



Message from the Director - Earl "Rusty" Lee, Ph.D.

Hard to believe that Memorial Day has come and gone and summer is almost here. It's been a busy past few months for the T² Center. Our summer interns will be starting their new positions soon. We just wrapped up the MUTCD training series and several other new offerings are on the calendar. Matt has been busy with town visits and assists.

There are three classes scheduled for this summer. The NHI Bridge Inspector course will be held June 16th to June 27th. Matt is doing an Asphalt Best Construction Practices course on the 11th and there

will be an ADA Design for Pedestrians course July 9 and 10.

Ted Green from the New Jersey T² Center and Matt Carter from the Delaware T² Center will co-teach the ADA course and it has been very well received. The course includes classroom style instruction on the existing guidelines but will include hands on activities for participants, including navigating ramps in wheelchairs and simulated low-vision navigation. This is an extremely worthwhile experience.

The Center is also working with DelDOT on a new course that will cover ADA self-

assessments and transition plans.

If there ever is a need for a quick refresher training on any topic, you can always take advantage of the courses offered in the Transportation Curriculum Coordination Council (TCCC) in partnership with NHI. There are dozens of courses available for free and taught online in topics ranging from grading, concrete and asphalt pavements, math refreshers, ethics, etc. A complete list can be found at the National Highway Institute website (<https://www.nhi.fhwa.dot.gov/>) and search for keyword TCCC.

Inside this issue:

Roundabouts in Delaware 1

UD Travels to ITE Traffic Bowl 2

Ready for June 14? 2

Using Contractors Versus In-House Staff 3

Refresh Cordless Battery Packs 4

Students/ Professionals Together in NHI Bridge Class 6

Recent Student Field Trips 7

Upcoming Events 9

Center Request Form 9

Roundabouts in Delaware

Can we agree that it's probably about time we stopped comparing the modern roundabout to the hideous memory of the traffic circle, those monstrosities forever linked in our minds with New Jersey, Great Britain, and Paris?

Well, it seems, no. For those being told that a roundabout is coming their way, it is seemingly the go-to visceral reaction and our general instinct is to "put our foot down" and resist them at every turn.

Why is that? States like Delaware have come to realize that before they get a chance to show what they have in mind, the public has already envisioned one of those

Hollywood scenes involving Chevy Chase or the Pink Panther. Recognizing that great planning and engineering sometimes aren't enough, DelDOT put on another one of its hats - educator.

Borrowing ideas from other states and the Federal Highway Administration, DelDOT dedicated a portion of its website to roundabout education (http://www.delDOT.gov/information/community_programs_and_services/roundabouts/index.shtml) and shot its own outreach video.

On the website, DelDOT fields frequently asked questions, describes how to use



a roundabout from the vantage point of a driver, a cyclist, and a pedestrian, and shows a map of

(Continued on page 5)

UD Places Second in ITE Traffic Bowl



On April 9, 2014, the student chapter of the Institute of Traffic Engineers travelled to Harrisburg, PA for the 5th annual Traffic Bowl. This year's competition included the UD team and teams from Pitt, Penn State and Morgan State. The Jeopardy-style tournament on transportation facts included a new twist this year by making it a double elimination tournament. UD drew Morgan State in the first round. The UD team was a little slow off the buzzer and went down to de-

feat. Pitt was up next for the UD team and Pitt went down to defeat. UD then faced Morgan State twice until one team was defeated for the second time. UD won both contests and moved to the finals against Penn State, the only team that had gone undefeated to this point. The contest was extremely close, going down to the next to last question. A UD wrong answer and a Penn State correct answer gave the margin of victory to Penn State, with UD finishing second again.

With many UD alumni in the room, there was no lack of support for the team and overall the team was excellent ambassadors for the university and the program. The UD team was made up of Mosi London, Anna Duryea, and Elise Lontos. The team alternate (in case of sprained wrist or loss of voice) was Dana Anderson and the UD team was coached by UD alum and former team member, Mindy Laybourne of RK&K.

"Compliance with the Standard... is achieved by having a method in place and using the method to maintain the minimum levels established in Table 2A-3. Provided that an assessment or management method is being used, an agency or official having jurisdiction would be in compliance with the Standard... even if there are some individual signs that do not meet the minimum retroreflectivity levels at a particular point in time."

—MUTCD Part 2.08

¶103



Ready for June 14th?

Easily forgotten, to be sure, but June 14th (of this year) is when all roadway owners must have in place an assessment or management method to ensure compliance with the sign retroreflectivity standards in Table 2A-3 of the Manual on Uniform Traffic Control Devices. Not sure whether you're there yet? This would be a good time to go back and refresh yourself on the requirements.

The Federal Highway Administration (FHWA) has updated their 4-page "Maintaining Traffic Sign Retroreflectivity" briefing and you can access it quickly online by scanning the QR Code below or searching using the title above (make sure you get the 2013 version). In that briefing, you'll see descriptions of three nighttime inspection methods, the measured retroreflectivity method, the expected sign life method, the blanket replacement method, and the control signs method—all of the basic choices you have for your program. It also excerpts some of the MUTCD

language from part 2A.08, including the section that excerpts certain sign classes from the quantitative retroreflectivity standards.

Of course, as Delaware agencies, we will want to consult our own Delaware MUTCD for unique requirements that apply here (www.mutcd.deldot.gov). However, in this case, the language in Delaware's MUTCD for Sections 2A.07 and 2A.08 are the same as the Federal version.

Remember that the definition for compliance is provided in a Support statement in the MUTCD (see sidebar). While this is no "Get Out of Jail Free" card, it does establish a reasonable expectation for agencies. In effect, it recognizes that even with an effective and continuously implemented maintenance program, some signs will slip through our process.

How many are too many? The MUTCD doesn't tell us and that is probably intentional. If we were told it was 3% or

5% or 10% of our signs, some of us would be less aggressive in our approach. If we strive for 100% compliance, this language suggests that the Courts will appreciate our efforts, even if we're found with "some" signs that fall short.

There's a lot more to know about retroreflectivity and the FHWA website has a great deal of information. One such source is the Sign Retroreflectivity Guidebook (see below) - if you don't already have a copy, contact the Delaware T²/LTAP Center and we'll send one out. And if you find you're not quite as far along the road of compli-



ance as you should be with the impending deadline, feel free to give us a call and we'll be happy to help.



Using Contractors Versus In-House Staff

By Joe Sisler, P.E., Chief of Engineering and Facility Maintenance, County of York, Virginia, Member, APWA Facilities and Grounds Committee.

[This article was originally printed in the APWA Reporter, April 2014 issue; reprinted with permission.]

Facility managers, and others responsible for managing public works employees, must make decisions regarding whether to perform major repairs and projects using staff or to hire the work out to consultants and contractors. Many times these decisions are made based upon the budget alone. If funds are available the work is contracted out and if funding is not available, the work is done by staff. There are other considerations that should be taken into account when making these decisions and failing to evaluate all of the factors may lead to wasted resources and poor outcomes. Certainly, using in-house staff results in a lesser hit to the project budget than hiring a contractor, but at what cost to overall operations?

Preventive maintenance tasks are likely to be postponed or cancelled when the agency's facility staff members are otherwise occupied with projects and routine repairs. Almost everyone agrees on the benefits of an effective preventive maintenance program which include: longer equipment life; fewer unexpected failures; and increased operating efficiencies and performance. It has been reported that proper preventive maintenance results in a 12 to 18 percent savings of energy costs. As the importance of sustainability increases, such energy savings should not be taken lightly. The problem is that it is nearly impossible to make direct correlations between preventive maintenance and these benefits. Therefore putting off the future benefits of preventive maintenance to free staff up to work on projects is often very appealing. Facility managers should carefully weigh all of the costs when choosing to forgo preventive maintenance.

When deciding between staff and contractors, it must be determined if staff have the necessary equipment, tools, skills and knowledge to take on



the project. Contractors may have specialized equipment or may be using the latest materials and techniques that can result in a better end product. Most agencies do not have large construction equipment or the operators necessary to use it. Many tasks can be more efficiently performed by craftsmen that do this work on a daily basis. Such factors may point in favor of contracting even though doing so costs more.

Another such factor is that of proper planning. Proper planning is the key to any successful project. Each hour of upfront planning can easily save four or more hours of project time. Unless the organization has, and is willing to commit, the resources to perform the necessary planning, permitting and procurement work, the project will likely end up costing more than expected and may have been better left in the hands of a competent consultant.

Other considerations are harder to measure. No one has more interest in seeing the job done well than the people that are going to have to repair and maintain it in the future. It is

"When deciding between staff and contractors, it must be determined if staff have the necessary equipment, tools, skills and knowledge to take on the project. Contractors may have specialized equipment or may be using the latest materials and techniques that can result in a better end product."



(Continued on page 4)

Using Contractors Versus In-House Staff (cont'd)

"Profit is not just important to the contractor, it is a necessity. So if the contractor is faced with doing the job well and losing money or doing it just okay and staying in the black, it is understandable that the agency may not get the best possible outcome."

(Continued from page 3) often lamented that contractors cut corners and do shoddy work, which is generally not a fair assessment. It is in the contractor's best interest to perform quality work in order to have satisfied customers and a good relationship for future projects. Any contractor that operates otherwise is not going to be in business for long. However, there are two important differences between the contractor's interests and the owner's that result in the generally better outcomes when the work is done by staff.

Profit is not just important to the contractor, it is a necessity. So if the contractor is faced with doing the job well and losing money or doing it just okay and staying in the black, it is understandable that the agency may not get the best possible outcome. The second difference is that of time frame. Most contracts are

written to require the contractor to repair or replace anything that has failed for a relatively short period of time, generally one year. When public works staff construct a project or install a building system, they or their coworkers are going to be the ones maintaining the work throughout its useful life. That is about the best motivation available to ensure that the job is done well and will be sustainable for many years to come.

There can be compromises between contracting the work or performing it in-house that result in considerable cost savings. One is to purchase as much of the equipment or material directly and then supply it to the contractor for installation. Contractors typically mark up such purchases between 10 and 20 percent. By purchasing direct, the agency can save that markup and in some cases there are additional

tax savings as well. However, there is a downside, as the risk of obtaining the materials is transferred from the contractor to the owner. If not done properly, the agency may find itself paying damages for delaying the work of the contractor. Also, there is a fair amount of work involved in procuring such materials and equipment. One must execute the purchase contracts, arrange for delivery and possible storage, and keep everything on schedule. But these are chores that most public works agencies perform on a regular basis and the savings obtained by performing them can be considerable.

Another compromise is to perform certain portions of the project with staff and contract the rest. All public works agencies have types of work that they are particularly good at. Removing this work from what

(Continued on page 8)

Refresh Cordless Battery Packs

Cordless tools have become a staple for many of us, including drills, saws, vacuums, and more. Too often, however, the cost of replacement battery packs have begun to approach the cost of just replacing the tool. That's not very sustainable and it's a painful waste of money.

The time came this winter to replace the aging battery packs for our retroreflectometer. Two at a cost of about \$70 was an aggravating prospect. But consulting prices at a large on-line retailer, we stumbled across an alternative—battery rebuild kits. At about half the cost of replacement battery packs, we were

intrigued and the online comments assured us that even fools like us could handle this simple swap out. Once you recognize that these battery packs are simply a serial grouping of what look a lot like C-cell batteries, the mystery fades.

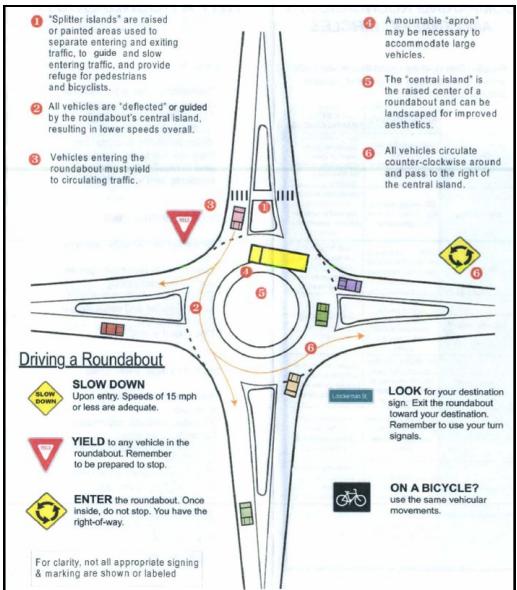
So we tried it, finding a two for \$70 deal. The only hiccup was persuading the original cluster out of the battery case—the black plastic wrapping made it pretty snug. But we overcame that with stubbornness and we were done in just a couple minutes.

The result? Seems like they work great. We're back to at least a full day charge for the retroreflectometer and we saved \$70.



Roundabouts in Delaware (cont'd)

(Continued from page 1)
 Delaware's current 13 roundabouts. Links are made to three other state DOT roundabout videos, as well as DelDOT's own.



In Delaware's eight minute video, many of the standard myths, misunderstandings, and worries are confronted, explained, and resolved. For example, a common fear of roundabouts centers on whether fire trucks can get through, large tractor trailers, school buses, and farm equipment, so the video demonstrates how the modern roundabout geometrics provide for all types of vehicles. The video goes on to address how roundabouts can accommodate pedestrians and bicyclists as well.

The modern roundabout presents several advantages over the four-way intersection, signalized or not. The flow of traffic is much more continuous for all approaches and particularly in off-peak times,

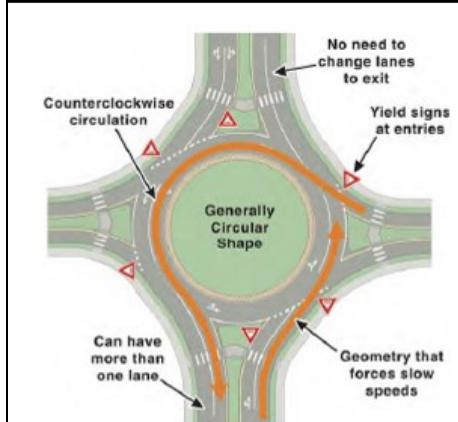
one need not come to a stop if there is not a direct conflict and even then, a brief pause is the worst encounter. Speaking of conflicts, the traditional four-way intersection involves 32 points of conflict, including the most risky, the crossing conflicts. The roundabout allows only eight conflicts, none of which

reduce fatal crashes (our first priority) by 90%, personal injury crashes by 75%, pedestrian crashes by 30-40%, and bicycle crashes by 10%.

With all that roundabouts have to offer, there will clearly be more in Delaware's future and with each one there will understandably be some among us that raise these common questions and concerns. When you hear them, point them to the DelDOT website before they form the wrong opinion and encourage them to visit one of the current installations and have a look for themselves.

Source:
DelDOT
Roundabout
Brochure

are right angle crashes.
As a result, crashes have been shown to drop significantly when roundabouts are designed correctly and constructed at locations that can most benefit from them.

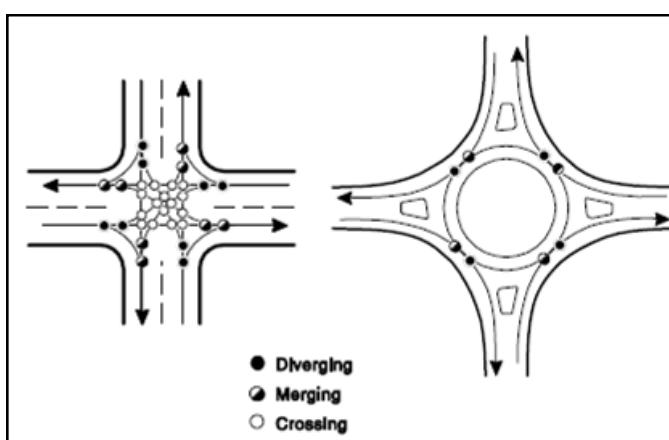


1.2 DISTINGUISHING CHARACTERISTICS OF A ROUNDABOUT

Modern roundabouts circulate traffic counterclockwise only and vehicles on approach yield the right of way to those already inside the roundabout.

A typical four-way intersection presents 32 points of conflict, many of them severe angle crashes, whereas the modern roundabout presents only eight, none of which are severe angle risks.

Source: NCHRP Report 672 - Roundabouts: An Informational Guide



The numbers vary a bit depending upon what is included and what time period is evaluated, but DelDOT reports that roundabouts can



Students/Professionals Together in NHI Bridge Course

"I believe most of these students also had some engineering experience through co-ops. I think it was a great opportunity for them to learn the terminology and see actual photos of various bridge types or components before hitting the job market...I can't tell you enough what a great idea it was for the University to initiate this course for their students."

—Diane Kretz, P.E.

In January, 2014, the Delaware LTAP/T² Center and the Department of Civil and Environmental Engineering, at the University of Delaware, hosted the National Highway Institute's "Safety Inspection of In-Service Bridges" course. This course represented a first for NHI. Not for the courses content, or the participants, but for the fact this was the first time an NHI course had been used as a technical elective for an undergraduate program. Twenty four junior and senior civil engineering majors took the course during the Winter, 2014 semester, to satisfy one of the three technical elective requirements for their degrees.

NHI Course 130055, "Safety Inspection of In-Service Bridges", is a requirement in many states in order for a person to be certified as a bridge inspector. The idea to sponsor the course for the students was the idea of Professor Harry "Tripp" Shenton, the Department Chair, as he felt this might be an excellent technical experience for the students in tying what is taught in the classroom to what is used in practice. Also, he felt that having

completed the course might be an advantage for this group of students in searches for jobs and internships.

Thirty four individuals attended the two week course. In addition to the 24 UD students, representatives of FHWA, the Delaware Department of Transportation and several engineering consulting firms were present. The course is one of the few NHI courses to have a pre-requisite requirement and Professor Shenton was pleased to see that all of the students were able to complete the pre-requisite with little trouble. The course covered a majority of current construction standards, bridge construction types and materials not often utilized today, but still in service. It also covered other factors not necessarily associated with the bridge itself, such as inspection safety, traffic control, signing and approach railing. The course can include a field inspection of local structures or students can inspect a bridge in a virtual computer environment. The Virtual Bridge Inspector (VBI), is a computer based simulation, where students are able to inspect a bridge and includes all their safety equipment, tools and support equipment that they would find in the field. The VBI has become the preferred tool for the course since students are able to examine a more complete range of bridge defects. Local site inspections require greater logistics, includ-

ing temporary traffic control; can be hampered by weather; and students are limited to only a few of the range of bridge defects, whatever might be present at the chosen sites.

Feedback from the participants was very positive. There was a concern that the large number of undergraduate students might slow down the course because of their lack of field experience. The comments of Diane Kretz P.E., Structural Engineer, NJ Division office, Federal Highway Administration, captured the feelings of most of the attendees:

"The number of students was not a hindrance to the instruction or pace of the class at all. Their college courses seemed to be fresh in their minds and they followed along very easily. I believe most of these students also had some engineering experience through co-ops. I think it was a great opportunity for them to learn the terminology and see actual photos of various bridge types or components before hitting the job market. As long as they can get the required experience to go along with the training, this is no different than other novice inspectors/engineers taking the course. They all worked hard during their two-week training, and I think their test scores probably would show it. I can't tell you enough what a great idea it was for the University to initiate this course for their students."

Student comments included Audrey Landmark, Junior CE major: "Overall I felt the course was great. The teachers were passionate, interested and each had a different perspective. Sharing the classroom with professionals was also a new and exciting experience. I feel like I have a very clear understanding about



(Continued on page 8)

Recent Student Field Trips

**ASHE@UD students tour the
DelDOT Sign Shop and Signal
Shop in Dover**



**ASHE@UD
students tour
the
underbelly of
the Fort
McHenry
Tunnel in
Baltimore**



The T²/LTAP Center organizes and supports many student field trips each semester to operational centers, construction sites, labs, and maintenance facilities. While these are sometimes associated with specific academic classes, most trips are centered around student groups from professional associations like ITE, ASHE, ASCE, etc. These excursions are very instructive to students as they decide how to focus in engineering and they are an important part of our workforce development charge.

Students/Professionals Together in NHI Bridge Course (cont'd)

"In my opinion, one of the best parts of the class was the interactive nature of it. The instructors brought a 'clicker'-like system to class and gave them out to students on the first day. The questions that were asked made the students think critically about what they've just learned and apply it to the question."

—Bobby Andersen

(Continued from page 6) what a bridge inspector does, how to inspect a bridge and the current standard of bridge levels of disrepair. The course moved quickly obviously, but I found the information manageable, albeit the days were quite long.

I felt that my coursework and the prerequisite adequately prepared me for the class. I know that the prerequisite really allowed me to see what I was getting into with the actual course and prepared me for the great deal of information I was going to consume in the two week period. Furthermore the course was very practical and therefore I felt that it was extremely beneficial to students. I know from the past that knowing even just terminology means a lot in the field. I think this course introduced the practical, sometime elementary, knowledge, that sometimes gets put on the side in computation based classes."

Other students weighed in similarly. Eric Stein: "I had a great time taking the course. I believe the pace was slow but covered all of the material well. It was all very relevant to our degree and careers. I also think we were more than prepared for the course, seeing basic versions of what we already learned throughout the course."

Jonathan Sabatino: "I

learned a great deal from this course in a very short period of time. Now I can't help but evaluate every bridge I come across. It was a bit of a struggle to stay focused on one topic all day, but worth it to learn the material. I feel that the coursework I learned at the university prior to this class prepared me very well. Most of the information presented in the first few days was a review of concepts that had been reinforced throughout my college career. Courses like this are very beneficial and help prepare students for post-collegiate work."

Bobby Andersen: "The class was very well organized. I liked having all of the materials in front of me while taking the class instead of taking notes. This also gave students the opportunity to look ahead to what was going to be covered the next day in order to prepare for class. All of the handout material was easy to follow."

"In my opinion, one of the best parts of the class was the interactive nature of it. The instructors brought a 'clicker'-like system to class and gave them out to students on the first day. The questions that were asked made the students think critically about what they've just learned and apply it to the question. These clicker questions were not graded at all, but the instructors showed all student responses and

commented on the right answers and why they were right, and the wrong answers and why they were wrong. The virtual bridge inspections were also very beneficial in applying the course material.

"I feel that I was adequately prepared by the curriculum to date to do well in the course. We knew the basic concepts and elements of bridges that were essential. It was not only useful for the different course material, but it also was good from a professional development standpoint. Passing this course is something that I have since put on my resume when applying to transportation and bridge related firms. I believe it's definitely a plus for a student to have this training complete before going out into the workforce because then the firm doesn't have to send their employee to it."

The course can only be considered a great success, not only from the fact that all 34 participants passed and received their certificates, but from the opportunities it provided. Professor Shenton has said that he intends to keep this course as part of the winter session offerings.

Using Contractors Versus In-House Staff (cont'd)

(Continued from page 4) is contracted can lower the cost of the contract considerably. Similarly, the agency can save money by performing certain aspects of the work that would otherwise require the contractor to hire subcon-

tractors, such as saving a general contractor from having to hire an electrician just to disconnect and reconnect some circuitry. Regardless of what decision is reached regarding contracting versus using agency resources, better choices can

be made when all factors and not just cost are considered.

Joe Sisler can be reached at (757) 890-3800 or sislerj@yorkcounty.gov.

Upcoming Events

The T²/LTAP Center is currently planning the following upcoming events. Others will follow. We will announce exact dates, locations, and other information as we finalize details. Monitor our website for up to the minute details and registration.

- Training Workshop—Asphalt Construction—June 11, 2014
- Training Workshop—Designing Pedestrian Facilities for Accessibility—July 9&10, 2014
- Training Workshop—Winter Maintenance—Date TBD (September/October)



**“Training”
Get it?**

See our website for further details: <http://sites.udel.edu/dct/t2-center/courses-workshops-seminars/>.

T²/LTAP Center Request Form

Your feedback and interests help us increase the T²/LTAP Center's effectiveness, so please complete and return this form or email us—all compliments, criticisms, and ideas are welcome!

Please add my name to the T²/LTAP INFO-CHANGE subscription list—subscriptions are free

I have an idea for a future T²/LTAP newsletter article
Topic:

I volunteer to author this article—please contact me
 Please consider these topics for future training sessions
Topic:

Topic:

I would like to learn more about the T²/LTAP Center and how its free services can assist my municipality or agency—please contact me
Name:

Agency:

Address:

email:

Please return this form to:

Delaware T²/LTAP Center, Delaware Center for Transportation
360 DuPont Hall, University of Delaware, Newark, DE 19716



Care to
contribute an
article? Just let
us know by
filling out this
form or
emailing us.

Helping to Bridge your Transportation Gaps

DELAWARE T²/LTAP CENTER

Delaware Center for
Transportation
360 DuPont Hall
University of Delaware
Newark, Delaware 19716

Phone: 302-831-6241
Fax: 302-831-0674
E-mail: matheu@udel.edu

[http://www.ce.udel.edu/
dct/T2.html](http://www.ce.udel.edu/dct/T2.html)

The Local Technical Assistance Program (LTAP) is a nationwide effort financed jointly by the Federal Highway Administration and individual state departments of transportation. Its purpose is to conduct training and technology transfer in the form of workshops, seminars, and conferences. The Delaware T²/LTAP Center Info-change is published semi-annually. T²/LTAP Center articles also appear semi-annually in the TransSearch - the newsletter of the Delaware Center for Transportation. Any opinions, findings conclusions or recommendations presented in this newsletter are those of the authors and do not necessarily reflect views of the University of Delaware, Delaware Department of Transportation, or the Federal Highway Administration. Any product mentioned in the newsletter is for information purposes only and should not be considered a product endorsement.



The Delaware T²/LTAP Center is a member of the
National Local Technical Assistance Program (LTAP)

**Delaware
T²/LTAP**

T²/LTAP Center Organization Contacts

T²/LTAP Center Staff

Dr. Ardeshir Faghri, Director, Delaware
Center for Transportation

Dr. Earl "Rusty" Lee, T² Program Coordinator

Matheu J. Carter, P.E., Municipal Engineering
Circuit Rider

Ellen M. Pletz, Business Administrator

Sandi Wolfe, Event Coordinator

Contact us by phone, fax, email, or snail mail

Phone: (302) 831-6241

Fax: (302) 831-0674

355 DuPont Hall, University of Delaware
Newark, Delaware 19716

matheu@udel.edu

DelDOT Liaison

Ralph Reeb, Division of Planning

Federal Highway Administration Liaison

Patrick A. Kennedy, P.E., Safety/Mobility Program
Leader, DelMar Division (Dover)

AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

The University of Delaware is committed to assuring equal opportunity to all persons and does not discriminate on the basis of race, creed, color, gender, genetic information, age, religion, national origin, veteran or disability status, or sexual orientation in its educational programs, activities, admissions or employment practices as required by Title IX of the Educational Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, Title VII of the Civil Rights Act of 1964, and other applicable statutes.

Inquiries concerning Section 504 compliance and information regarding campus accessibility should be referred to the Office of Disability Support Services (DSS), (302) 831-4643, located at 119 Alison Hall.

Inquiries concerning Title VII and Title IX should be referred to the Office of the Assistant Vice President for Affirmative Action, (302) 831-8735, located at 124 Hullihen Hall.



UNIVERSITY OF
DELAWARE

