



## Signal Retiming - Benefits for All Highway Users

*(Reprinted in part from the Florida Technology Transfer Quarterly, August 2005)*

One of the most frustrating travel experiences is having to stop needlessly at traffic signals. Proper signal timing optimizes the operation of signalized intersections to respond to demands of motor vehicles, bicycles, and pedestrians. Traffic signal retiming is one of the most cost-effective ways to improve traffic movement, make streets safer, and lessen citizen frustrations. Signal retiming can produce benefit-to-cost ratios of 40 to 1.

Signal retiming:

- reduces motorist frustration by reducing stops, delay, and unsafe driving behavior;
- improves traffic flow through a group of signals and reduces delay at individual intersections;
- improves air quality and reduces fuel consumption;
- accounts for changes in traffic patterns due to new developments and traffic growth;
- reduces response time for emergency vehicles;
- and postpones the need for improving traffic flow with the existing resources.

Time and cost estimates required to time signals vary according to available expertise and



equipment but are roughly \$2,000 to \$2,500 per intersection for the typical four retiming plans: AM peak, noon peak, PM peak, and off peak.

According to the Institute of Transportation Engineers, traffic signal improvements reduce travel time from 8 percent to 25 percent. As an example; a retiming project conducted in 2001 in St. Augustine Florida, 11 intersection arterials reduced average arterial delay by 36 percent, arterial stops by 49 percent, and arterial travel time to 10 percent. The estimated annual fuel savings was 26,000 gallons with an overall cost savings of \$1.1 million (2001 dollars).

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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 Direc-

As you read this, we'll be well into what is so far turning out to be a typically beautiful Tennessee springtime. The flowers are in full bloom, temperatures are warming up, and the trees are leafing out again. Ah, springtime!

We've had a busy springtime here at TTAP. I'm pleased to report that we've had excellent turnout for the winter/spring training "semester." We've offered a diverse group of courses, from "Confined Space Entry" to "Intersection Design" and have been very pleased by your turnout and the positive comments and suggestions. Providing high quality training is a key TTAP objective, and we hope we're meeting your needs in this area. As always, comments and suggestions are welcomed and encouraged!

With spring, many of you will again be preparing for annual construction and maintenance activities needed to keep your roads and streets in (hopefully!) tip-top condition. While April showers may bring May flowers, we have to make sure all that water drains away from the roadway. Keep those pavements sealed, make sure the roadway cross-section is properly sloped, and keep the drainage system in good shape and your roads should be good for many years of use. Let water in, and you'll face a host of problems. Of course, if you do, our technical assistance folks will be glad to come out and help you, but an ounce of prevention is worth a pound of cure.

Ah well, time to get down off my soapbox. Best wishes for the rest of your spring! Work safely and call us if we can help you in any way.



## Signal Retiming, continued from page 1

Signal retiming typically falls to an agency's public works or traffic engineering department where signals are located. Many agencies utilize consulting engineers.

TTAP will be presenting three workshops on Signal Timing

- ▶ September 13 (Knoxville)
- ▶ September 27 (Nashville)
- ▶ October 11 (Jackson)

The instructor for the workshop is Dr. Tom Urbanik. He is a faculty member at the University

### Signal Timing Workshop

September 13 (Knoxville)  
September 27 (Nashville)  
October 11 (Jackson).

of Tennessee Department of Civil and Environmental Engineering. Dr. Urbanik is an international expert in transportation system operation and management including advanced traffic control systems, system performance, measurement and optimization, highway-railroad grade

crossings, transit priority, geometric design, and transportation management during natural and technological emergencies.

Plan now to attend a workshop in your vicinity. This will be an excellent opportunity to discuss retiming plans and strategies. For other training opportunities check our website <http://ctr.utk.edu> or call the TTAP office (800-252-7623).

## Maintenance of Drainage Facilities (Part 4)

by Dr. David Clarke, P.E.

The last article in my drainage series discussed culvert inspection. In this installment, we'll discuss culvert maintenance.

The majority of culverts can be addressed by these actions:

- cleaning drift and sediment from within the barrel
- making sure that the inlet and outlet are unimpeded
- placing riprap, concrete, or other materials to address scour, and
- maintaining headwalls and wingwalls to prevent fill erosion at the inlet.

These actions are relatively straightforward to accomplish, and should be part of a routine culvert maintenance program. Evidence of structural deterioration of a culvert, such as cracking or joint separation, may require a more elaborate repair procedure.

In order to assure that a culvert will pass the design water flow, the barrel needs to be kept clear of drift, debris, and sediment that reduce the cross-sectional area. Some culverts are more prone to such buildups than others, so the inspection schedule should take this into account.

Cleaning out culverts is fairly straightforward. Culverts large enough to accommodate a person (36" diameter and above) are frequently cleaned out using hand labor. Smaller diameter culverts are more problematic. The time honored practice of dragging a bucket through the culvert works when not too much debris

is present. Cleaning heavily clogged culverts is more challenging. Some agencies periodically dig up these culverts, empty the accumulated dirt, and relay them. While effective, this is an expensive practice. Flushing the sediment and debris out using a high pressure water stream is a popular alternative. Special equipment is available for culvert cleaning in this manner, but the local fire department's pumper truck can perform the same job. If the culvert carries flow all the time, measures should be taken to minimize the discharge of silt into the watercourse. In any case, disposal of sediments and other removed material must be done in compliance with applicable rules and regulations.

The next step in the maintenance process is to examine the culvert inlet and outlet. Remove and dispose of any drift or debris that could affect the water flow. If present, make sure that grating is clear of debris and in good order. Cut back vegetation growing in the streambed or channel banks to acceptable levels. Avoid disturbing the channel lining if at all possible.

The ends of flexible metal culverts are frequently distorted by errant vehicles or mowing. Restoring these ends to the proper cross section will ensure that the culvert has adequate capacity. Jacking rigs are available to perform this operation.

Scour at culvert inlets and outlets is a common issue. On the inlet side, scour may occur in the channel bed or around the culvert itself. Replace the scoured material and protect the areas with something that can resist the erosive forces of the water.

Riprap, concrete, gabions, and gravel are common approaches. The use of modern reinforced vegetative mats may offer a more esthetic solution, and seems to have some cost advantages, too.

On the outlet side, the energy of the culvert discharge needs to be controlled to prevent erosion. Riprap is a common energy dissipater. The bank material behind the riprap may sometimes still be eroded away, however. Placing a geotextile between the riprap and the bank can help keep everything in place.

Headwalls and wingwalls are also important to maintaining proper culvert flow, as well as protecting the embankment from erosion. Maintain these components to original condition. Also, for safety, if the culvert location is not protected by a barrier, make sure that the headwall and wingwalls do not protrude more than four inches above the ground line. Otherwise, they may be a safety hazard. It may be possible to backfill with earth to minimize this problem.

Well, that sums up the basics for routine culvert maintenance. I'm about out of room for this installment, so we'll resume the drainage topic in a future issue. Meanwhile, keep that water moving!

# U.S. Committee Government Purchase Alliance

Public agencies purchase billions of dollars per year in goods and services and are continually looking for new solutions to help them meet their purchasing requirements and needs. Government agencies – as keepers of taxpayers’ hard-earned dollars – also want a good return on investment for the goods they purchase. During this time of diminishing local government resources and federal and state deficits, local agencies need programs that help save precious taxpayer resources. LTAP recently became aware of a program that significantly reduces the costs of purchased goods. The program is known as the U.S. Communities Government Purchasing Alliance.



is nationally sponsored by the National Association of Counties, National League of Cities, the Association of School Business Officials International, National Institute of Governmental Purchasing and U.S. Conference of Mayors.

Through U.S. Communities, counties, cities and other public agencies such as schools and special districts can piggyback on competitively solicited contracts, thus taking advantage of the enormous collective purchasing power of thousands of U.S. local government agencies.

Designed in cooperation with an Advisory Board of local government purchasing officials, U.S. Communities pools the purchasing power of

public agencies, achieves bulk volume discounts on behalf of public agencies, competitively solicits quality products through a lead public agency and provides a purchasing forum for public agencies nationwide. Today over 14,000 public agencies are participating in U.S. Communities including counties, cities, school districts and other public and nonprofit agencies in all 50 states.

## Products

The US Communities program offers a variety of commodity lines, as well as services, on their contracts. The chart below shows the commodity line or service, the lead public agency that executed the solicitation and the supplier or suppliers awarded under the contract.

*(continued on page 5)*

US Communities Contracts as of December 2005		
Product Lines	Supplier	Lead Agency
Office & School Supplies	Office Depot	Los Angeles County, CA
Office Furniture	Knoll, Haworth, Herman Miller, Steelcase	Fairfax County, VA
Classroom Furniture	Virco	Wichita Public Schools, KS
Technology Solutions	GTSI	Fairfax County, VA
Electrical/ Telecom	Graybar	Los Angeles County, CA
Janitorial Supplies	ZEP	Allegheny County, PA
Carpet & Flooring	Milliken	Los Angeles County, CA
Office Machines	Ricoh, Savin, Gesteltner	Miami Dade County, FL
Park & Playground Equipment	Gametime, Landscape Structures, Little Tykes	City of Charlotte/ Mecklenburg County, NC
P.E. Supplies	Sportime	Harford County Public Schl, MD
Homeland Security Solutions	Hagemeyer North America	Fairfax County, VA
MRO Supplies	The Home Depot Supply	Maricopa County, AZ.
Apparel and Promotional	Office Depot	Los Angeles County, CA

# Southeast Local Roads Conference

by Jenny Jones

We would like to thank all the participants, speakers, exhibitors and our Local Technical Assistance Program (LTAP) partners in Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, Puerto Rico and South Carolina for making the Tenth Southeast Local Roads Conference a huge success.

The conference was held in Chattanooga, TN from May 21-23, 2006. The sessions addressed topics such as southeastern local road safety statistics, low-cost maintenance



safety improvements, OSHA safety training and erosion control for local road agencies. The conference was a great opportunity for people working on local roads in the southeastern states to get together, discuss common problems and solutions, and learn from each other.

If you missed this year's conference, the 2007 conference will be in Alabama and hosted by the Alabama LTAP Center. Keep a lookout for the announcement.

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**U.S. Government Purchase Alliance**, *continued from page 4*

## Advantages of the Program

The key advantage is cost savings for public agencies. Public agencies gain access to the national purchasing power of all local government public agencies through U.S. Communities. Public agencies secure the following key advantages:

- Competitively solicited contracts by a lead public agency
- Most favorable public agency pricing
- No cost to the public agency to participate
- Nationally sponsored by leading associations and purchasing organizations
- Broad range of high quality products
- Aggregated purchasing power of public agencies nationwide
- Managed by public purchasing professionals
- Available to all counties, cities, schools, special districts, townships, villages, boroughs, other local governments and state agencies, as well as non-profit agencies that support local and state governments.

In addition, U.S. Communities works closely with public agencies to understand their buying needs and the needs of thousands of other public purchasing agents, purchasing managers, purchasing directors, and procurement officers. U.S. Communities is constantly expanding its product offering to public agencies and acts as a strategic sourcing option for local government.

The purchasing function plays a critical role in helping local governments save money on the goods purchased by their agencies each year. U.S. Communities is a successful, proven tool to help counties, cities, schools, and other public agencies achieve this important mission.

For more information and to become a public agency participant, visit <http://uscommunities.org> or send an e-mail note to [info@uscommunities.org](mailto:info@uscommunities.org)



**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.**

<b>Title</b>	<b>Date</b>	<b>Location</b>	<b>Instructor/s</b>
* 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

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Title	Date	Location	Instructor/s
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.*

## TALK TO TTAP

**W**e 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.

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

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

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

\_\_\_\_\_

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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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 E-mail: [TTAP@utk.edu](mailto:TTAP@utk.edu)  
 Web: <http://ctr.utk.edu/ttap>

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## Materials Available



TTAP regularly receives 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 <http://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	Source	Year
Achieving a High Level of Smoothness in Concrete Pavements Without Sacrificing Long-Term Performance (Publication No. FHWA-HRT-05-068)	FHWA	2005
Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations - Final Report and Recommended Guidelines (FHWA Publication No. HRT-04-100)	FHWA	2005
Roadway Safety Hardware Asset Management Systems Case Studies (Publication No. FHWA-HRT-05-073)	FHWA	2005
<b>CD</b>		
Pavement Preservation Toolbox: Strategies for Preventive Maintenance Programs	FHWA	2005

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