

### Celebrating 45 Years of the Center for Transportation Research



On November 1, 2017 the Center for Transportation Research at the University of Tennessee celebrated its 45th Anniversary at an event in Knoxville. Staff members, students, friends and associates across the State of Tennessee shared a comprehensive program led by CTR’s director, Dr. David Clarke. Highlighting CTR’s efforts to continue to conduct transportation research with excellence and innovation, Dr. Clarke also focused on CTR’s commitment to multidisciplinary transportation research. By serving as the focal point for transportation research at the University of Tennessee, CTR brings experts from multiple engineering disciplines together with economists, planners, logisticians, environmental scientists, and other relevant specialists to provide timely information to federal, state and local governments and the private sector. Dr. Clarke was joined by two former CTR directors: Dr. Kenneth Heathington and Dr. Stephen H. Richards. Dr. Wayne Davis, Dean of UT’s Tickle College of Engineering (TCE), and Dr. William Dunne, Associate Dean for Research and Facilities at TCE, acknowledged CTR’s importance to the Tennessee transportation community.

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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

It is late November as I write to you today. Thanksgiving has come and gone, signaling that the end of another year is close at hand. The leaves were beautiful this year – a welcome change from the drought and wildfires of fall 2016. The mornings are cold, but most afternoons are comfortable. If you can't tell from my comments, fall is my favorite season. Fall is normally an exciting time to be around the UT campus. I've been thinking about how best to sum up the last few months with the Vols and I think it's best to say that I am very happy to transition to basketball season!

We received more than 150 responses to TTAP's 2018 Training Needs Assessment Survey. I want to thank every survey participant for taking the time to share his or her opinions. The Tennessee Transportation Assistance Program exists to serve the needs of the professionals who keep our state's transportation network running, and your feedback allows us to identify those needs. We will share some detailed results from the survey in the Winter 2018 issue of *RoadTalk*. You will also see your input reflected in TTAP's training calendar as we move into 2018. The survey may be closed, but we always want to hear what is on your mind. Please reach out to me or any other TTAP staff member if there is anything that we can do to help you serve your community.

The Center for Transportation Research celebrated its 45<sup>th</sup> Anniversary on November 1. I am proud to have been a part of the last 20 years of CTR's history, but the November event was really about the next 20 years of transportation in Tennessee. We had great participation from several state agencies with big roles in our transportation future. Commissioner David Purkey with the Tennessee Department of Safety and Homeland Security, Deputy Commissioner Toks Omishakin with the Tennessee Department of Transportation, and Director of Primary Prevention Leslie Meehan with the Tennessee Department of Health joined CTR to share their respective departments' views on how changes in transportation will affect Tennesseans in the years to come. The event also provided a public introduction of the 2017-18 CTR Fellows. The CTR Fellows program helps to support CTR's role as an interdisciplinary research center by providing funding and recognition for individual staff and faculty researchers in departments across UT's Knoxville campus. You can learn a little more about what our guest speakers had to say by reading our CTR 45<sup>th</sup> Anniversary article on page 1.

That's all I have for now. The holidays will soon be upon us, and I hope that each of you has a safe and happy conclusion to your 2017. All of us at TTAP look forward to hearing from you in 2018!



Dr. Richards, who currently serves as Director of the Southeastern Transportation Center (STC), presented a historical overview of CTR accomplishments ranging from its work to support pioneering legislation requiring the use of child safety seats in Tennessee to research on multimodal transportation and highway safety.

Dr. Robert Nobles, Interim Vice Chancellor of Research and Engagement at the University of Tennessee, Knoxville, spotlighted the importance of CTR's research and partnerships. Since its formation in the early 1970s, 50+ CTR principle investigators have led approximately 650 sponsored projects. These projects brought the university more than \$150,000,000 in awards from 182 unique sponsors. CTR's top sponsors are the Tennessee Department of Transportation, the US Department of Transportation, and the US Department of Energy. Additionally, he recognized that three CTR staff members, Dr. Jerry Everett, Dr. Clarke, and Dr. Richards, were among UT's largest recipients of funding.

The celebration continued with invited guest speakers that included Commissioner David Purkey from the Tennessee Department of Safety and Homeland Security. Mr. Purkey highlighted the Tennessee Highway Patrol's successful use of Predictive Analytics software. These models have proven to be approximately 70 percent accurate in predicting crash times and locations on Tennessee roadways. These predictions have contributed to declining traffic fatalities in Tennessee and have helped produce significant reductions in THP response times. Mr. Purkey also discussed future concerns with cybersecurity for connected and automated vehicles. Deputy Commissioner Toks Omishakin of the Tennessee Department of Transportation cited CTR's research efforts on behalf of TDOT in all transportation spheres, including planning, design, operations, maintenance and economic impacts. Mr. Omishakin also pointed to TDOT's increasing emphasis on Transportation Systems Management and Operations (TSMO) as multimodal strategies to maximize the efficiency, safety, and utility of existing and planned transportation infrastructure. Finally, Ms. Leslie Meehan, Director of Primary Prevention at the Tennessee Department of Health, elaborated on her department's efforts to create livable, prosperous and healthy communities across Tennessee by focusing on the built environment and opportunities for active transportation.

Dr. Clarke concluded CTR's 45<sup>th</sup> celebration presenting the 2017-18 CTR Fellows. The CTR Fellows Program allows the department to recognize existing partners and stimulate new connections with researchers across UT's Knoxville campus. The latest group of fellows includes: Dr. Rachel Chen, Director of the Center for Sustainable Business and Development in the Institute for a Secure and Sustainable Environment; Dr. David "Butch" Irick, Research Associate Professor in TCE's Department of Mechanical, Aerospace, and Biomedical Engineering; Dr. Lance Saunders, Assistant Professor of Marketing and Supply Chain Management in the Haslam College of Business; Dr. Brad Collett, Associate Professor of Plant Sciences in the UT Institute of Agriculture; and Dr. Qing "Charles" Cao, Associate Professor in TCE's Department of Electrical Engineering and Computer Science.

The technical program was followed by a reception which provided attendees with an opportunity to interact with the 11 UT students presenting their research as part of a poster session.



# Automated Driving Systems – Policy Statement

Source: US Department of Transportation – NHTSA (adapted by Airton G. Kohls)

NHTSA's mission is to save lives, prevent injuries, and reduce the economic costs of roadway crashes through education, research, safety standards, and enforcement activity. As automated vehicle technologies advance, they have the potential to dramatically reduce the loss of life each day in roadway crashes. To support industry innovators and States in the deployment of this technology, while informing and educating the public, and improving roadway safety through the safe introduction of the technology, NHTSA released Automated Driving Systems: A Vision for Safety. It is an important part of the US Department of Transportation's multimodal efforts to support the safe introduction of automation technologies. In this document, NHTSA offers a nonregulatory approach to automated vehicle technology safety.

Section 1: Voluntary Guidance for Automated Driving Systems supports the automotive industry and other key stakeholders as they consider and design best practices for the testing and safe deployment of Automated Driving Systems (ADSs - SAE Automation Levels 3 through 5 – Conditional, High, and Full Automation Systems). It contains 12 priority safety design elements for consideration, including vehicle cybersecurity, human machine interface, crashworthiness, consumer education and training, and post-crash ADS behavior. Given the developing state of the technology, this Voluntary Guidance provides a flexible framework for industry to use in choosing how to address a given safety design element. In addition, to help support public trust and confidence, the Voluntary Guidance encourages entities engaged in testing and deployment to publicly disclose Voluntary Safety Self-Assessments of their systems in order to demonstrate their varied approaches to achieving safety. Vehicles operating on public roads are subject to both Federal and State jurisdiction, and States are beginning to draft legislation to safely deploy emerging ADSs.

To support the State work, NHTSA offers Section 2: Technical Assistance to States, Best



Operational Design Domain (ODD) – definition of where and when an Automated Driving System is designed to operate (Source: US DOT / NHTSA)

Practices for Legislatures Regarding Automated Driving Systems. The section clarifies and delineates Federal and State roles in the regulation of ADSs. NHTSA remains responsible for regulating the safety design and performance aspects of motor vehicles and motor vehicle equipment; States continue to be responsible for regulating the human driver and vehicle operations. The section also provides Best Practices for Legislatures, which incorporates common safety-related components and significant elements regarding ADSs that States should consider incorporating in legislation. In addition, the section provides Best Practices for State Highway Safety Officials, which offers a framework for States to develop procedures and conditions for ADSs' safe operation on public roadways. It includes considerations in such areas as applications and permissions to test, registration and titling, working with public safety officials, and liability and insurance.

**For additional information on the policy go to:  
<https://www.nhtsa.gov/press-releases/us-dot-releases-new-automated-driving-systems-guidance>**

# How to Fix Congestion

Source: Texas Transportation Institute (adapted by Airton G. Kohls)

Is congestion fixable? Well, we can all agree that there is no one quick-fix for traffic congestion. The size of the congestion problem in the largest metropolitan areas is more significant than any one strategy will be able to address, but each strategy does represent a part of the solution. The Texas Transportation Institute under its transportation policy section has developed a very user friendly website with valuable information on congestion management. Please check it out at <https://policy.tti.tamu.edu/congestion/how-to-fix-congestion/>.

The website is structured with tools that can be used to filter and sort strategies by type (more than 80 in total), cost, time to implement, geographic impact (state, regional, local, corridor, spot) or who is responsible (city, state). I personally liked the success stories section, providing potential implementation issues and how the strategy would best help your agency. Furthermore, the strategies are organized in the following categories:

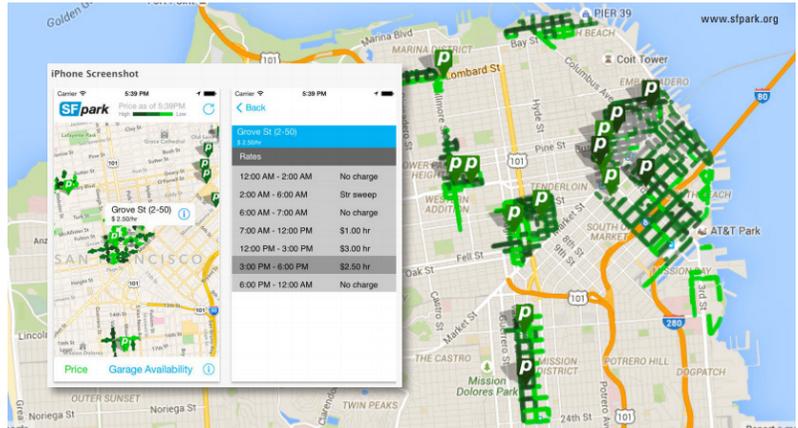
- Traffic Management
- Additional Capacity
- Pricing Strategies
- Travel Options
- Construction Improvements
- Land Use Planning
- Bicycle and Pedestrian Facilities
- Freight
- Active Traffic Management
- Technology

The following is a small sample of some of the strategies used around the country to help alleviate congestion.

## Parking Management

Cities are starting to see parking as a commodity rather than required infrastructure. Some cities are using new parking technology with paid parking to better manage the available parking space. Through online and smartphone applications, drivers can identify when and where parking is available at their destination. By using real-time monitoring and active management of changing parking rates, cities and business districts can:

- Ensure the necessary number of open spaces is available.



Screenshot of city of San Francisco dynamic management of 7,000 metered parking spaces and 15 city-owned parking garages. (Source: TTI)

- Reduce the traffic congestion caused by looking for a parking space.

## How Will This Help?

- Reduces localized traffic congestion by reducing the need to hunt for a parking space.
- Reduces pollution associated with idling and circling city blocks looking for a parking space.
- Encourages mode shifts by making public transit more attractive in crowded areas.

## Implementation Issues

Taking advantage of available parking is desirable. However, where public agencies and private entities provide limited parking space, cooperation is often weak. This is worsened by the fact that parking generates money, and no party wants to reduce its related profit. The key is to show that providing customer convenience and improved efficiency helps everyone.

## Reducing Construction / Maintenance Disruption

A transportation management plan should coordinate efforts by several stakeholders, shape public expectations, and include three elements for controlling traffic operations during the projects:

- Temporary Traffic Control Plan (guiding traffic through the work zone).
- Transportation Operations Plan (route, departure time, and modal strategies to mitigate project induced congestion in the corridor or region).

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- Public Information Plan (communicating to the public before and during the project)

A new technique for reducing congestion at construction sites is the zipper (also late or joint) merge where drivers are asked to take turns merging into one lane at a merge point. This technique has been shown to shorten queue lengths by up to 35 percent.

#### How Will This Help?

- Mitigates congestion and reduces delay caused by construction or maintenance.
- Increases safety in work zones for construction workers and travelers.
- Expedites construction and maintenance on roadways.

#### Implementation Issues

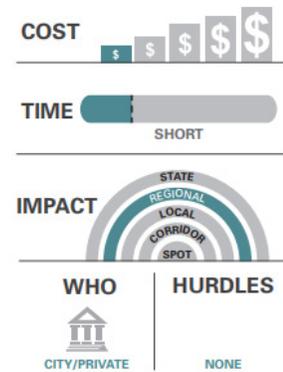
No major implementation issues are associated with developing a traffic management plan. Planners must communicate with and include all stakeholders early in the development process to ensure the plan covers all elements of the project, including utility management, safety, incident management, emergency services, law enforcement, and public awareness.

#### Flexible Work Hours

Flexible work hour programs (or flextime) allow employees to work within a specific time range during the day, often avoiding peak traffic periods, though all employees work a core period of the day. Flexible work hour programs distribute peak-hour traffic to less congested hours, reducing commute times and potentially extending daily hours of operation. Unlike telecommuting, flexible work hours can be more easily used by businesses that use shift work.

#### How Will This Help?

- Reduces traffic volume and congestion during peak times by shifting drivers to less congested times or alternate modes.
- Saves employer and employee costs through happy employees and time and fuel saved from commuting in off-peak hours.



The 'SUCCESS STORIES' section is highlighted with a teal header. It features two examples. The first is for 'Texas Instruments', which includes an icon of a calendar and a clock, and text stating that their workplace flexibility program began in 1993, encouraging employees to use flexible schedule options. The second story is for 'Houston, Texas', featuring an icon of cars on a road and a clock, and text describing a flextime initiative launched in 2006 that improved travel times and reduced freeway congestion.

A sample of the metrics of Flexible Work Hours as a congestion management strategy (Source: TTI)

## Statewide Interim Approval for Optional Use of Three Section Flashing Yellow Arrow Signal Faces

by Airton G. Kohls (Source FHWA)

The Tennessee Department of Transportation has received interim approval for optional use of the Three Section Flashing Yellow Arrow Signal Faces statewide in Tennessee, including State highways and all local jurisdictions' roadways. Any local jurisdiction desiring to use the Three Section Flashing Yellow Arrow Signal Faces will need to coordinate with the Tennessee Department of Transportation (TDOT) State Traffic Engineer. FHWA requires TDOT to maintain and periodically update a list of all the locations where this traffic control device is used.

It is important to notice that this interim approval refers to the optional use of the Three Section Flashing Yellow Arrow (FYA) Signal that use the middle section to show both the FYA and the steady yellow arrow.

## Background

In 2014, FHWA approved the optional use of the Three Section Flashing Yellow Arrow Signal Faces that use the middle section to show both the FYA and the steady yellow arrow based on an NCHRP research titled "Evaluation of the Flashing Yellow Arrow (FYA) Permissive Left-Turn and Yellow Arrow Change Indications in Protected/Permissive Left-Turn Control: The Impact of Separate and Shared Yellow Signal Sections and Head Arrangements" and on recommendation from the National Committee on Uniform Traffic Control Devices (NCUTCD). The NCHRP Web-Only Document 207 can be found at:

[http://www.itap.org/login/resource/entryupload/uploads/1742658608\\_resources\\_20150107150622NCHRP%20Report%20207.pdf](http://www.itap.org/login/resource/entryupload/uploads/1742658608_resources_20150107150622NCHRP%20Report%20207.pdf)

The primary advantage of allowing the optional use of a three-section FYA signal face that uses the middle section to show the FYA and the steady yellow arrow is that existing three-section protected-only left-turn signal faces could easily be converted to three-section FYA signal faces. This conversion would allow the use of variable mode left-turn phasing on approach, with the protected-only left-turn phasing mode being used during peak periods when gaps in opposing traffic are infrequent and the protected/permissive left-turn phasing mode being used during off-peak periods when gaps in opposing traffic are more plentiful.

The city of Cleveland, TN has installed the 3-section FYA and provides videos for the operation of the signals in their website: [http://www.clevelandutilities.com/Traffic/FYA\\_info.htm](http://www.clevelandutilities.com/Traffic/FYA_info.htm)



**Steady Red:**  
Stop

**Steady Yellow:**  
Prepare to Stop

**Flashing Yellow:**  
Left turn after yielding to oncoming traffic/pedestrians

**Steady Green:**  
Protected Left Turn

3-section FYA (Courtesy: Cleveland Utilities – Cleveland TN)

## Safety Tips for Snow and Ice Control



*Reprinted with permission from the Iowa LTAP, Iowa State University*

With the approach of winter weather, we found some tips that will be useful to our readers. However, please always check with your supervisor and follow your agency's safety policies and procedures.



### Suggested personal safety gear

- Layers of clothes, extra gloves, heavy boots
- Shovel and ice scraper
- Flashlight for night operations
- Sunglasses for glare
- Water and/or hot liquid



### Advance preparation

- Be properly trained and thoroughly familiar with all equipment and chemicals.
- Make sure an up-to-date first-aid kit, emergency contact information, and hand-held radios or cell phones are available in your vehicle.
- Be in good physical condition with adequate rest.
- Perform a pre-trip safety check of truck and equipment. Make sure the vehicle has adequate warning lights in good working order.
- Make a practice run of assigned route to check for obstacles and potential problem areas.
- Know the contact procedures for reporting crashes or equipment breakdowns.

### During operations

- Dress in layers with heavy boots.
- Wear highly visible apparel when out of your vehicle.
- Plow at appropriate speed.
- Watch for pedestrians and other vehicles.
- Don't back up without a spotter.
- Operate wings carefully.
- Make sure warning lights are activated.



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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. Please fill out and fax the form below to TTAP at (865) 974-3889 or mail to TTAP; Suite 309 Conference Center Building, Knoxville, TN 37996-4133 or email TTAP@utk.edu if you have any questions.

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

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

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