cutr.usf.edu.
2004 CUTR Transportation Achievement Award honors C. David Brown II

Former Florida Transportation Commission chair C. David Brown II was honored with the 2004 CUTR Transportation Achievement Award at CUTR’s annual award dinner, held on October 13 at the Museum of Science and Industry in Tampa and attended by more than 280 people.

Brown is chairman of Broad and Cassel, a law firm with eight offices throughout Florida, which he joined in 1980. He was appointed by Governor Bush to serve on the Florida Transportation Commission from 1999 to 2004, where he served as Chairman from 2001-2003.

Brown’s professional focus has been directed at organizing major corporate, real estate and governmental transactions. He was recognized by the Orlando Business Journal as one of Central Florida’s Most Influential Businessmen in 2002 and was appointed to the Florida Council of 100 in 2003. He was selected a “legal elite” real estate transactions and eminent domain practitioner by Florida Trend’s 2004 survey of lawyers.

A UF graduate, Brown serves on the Board of Trustees for the University of Florida and is a member of The Florida Bar, the American Bar Association, and the Florida Federal Judicial Nominating Commission.