



ROADTALK

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Free Technical Assistance to all Cities and Counties Across Tennessee

by Matt Cate, E.I.T.

Does your community have an unsafe intersection that you don't know how to address? Do you need to collect traffic data but you don't have the equipment? Do you need help in setting maintenance priorities on your local roads? If you have answered "yes" to any of these questions, TTAP is here to help you tackle these problems. Through funding from the Tennessee Department of Transportation and the Federal Highway Administration, TTAP is able to offer transportation technical assistance to any city or county at any point across Tennessee.

In addition to our own staff members, TTAP also has access to the staff of the Center for Transportation Research and the faculty of the Department of Civil and Environmental Engineering at the University of Tennessee. TTAP has tube-type traffic counters and turning movement count boards. These assets, combined with our video and publications library, mean that TTAP is able to take on projects in many basic transportation engineering areas. Best of all, TTAP is here to help you.

Examples of TTAP Technical Assistance Projects

- **Traffic Counting (volume and turning movements)**
- **Pavement Management Systems**
- **Intersection Safety Studies**
- **Sign Inventory**
- **Traffic Signal Inventory**
- **Traffic Signal Warrant Analysis**
- **Street Closure Assessment**
- **Drainage Studies**

TTAP's goal in providing technical assistance is not only to help local agencies tackle a specific problem in the short term, but also to provide demonstration and materials along the way that will leave the agency better prepared to handle similar situations in the future. While TTAP is willing to help with almost any problem, there must be a limit to the extent of our support in order to ensure that all requesting agencies are given an opportunity to utilize our services. TTAP cannot replace local staff or private consultants – we cannot provide detailed design drawings, perform extensive traffic counting for a single agency on a regular basis, or

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Road Safety Audits

by Dr. Martin E. Lipinski, P.E.

In recent years, transportation safety professionals have focused attention on the application of Road Safety Audit (RSA) concepts. This interest developed as a result of the successful use of RSAs globally, particularly in Australia and New Zealand, and the documented findings, which demonstrated how the use of road safety audits can identify a broad spectrum of issues that may be addressed to improve safety performance.

A Road Safety Audit (RSA) as applied in the US, is a formal examination of a future roadway plan (or project plan) by an independent, qualified audit team who then reports on safety issues. The key elements of this definition are:

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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.

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From the Director

I think you will enjoy this issue of RoadTalk. We have articles on Road Safety Audits and Context Sensitive Design as well as information on how cities and counties may access free technical assistance. We also look at the hazards presented by spring vegetation growth along our roadways. The "Leave it to Beaver" article provides a solution to problems created by those busy critters who are superb engineers. More later.

Reminder: The Eastern Winter Road Maintenance Symposium will be Sept. 8-9, 2004 at the Knoxville Convention Center.

If you have a problem, we may have a solution. Call us. We're here to be of service.

David Clarke

Materials from TTAP



TTAP has received CDs and publications from a variety of sources. As part of TTAP's mission to provide information on the latest materials and techniques being used in the transportation field, we make these materials available to you, the city and county transportation officials of Tennessee. We have multiple copies of some materials, while others can only be loaned for short-term use. A complete listing can be found on our website ctr.utk.edu/ttap/. If you have an interest in any of the materials listed below, please call 1-800-252-ROAD or (865) 974-5255.

Publication Title	Source	Date
On the Safe Side: Accessible Sidewalks and Street Crossings	FHWA	2004
Accessible Sidewalks and Street Crossings: An Information Guide	FHWA	2004
A Review of Pedestrian Safety Research in the United States and Abroad	FHWA	2004
NCHRP Report 509: Equipment for Collecting Traffic Load Data	NCHRP	2004
TCRP Report 86: Robotic Devices: A Guide for the Transit Environment	TRB	2003
NCHRP Synthesis 322: Safety Management Systems	NCHRP	2003
NCHRP Report 495: Effect of Truck Weight on Bridge Network Costs	NCHRP	2003
NCHRP Report 511: Guide for Consumer-Driven Benchmarking of Maintenance Activities	NCHRP	2004
TRB Journal 1847: Operational Effects of Geometrics	TRB	2003
NCHRP Synthesis 324: Prefabricated Bridge Elements and Systems to Limit Traffic Disruption During Construction	NCHRP	2003
TCRP Report 95: Parking Management and Supply	TRB	2003
TRB Journal 1853: Pavement Management and Rigid and Flexible Pavement Design	TRB	2003
TRB Journal 1851: Highway and Facility Design	TRB	2003

“Leave it to Beaver”

by Dr. David Clarke, P.E.

The expression “busy as a beaver” is familiar to most Tennesseans, but to those of us involved in the maintenance of highway fills and drainage structures, it is frustratingly meaningful! It has been said that the beaver is second only to man in its ability to change the earth’s landscape. The beaver is a natural hydraulic engineer, building amazingly solid dams across streams and small rivers. The resulting bodies of water not only support the beaver’s lifestyle, but also that of many other plant and animal species. Unfortunately, these beaver dams often obstruct our drainage culverts and bridges, and the impounded water represents a hazard to downstream fills and structures. While not as common a problem, beaver ponds can also flood upstream roadways.

The American beaver (*Castor canadensis*) is the largest domestic member of the rodent family, which includes squirrels, rats, and mice. Adult beavers reach weights of 40-60 pounds. The animal’s fur, flat tail, and webbed feet superbly equip it for a life in and around water. Beavers are vegetarians, with the leaves and green bark of trees forming a major part of their diet. Like other rodents, the beaver is formidably equipped for chewing, having incisor teeth that the animal uses to great effect in its food consumption and dam build-

ing activities. The distinctive teeth marks on tree trunks and limbs are sure sign of the beaver’s presence.

Beavers are awkward on land, and normally seek habitat near streams and rivers where their swimming skills provide safety from predators. The beaver’s dam building behavior serves several functions. First, the resulting pond creates a protective moat around the lodge site. Second, the pond broadens the area



Can you find the Culvert?

it easier to move tree limbs and other food back to the lodge. If necessary, the beaver will build canals off the main body of water to reach a promising food source.

During the colonial era, beaver fur was in high demand and trapping greatly reduced the population range and numbers. With changes in styles, the market for beaver fur has disappeared and the species is again on the increase. Beavers are found today throughout Tennessee wherever water and food conditions permit. Their range and numbers are again expanding. The animal seems unbothered by the presence of humans, and beavers

are right at home in urban settings.

Unfortunately, whether urban or rural, the beaver’s industriousness is a source of problems for highway agencies. The beaver sees a culvert through a fill as simply a hole to be plugged in a perfectly good dam! There are several possible avenues of attack when dealing with beavers: remove the beavers, remove the dams, remove the habitat, or modify the water system. These are discussed in more detail below.

Removing the beavers may seem to be the obvious solution. However, beavers generally live in colonies containing a breeding pair and up to eight offspring. It takes an experienced trapper to

remove all the animals successfully. The agency risks a public relations outcry, especially in urban areas, if live trapping is not performed. The presence of beavers means that the habitat is favorable, and, with populations on the increase, it is only a

matter of time before a new colony is established. Furthermore, like many animal species, beavers respond when persecuted with larger litters. Thus, removal is likely to be unsuccessful in the long term.

Removing beaver dams is another possible option. However, there are a number of disadvantages to this approach. Anyone who has attempted to remove a dam by hand will

which the beaver can reach by water. This minimizes exposure of the animal to land based enemies and makes



Limbs Chewed by Beavers

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1. It is a formal examination with a structured process and not a cursory review.
2. It is conducted independently, by professionals who are not currently involved in the project.
3. It is completed by a team of qualified professionals representing appropriate disciplines.
4. It focuses solely on safety issues.

RSA is proactive, done before a crash history indicates a problem exists. It considers all road users – drivers, pedestrians, bicycle riders, etc. and it considers all environmental conditions – daylight, nighttime, inclement weather, etc. An analogy can be made to the medical field. It is difficult to prove the benefits of preventive medicine, yet is generally accepted that exercise, proper diet, etc. will reduce long-term medical costs.

A Road Safety Audit Review (RSAR) is a safety assessment of an existing street or roadway section or a newly completed section prior to opening. The Road Safety Audit Review differs from the conventional safety analysis and scoping study as it is proactive and not dependant solely on crash statistics.

Road Safety Audits can be performed at one or more stages of a new roadway project:

- Planning
- Draft Design
- Detail Design
- Traffic Control Device (TCD) Construction Planning
- Construction

The audit team is comprised of trained and experienced transportation professionals and other individuals with special skills that can be added to the team. The team members also should be independent of the project being audited and, therefore, able to look at the project without bias. A core team comprising a highway/traffic safety specialist, highway designer, and traffic engineer is usually used effectively on most projects. To that core team others may be added, as needed, to provide expertise pertinent to the project being audited. Specific disciplines that can be added include planning, enforcement, pedestrian/bicycle experts, human factors, local resi-



A potential roadside hazard at a new driveway

dents, etc. The diverse perspectives of the team members foster the exchange of ideas that enrich the audit. For local agencies conducting RSARs, the size of team may be reduced.

The audit can be conducted in one to two days. Once the team is selected, it meets with the client/designer to discuss the focus of the audit and to review pertinent materials – plans, APR reports, etc. The team then makes a site visit and records observations. This may include both day and night visits to identify potential safety problems. Typically, the team uses checklists or prompt lists to identify issues to be investigated.

The team meets with the client/designer to discuss findings. The final product is a short report – 2 to 5 pages – containing the team’s findings and recommendations. The agency then responds to the findings, indicating which ones can be implemented. The client/designer then makes all feasible changes and monitors the project.

One issue raised by state and local governments is that of liability and the concern that the audit will be a “smoking gun” to be used in litigation against the agency. In fact, all public agency attorneys that have reviewed the audit process have supported the use of audits as a means of demonstrating that the agency has a comprehensive safety program.

A second issue is that of benefits from an audit. While the use of audits is in its infancy in the US, international studies have documented that the use of audits improve safety.

To date, RSA and RSAR training has been conducted in approximately fifteen states. A National Highway Institute (NHI) Course - # 380069 – has been developed. To date, it has not been offered in Tennessee. This course is available and can be requested by state DOTs.

(Dr. Lipinski is the Ensafe Professor & Chair, Department of Civil Engineering at the University of Memphis. He can be reached at 901-678-3279; email: mlipinsk@memphis.edu)

Every Spring Brings an Additional Hazard to Road Use

by Frank Brewer

We all look forward to the joys of spring: warmer weather, longer days, the promise of summer to come, the flowers, and do not forget the abundance of vegetation. As the trees and bushes leaf out we may see problems where none were before.

Line of sight issues at intersections, blocked traffic signs, shadowed lighting, limbs in utility lines, plant encroachment to travel ways, etc. What do we need to do to solve these issues? Keep in mind that signs and other vehicles need to be visible to drivers, bicyclists, and pedestrians.

As vegetation “greens up” it obstructs items important to the driver. At intersections, remember the “sight triangle.” Provide the driver a clear sight line to avoid collisions. This allows sufficient time to gauge speed of the oncoming traffic plus assists in locating the critical gap needed to enter the traffic flow safely. Also, the driver needs to be aware of any roadside hazards.

Signage is often hidden by the new growth. Keep in mind that the driver needs anywhere from 3 to 5 seconds to read and respond to a sign. This time span equates to distance which is speed dependent. Please refer to the chart below.

Speed limit (MPH)	Non-critical Signs (feet)	Critical Signs (feet)
30	150	250
40	200	350
50	250	450
60	300	600

Some of the critical signs are: STOP, YIELD, or ADVANCE CURVE. Non-critical signs include parking regulations, guide signs, or other warning or informational signs.

When trimming trees and bushes remember traffic control. Do not surprise drivers with bucket trucks or other brush removal equipment. These are work zones and should be signed accordingly. Refer to Chapter 6 of the MUTCD 2003 edition on short-term or intermediate work zones. No one should be dodging traffic.

Also, prepare the crew for the job. Along with the traffic control devices needed, they will need leather gloves, hard hats, safety glasses or goggles, safety vests, chain saw, fuel, bar oil, a gasoline “weed eater”, brush knife or machete, ax, and possibly a ladder.

The vegetation control information in this article and more can be found in the following publication: Vegetation Control For Safety: A Guide for Street and Highway Maintenance Personnel, U. S. Department of Transportation and the Federal Highway Administration, 1990, Publication number FHWA-RT-90-003. The complete guide can also be found on FHWA’s web site at <http://www.fhwa.dot.gov/tfhr/safety/pubs/90003/intro.htm>.

Beaver, continued from page 3

know just how superb an engineer the beaver is. It often takes a backhoe or even explosives to remove a dam. Unfortunately, the beaver is a busy critter and can often repair damages, even extensive ones, in a startlingly short time. In the author’s experience, dam removal is an exercise in frustration.

Changing the beaver’s habitat is a possible way to make the beaver pull up stakes and head for greener pastures. This means removing one of the two things the animal likes: food or water. It will be the rare situation where this is really a practical approach, especially in today’s climate of environmental consciousness. Clear cutting the trees around a stream to deprive the beaver of food isn’t likely to win many kudos for the highway agency.

This leaves the final option: modify the water system. To understand how this is done, we delve into the psychology of the beaver. Research has shown the dam building behavior of this formidable animal engineer to be triggered by current flow or the sound of running water. Stop both of these things and the beaver reverts to a furry little couch potato. Let the beaver build its dam, but then modify the dam by inserting a device which permits water to flow through it without the current flow or noise that makes the beaver do its thing. We give the beaver some pond, but permit our drainage structures to perform without a dangerous backup of water. There are a number of designs, based on the use of inexpensive materials, that accomplish this. We’ll discuss these in a future issue of Roadtalk.

Register For Courses

by Frank Brewer

To conduct a TTAP course several things have to happen that are attendance driven. Meeting space needs to be secured. Materials need to be printed. Catering needs to be set up. Travel and hotel space need to be considered. The instructor and the attendees have their expenses and work schedules to take care of.

When you register early, TTAP is able to arrange and prepare for the numbers of the course. Occasionally we have walk-ins. We welcome their interest but last minute arrivals can cause a logistics burden and additional expense. As example, we may not have sufficient materials for them the day of the course and must pay to mail them at a later date.

Unfortunately, we are not able to underwrite the cost of a course. The registration fees provide that function. Without sufficient advance registrations we may have to cancel a course. Timing now becomes an issue. We must make that decision early enough to prevent non-refundable costs.

If you are planning to attend a course, please register as early as possible. Include a means for TTAP to contact you should we have to cancel the course or make any changes regarding the course. If you cannot attend, please notify TTAP as soon as possible. If you plan to walk-in, please call TTAP (865-974-8251 or 800-252-ROAD (7623)) as early as possible to confirm that the course is not cancelled, the location has not changed, or any specific equipment may be needed. Thanks!



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.



TITLE	DATE	LOCATION	INSTRUCTOR(S)
*Context Sensitive Highway Design	July 13, 2004	Knoxville	Norm Johnson
Road Surface Management System (RSMS) for Beginners	Sept 08, 2004	Nashville	Cate/Brewer
Design of At-Grade Intersections	Sept 13, 2004	Nashville	Childers
Advanced Roadway Surveying	Sept 20-21, 2004	Nashville	Kervin
Roadside Design Guide	Sept 29, 2004	Chattanooga	Brunelle
Work Zone/Flagging	Oct 04, 2004	Jackson	Kervin
Work Zone/Flagging	Oct 05, 2004	Nashville	Kervin
Pavement Design	Oct 14, 2004	Jackson	Huang
Storm Water Drainage	Oct 25, 2004	Nashville	Kervin
Asphalt Pavement Patching	Nov 08, 2004	Knoxville	Hearn
Asphalt Pavement Patching	Nov, 09, 2004	Nashville	Hearn
Traffic Signs & Pavement Markings	Nov 16, 2004	Nashville	Kervin/Brunelle
Traffic Engineering 1	Dec 13-15, 2004	Nashville	Wegmann/Chatterjee/Han

*Add on - not listed in catalog

Context Sensitive Design

by Frank Brewer

Context Sensitive Design (CSD) is a philosophy that is being used in Tennessee and nationwide. The Federal Highway Administration (FHWA) and American Association of State Highway and Transportation Officials (AASHTO) have a website <http://www.fhwa.dot.gov/csd/index.htm> that offers background and links regarding this concept.

Quoting from that site; "Context sensitive design (CSD) is a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility. CSD is an approach that considers the total context within which a transportation im-

provement project will exist."

Highway planners historically look at a new roadway with safety, mobility, congestion management, and economics in mind. This may provide for an efficient facility yet be inconsiderate of community goals and objectives. The CSD approach is that a roadway affects many people and can be much more than a corridor between point A and point B. By including public input and participation, the resulting project can be conducted with respect for community goals, minimizing adverse impact and even enhancing the environment.

TDOT is implementing the CSD approach in its new projects. Recently a two-day seminar was held in Knoxville where TDOT personnel were combined with persons from FHWA and other states, which have been working with CSD, to refine

TDOT's involvement with CSD and develop Best Management Practices (BMPs) for its use.

CSD is not just for state DOTs. Any new highway or roadway project will benefit from the CSD process. The CSD effort put forth at the start of and the use of the BMPs throughout the project will produce an efficient, aesthetically pleasing, and environment friendly facility.

TTAP held a one-day class on CSD in Nashville, April 22nd. It provided an overview of the process and explained when to include the local special interest groups as well as other aspects of CSD. The interest has been so great that a second class has been scheduled. This will be July 13th in

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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: _____

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Federal Highway
Administration



Free Technical Assistance, *continued from Page 1*

purchase equipment and materials to be left with the local agency at the conclusion of a project. However, do not let this scare you. What may seem like a large request to you may be a perfectly reasonable request for us. The worst that can happen is that we will have to refer you on to another party.

If there is an area in which you think TTAP could be of assistance, the first step in receiving technical assistance is to contact us. By phone, you can contact Matt Cate, TTAP Technical Assistance Coordinator, or David Clarke, TTAP Director, at 1-800-252-ROAD. By email, you can



TTAP graduate student Denczil Rolle examines a steel truss bridge as part of a technical assistance project for the City of Dandridge.

contact us at TTAP@utk.edu. Finally, if you are participating in a TTAP training course, you can request technical assistance directly from Frank Brewer, TTAP Assistant Director for Training. We look forward to hearing from you!

Context Sensitive Design, *continued from Page 7*

Knoxville at the National Transportation Research Center (NTRC). You should have received the brochure in the mail. If you need further information on the class or directions to the NTRC, please contact TTAP, 865-974-5255, 800-252-ROAD (7623) or ttap@utk.edu. Go to our website ctr.utk.edu/ttap for more information on the workshop on CSD. You can reduce the conflict between citizen groups and the agencies creating the new roadway. We are all in this together so together we reach consensus on the best way to address the needs of everyone concerned.

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