



# ROADTALK

VOL. 19/N0.4/WINTER 2006

THE UNIVERSITY of TENNESSEE 

## Join us for the Tenth Southeast Local Roads Conference May 21-23, 2006 in Chattanooga, TN

Tennessee Transportation Assistance Program (TTAP) is pleased to be the host for the Tenth Southeast Local Roads Conference (SELRC). TTAP last hosted the conference in 1999 in Gatlinburg with overwhelming success. We hope to accomplish the same success with the 2006 conference.

SELRC is targeted for county, city, and public works personnel but should also be attractive to federal and state highway personnel, contractors, vendors, consultants and all those whose work impacts the movement of persons and goods on local roads. It provides the opportunity to share success stories and innovative advances in transportation planning, traffic safety operations, roadway design, maintenance and construction.

The conference combines technical presentations with exhibits of highway products to provide a forum for exchange of ideas with the local roads community.

The SELRC is a collaboration of the Federal Highway Administration and the southeastern LTAP Centers, which include Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, Puerto Rico, South Carolina and

Tennessee.

The following information will assist you in planning for the conference:

### CONFERENCE LOCATION

Chattanooga Convention Center at One Carter Plaza, Chattanooga, TN.

### ACCOMMODATIONS

A block of rooms has been reserved at the Chattanooga Marriott, 2 Carter Plaza, Chattanooga, TN. The hotel adjoins the Chattanooga Convention Center. The rooms have been reserved at a special rate of \$79++ (code: **utkutkk (single room) or utkutkd (double room)**).

Please call the hotel directly at 1-800-841-1674 or 423-756-0002 to make your own reservations. This special rate is available until **April 19, 2006**.

### REGISTRATION FEES

Before: April 19, 2006 \$125.00  
After: April 19, 2006 \$150.00  
On-Site: \$175.00

The registration fee covers the reception (with cash bar) on Sunday evening, continental breakfasts, breaks and lunch. If your guest/s would like to join us for the reception please indicate on the registration form. (\$25 per adult, and \$12 for each

child over 12 years.)

If you are a vendor and would like to participate in the conference as an exhibitor, please call Jenny Jones at 865-974-6549 or email [gohjones@utk.edu](mailto:gohjones@utk.edu). Exhibitor space at the Chattanooga Convention Center is limited.

A golf outing is planned for Sunday morning (May 21, 2006). Please contact Matt Cate at 865-974-5255 if you are interested.

You can find a preliminary program and registration form on page 6.

We look forward to seeing you all in Chattanooga. We know the conference will be a great success with all your participation.

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# ROADTALK

is a publication of the Tennessee Transportation Assistance Program (TTAP). TTAP is part of a nationwide Local Technical Assistance Program (LTAP) financed jointly by the Federal Highway Administration (FHWA) and Tennessee Department of Transportation (TDOT). Its purpose is to translate into understandable terms the latest state-of-the-art technologies in the areas of roads, bridges, and public transportation to local highway and transportation personnel.

The views, opinions, and recommendations contained within this newsletter are those of the authors and do not necessarily reflect the views of FHWA and TDOT.

**Dr. David B. Clarke, P.E.,** Director

**Frank Brewer,** Assistant Director, Training

**Matt Cate, E.I.T.,** Technical Assistance Coordinator

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FIELD REPRESENTATIVE

Vacant

Call Matt Cate  
1-800-252-ROAD  
or email  
mcate@utk.edu  
if you need technical  
assistance!  
Remember, it's  
FREE!



The TDOT Work Zone Safety flipbook is available **FREE** to the public or private agency in the State of Tennessee. While these books are intended to supplement rather than replace Chapter 6 of the *Manual on Uniform Traffic Control Devices*, they do serve as a handy field reference for everyone from flaggers to supervisors. Please do not hesitate to request enough copies to ensure that all vehicles or workers have one handy. If you would like to receive copies of the flipbook, please contact TTAP by telephone at 1-800-252-7623 or by email at TTAP@utk.edu.”

## From the Director

The weather always has a big influence on our lives, and I've fallen into the habit over my past few columns of starting with some comment on our weather. We're blessed with a great climate in Tennessee—generally not too cold in winter or hot in summer, with simply lovely temperatures in spring and fall. Well, this has been a really warm winter so far, with virtually no below freezing temperatures. That's saved everybody a ton of effort keeping snow and ice off of the roads and streets, with the accompanying expense in chemicals, labor, and fuel. Another month and we should be home free! Hopefully, my optimism won't be a jinx, as we can see winter storms through February and into March.

2006 promises to be a great year for TTAP. We have a record number of training classes for you, with topics ranging from access management to chain saw safety. Our training manager, Frank Brewer, spends a lot of time and effort getting these classes organized for you, and he's really interested, as are all of us, in fulfilling your training needs. We're here to serve you, so please keep those suggestions coming on what we can offer in the way of training.

Another milestone in 2006 is TTAP's 20<sup>th</sup> anniversary. Yes, the years are rolling by, and we certainly thank you for all of your support over the years. And, we all owe thanks to our friends at the Tennessee Department of Transportation and the Federal Highway Administration, without whose support TTAP couldn't function. We don't yet have any specific plans for the big 2-0, except to keep serving you.

Safety is also a major theme of my writings. So, let me close with some good news on that front. The recent highway bill, SAFETY-LU, established a new highway safety improvement program (23 USC 148). The program nearly doubles the funding available to improve highway safety. City and county roads are eligible for Section 148 funding. A portion of the funding is dedicated to a High Risk Rural Roads program. Funds in this program can be used to target construction and operational improvements on public roadways classified as rural major or minor collectors or local roads. Eligible roads must have a crash rate for fatalities and incapacitating injuries higher than the statewide average for the functional class. We will discuss Section 148 in more detail in a subsequent issue of RoadTalk.

Best wishes for the rest of your winter! Call us if we can help you in any way.

David

## Maintenance of Drainage Facilities (Part 3)

by Dr. David Clarke, P.E.

The last article in my drainage series discussed the importance of maintaining ditches. In this installment, I discuss inspection of culverts that pass water flow through a highway embankment.

Depending upon the material type, culverts may be divided into two categories, flexible and rigid. In flexible culverts, the material offers relatively little resistance to bending and the culvert relies upon the surrounding fill to provide strength. Rigid culverts are constructed of a material that resists bending and does not deflect appreciably under load. Concrete culverts are rigid, while corrugated metal culverts are flexible.

When it comes to culvert maintenance, the basic objectives are to make sure that the culvert remains structurally sound and capable of accommodating the design flow of water. I recommend that roadway agencies develop an inventory of all culverts along each roadway, including characteristics such as location, type, diameter, number of barrels. Each culvert should be examined at least annually, although a more frequent schedule may be justified for trouble prone or especially important culverts. A standardized inspection form should be used to record findings.

Inspection of culverts should be done in a systematic manner, with emphasis on the following:

- ▶▶ Condition of roadway over the culvert,
- ▶▶ Condition of stream channel upstream and downstream of the culvert,

▶▶ Condition of culvert end treatments, and

▶▶ Condition of culvert barrel.

For additional guidance, the FHWA's *Culvert Inspection Manual* is an excellent reference.

The roadway condition over a culvert location can provide useful clues about potential problems. The inspector should sight along the pavement surface, guard rails, and markings over the culvert. Dips, sags, or cracking can indicate that a flexible culvert is collapsing, that fill material is improperly compacted, or that fill is being lost due to water piping along the outside of the culvert or through a crack in the culvert. Evidence of past pavement patching or the addition of fill or riprap on shoulders to address problems should also be noted.



**This corrugated metal culvert displays a significant loss of capacity due to excessive sedimentation both in the culvert itself and in the ditch leading to the culvert inlet.**

The culvert should correspond to both the horizontal and vertical alignment of the stream channel. Misalignments can reduce the hydraulic efficiency of the culvert, allow scouring of the fill beneath or adja-

cent to the culvert, or fill the culvert with sediment. Some stream channels are prone to shifting over time. Channel bottoms may also scour, either upstream or downstream of the culvert. Such scour can be a serious problem, affecting the integrity of the culvert and the surrounding fill.

Culvert end treatments include aprons, headwalls, and wing walls as well as various configurations of the culvert barrel (e.g. projecting, mitered). The inspection should verify the integrity of end treatments. Things to look for include undermining by water; damage from waterborne objects, mowing, or errant vehicles; loss of structural integrity due to decay, cor-

rosion, or other mechanisms; shifting or settlement; and damage due to hydraulic forces (buoyancy).

The final step in the inspec-

*continued on page 7*



**Education and training opportunities** are available through the University of Tennessee Center for Transportation Research (CTR), Southeast Transportation Center (STC), and Tennessee Transportation Assistance Program (TTAP). This listing of courses currently available includes both TTAP and TATE courses that are offered in conjunction with the University of Tennessee Department of Civil and Environmental Engineering and the Tennessee Section of the Institute of Transportation Engineers. Local roadway departments can benefit from all of the workshops. Because of this, we ask that you please share this listing with others who might be interested in our workshops. The Center for Transportation Research is always eager to meet your research and training needs. If you have a special course in mind or would like a course held on site especially for your employees, please contact Annette Jones at 1-800-252-ROAD.

**\*CEU and PDH credit hours available.**

Title	Date	Location	Instructor/s
Work Zone Traffic Control/Flagging	February 10	Jackson	Frank Brewer
* Intersection Design	February 14	Knoxville	Alan Childers
Trench Safety Competent Person	February 21	Jackson	Walter Idol
Trench Safety Competent Person	February 22	Nashville	Walter Idol
* Traffic Calming	March 2	Nashville	Alan Childers
Roadway Drainage	March 6	Chattanooga	Dave Clarke
Roadway Drainage	March 7	Nashville	Dave Clarke
* 2-Lane Geometric Design	March 8	Nashville	Dave Clarke
Work Zone Traffic Control/Flagging	March 13	Nashville	Frank Brewer
Road Safety Audit /Review	March 14	Jackson	Matt Cate
Road Safety Audit/ Review	March 15	Nashville	Matt Cate
Railroad Track Inspection & Safety Standards	March 13-17	Chattanooga	Dave Clarke
Timber Railroad Bridges	March 21-22	Knoxville	Dave Clarke
Confined Space Entry	March 21	Jackson	Walter Idol
Confined Space Entry	March 22	Nashville	Walter Idol
* MUTCD 101 How to use the MUTCD	March 23	Nashville	Dave Clarke
* Signs and Pavement Markings	March 29	Jackson	Matt Cate
* Traffic Access Management & Site Impact	April 4	Nashville	Dave Clarke
Drainage Rehabilitation	April 19	Chattanooga	Dave Clarke
* Highway Capacity Manual	April 26	Nashville	Dave Clarke
* Traffic Engineering 2	May/June 30-31-01	Nashville	Wegmann/ Chatterjee/Han

*continued on page 5*

Upcoming Training, continued from page 4

Title	Date	Location	Instructor/s
* Context Sensitive Solutions	August 23-24	Nashville	Norman Johnson
Chain Saw Safety Demo	August 29	Chattanooga	Tim Ard
Chain Saw Safety Demo	August 31	Jackson	Tim Ard
* MUTCD 101 How to use the MUTCD	September 7	Chattanooga	Dave Clarke
* MUTCD 101 How to use the MUTCD	September 11	Knoxville	Dave Clarke
* Signal Timing	September 13	Knoxville	Tom Urbanik
Confined Space Entry	September 14	Knoxville	Walter Idol
Drainage Rehabilitation	September 18	Jackson	Dave Clarke
Roadside Design	September 26	Nashville	Matt Cate
* Signal Timing	September 27	Nashville	Tom Urbanik
* MUTCD 101 How to use the MUTCD	October 3	Jackson	Dave Clarke
Backhoe/Loader Training	October 9-10	Chattanooga	David Carter
* Signal Timing	October 11	Jackson	Tom Urbanik
Backhoe/Loader Training	October 12-13	Jackson	David Carter
* Intersection Design	October 17	Jackson	Alan Childers
* Geo Tech Design/Earthwork: What makes a Good Sub-grade	October 19-20	Nashville	Eric Drumm
TDOT Funding	October 24	Knoxville	Bob Hayzlett
TDOT Funding	October 26	Jackson	Bob Hayzlett
Trench Safety Competent Person	November 2	Chattanooga	Walter Idol
Confined Space Entry	November 7	Chattanooga	Walter Idol
Road Safety Audit / Review	November 9	Chattanooga	Matt Cate
Trench Safety Competent Person	November 14	Knoxville	Walter Idol
Road Safety Audit / Review	November 28	Knoxville	Matt Cate
Work Zone Traffic Control/Flagging	December 5	Chattanooga	Frank Brewer
* Signs and Pavement Markings	December 6	Nashville	Matt Cate
Work Zone Traffic Control/Flagging	December 7	Knoxville	Frank Brewer
* Traffic Engineering 1	December 18-20	Nashville	Wegmann/ Chatterjee/Han

*\*This course is part of the curricula for the Tennessee Academy for Transportation Engineering (TATE). Upon successful completion of the required curricula of short courses and elective courses, the student will be awarded a certificate from the University of Tennessee TATE.*

**SOUTHEAST LOCAL ROADS CONFERENCE  
PRELIMINARY PROGRAM**



**May 21, 2006 (Sunday)**

9:00am – 2:00pm Golf Outing (tentative,  
depending on interest)  
3:00pm – 5:00pm Exhibitors (Set Up)  
3:00pm – 5:00pm Registration  
7:00pm – 8:30pm Reception - TN Aquarium

**May 22, 2006 (Monday)**

7:00am Registration  
7:00am – 8:00am Continental Breakfast with Exhibitors  
8:00am – 10:00am Opening Remarks  
General Session (TBA)  
10:00am – 10:30am Break with Exhibitors  
10:30am – 12:00pm Concurrent Sessions:  
Session 1A: Traffic Calming: From  
Theory to Practice  
(Moderator: Puerto Rico LTAP Center)  
Session 1B: OSHA Safety Training  
(Moderator: North Carolina LTAP Center)  
12:00pm – 1:30pm Lunch  
1:30pm – 3:00pm Concurrent Sessions  
Session 2A: Pavement Preservation  
(Moderator: Kentucky LTAP Center)  
Session 2B: Leadership and Management  
Training  
(Moderator: Florida LTAP Center)

3:00pm – 3:30pm Break with Exhibitors  
3:30pm – 5:00pm Concurrent Sessions  
Session 3A: Disaster Planning and  
Response  
(Moderator: Alabama LTAP Center)  
Session 3B: Low Cost Safety  
Improvements  
(Moderator: South Carolina LTAP  
Center)

**May 23, 2006 (Tuesday)**

7:00am – 8:00am Continental Breakfast with Exhibitors  
8:00am – 9:30am Concurrent Sessions  
Session 4A: The Safety Edge  
(Moderator: Georgia LTAP Center)  
Session 4B: GASB 34/Asset  
Management  
(Moderator: Mississippi LTAP  
Center)  
9:30am – 10:00am Break with Exhibitors  
10:00am – 11:30am General Session (TBA)/  
Closing Remarks

**MAIL/FAX REGISTRATION FORM TO:**



Tennessee Transportation Assistance Program (TTAP)  
Center for Transportation Research  
(Attn: Jenny Jones)  
The University of Tennessee  
Suite 309, Conference Center Bldg.  
Knoxville, TN 37996-4133  
Tel: 865-974-5255 Fax: 865-974-3889  
[www.ctr.utk.edu](http://www.ctr.utk.edu)

(Copy and fill out one for each registrant)

*(Please print)*

NAME: \_\_\_\_\_

NAME ON BADGE: \_\_\_\_\_ TITLE \_\_\_\_\_

ORGANIZATION: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_

PHONE: \_\_\_\_\_ FAX: \_\_\_\_\_ EMAIL: \_\_\_\_\_

\*I am interested in the golf outing. My handicap or average score is \_\_\_\_\_

**Please check appropriate boxes:**

**Registration:**

- \$125.00 (includes reception)
- \$150.00 (After April 19, 2006)
- \$175.00 (On site)

**Reception:**

- \$25 (Adult guest)
- \$12 (Child guest)

**Total paid \$** \_\_\_\_\_

Check (payable to The University of Tennessee)

 Cardholder's Name \_\_\_\_\_ Signature \_\_\_\_\_

 Card No: \_\_\_\_\_ Expires: \_\_\_\_\_

tion should be examination of the culvert barrel. In general, the inspector should look for structural problems with the barrel and blockages or debris that would restrict the flow of water. Each type of culvert material is prone to specific defects. We will address these subsequently.

When examining corrugated metal culverts, inspectors should be alert to the following:

- ▶ changes in shape,
- ▶ sags and deflection,
- ▶ separation of seams or joints, and
- ▶ corrosion or abrasion.

The flexible behavior of these culverts relies upon soil pressure to maintain shape. If the culvert

shape does not match the design, the culvert may not be able to withstand soil loadings. Sags and deflections may represent locations where the supporting bed is weak or even missing. These spots trap sediment and debris. Seam separations in corrugated metal culverts can be signs of impending structural failure, since the ability of the culvert to withstand soil pressures is jeopardized. Joint separations are less critical from a structural standpoint, but provide avenues for water to infiltrate the surrounding soil or for soil to leak into the culvert. Corrosion and abrasion of the culvert at or below the waterline degrade the structural integrity of the culvert.

This is the most common reason for culvert replacement.

Large arch and box culverts may have concrete or metal foundations that support the edges of the metal shell. The inspector should look for foundation settlement as evidenced by cracking, spalling or crushing. Scour at the foundation base is also of concern.

Precast concrete culverts are rigid and thus not subject to the shape deformations of corrugated metal. However, these culverts are subject to the following:

- ▶ sags and deflection,
- ▶ cracking and spalling,
- ▶ separation of joints, and
- ▶ chemical attack or abrasion.

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## TALK TO TTAP

**We** are always looking for your comments, ideas and suggestions to help make the TTAP program more useful to you.

1. Please send me more information on the following articles mentioned in this newsletter.

\_\_\_\_\_  
\_\_\_\_\_

2. Please list any additional training workshops you would be interested in attending.

\_\_\_\_\_  
\_\_\_\_\_

3. Please list topics for videos you would like TTAP to obtain.

\_\_\_\_\_  
\_\_\_\_\_

4. Please list any other ideas or suggestions on how TTAP could assist you.

\_\_\_\_\_  
\_\_\_\_\_

5. Please list your name and organization to verify for TTAP's mailing list.

Name \_\_\_\_\_

Address \_\_\_\_\_

Title \_\_\_\_\_

Organization \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Email \_\_\_\_\_

Are you currently on TTAP's mailing list? \_\_\_\_ yes \_\_\_\_ no

Do you wish to be on the mailing list? \_\_\_\_ yes \_\_\_\_ no

Please fax your form to TTAP at (865) 974-3889 or mail to TTAP; Suite 309 Conference Center Building; Knoxville, TN 37996-4133.

FROM: \_\_\_\_\_

Tennessee Transportation Assistance Program  
Center for Transportation Research  
The University of Tennessee  
Suite 309 Conference Center Building  
Knoxville, TN 37996-4133  
Tel: 865-974-5255/1-800-252-ROAD  
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Web: [ctr.utk.edu/ttap](http://ctr.utk.edu/ttap)

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### Maintenance of Drainage Facilities, *continued from page 7*

The inspector should be on the lookout for these conditions. Sags, deflections, and joint separation are indicative of the same problems as with flexible culverts. Cracking and spalling are a concrete culvert's response to excessive stress, usually as a result of poor bedding or overloading. Like corrugated metal, concrete is subject to attack by acidic water and abrasion from solids in the water stream. These may cause the complete disintegration of the invert.

Poured concrete is often used in the construction of box culverts.



**A headwall structure may have prevented the soil erosion and subsequent loss of pavement structure pictured at this three-barrel precast concrete culvert.**

These structures are inspected similarly to precast concrete culverts. Joints in box culverts are usually for

expansion purposes, but pose the same potential problems as for other culvert types. If the culvert has foundations rather than a poured floor slab, the inspector should check carefully for scour or undermining.

I'm out of space in this installment, so we'll have to get

into culvert maintenance next issue.