



# Are We There Yet?

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## Revised MUTCD Sets New Safety Standards

RECENT RELEASE of the 2009 Manual on Uniform Traffic Control Devices (MUTCD) introduces a range of updates and additions local road officials will need to apply in their jurisdictions.

The first comprehensive revision of the national standard in six years features changes from expanded use of symbol signs to new guidance on establishing right-of-way control at intersections. It also incorporates minimum sign retroreflectivity standards adopted in January 2008.

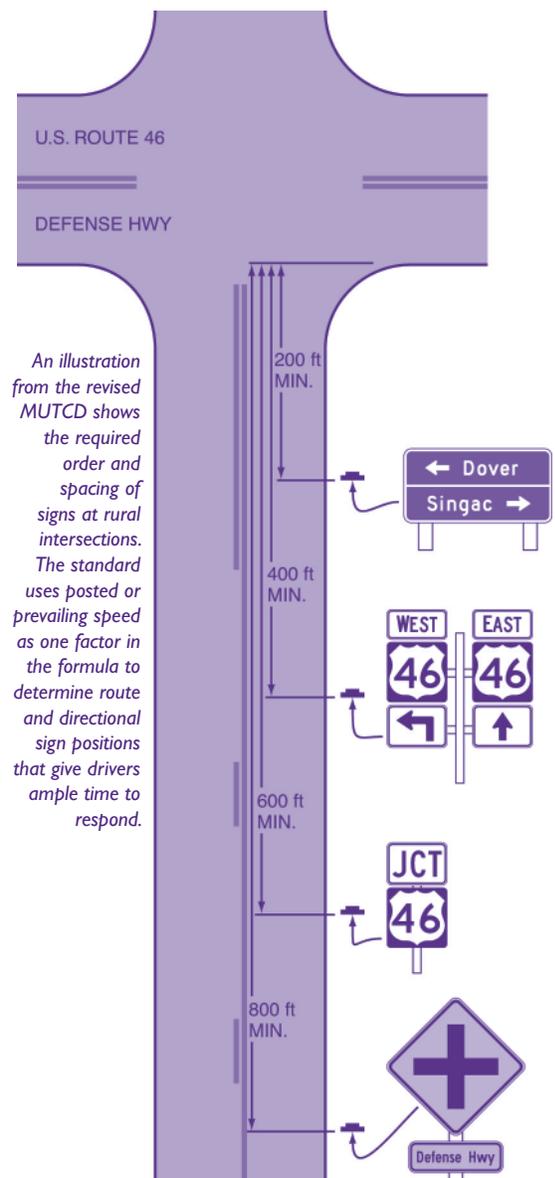
This article highlights a selection of the updated provisions that will influence transportation infrastructure for state and local governments.

### Safety data provides framework

Tom Heydel, Traffic Engineer for WisDOT Southeast Region—who served on a review committee for the 2009 edition—says the basis for many key changes came from data from traffic safety and operational studies and observed trends.

“More than previous editions, this manual reflects the results of individual FHWA initiatives focused on improving safety,” he observes. “The goal was to make sure there was good research and informed judgment behind every decision to change or add.”

*“The goal was to make sure there was good research and informed judgment behind every decision to change or add.”*



*An illustration from the revised MUTCD shows the required order and spacing of signs at rural intersections. The standard uses posted or prevailing speed as one factor in the formula to determine route and directional sign positions that give drivers ample time to respond.*



John Berg, Division Design and Operations Engineer for the Federal Highway Administration (FHWA), based in Madison, says the updated MUTCD also furthers the “complete streets” concept by requiring better pavement markings and longer walk times at crosswalks to increase safety for bicyclists and pedestrians.

Berg and Heydel identified the various provisions they know, from experience and feedback, will have an impact on keeping local roads safe and in compliance.

### More sign visibility

The MUTCD update adds methods for enhancing the conspicuity, or visibility of regulatory, warning or guide signs with flags, plaques, reflective stripes and beacons.

It also specifies the order and spacing of directional and route signs at rural intersections, and the minimum horizontal offset from the edge of the travel lane and/or shoulder. Here as elsewhere in the new edition, Heydel says detailed figures illustrating the standards make them easier to understand.

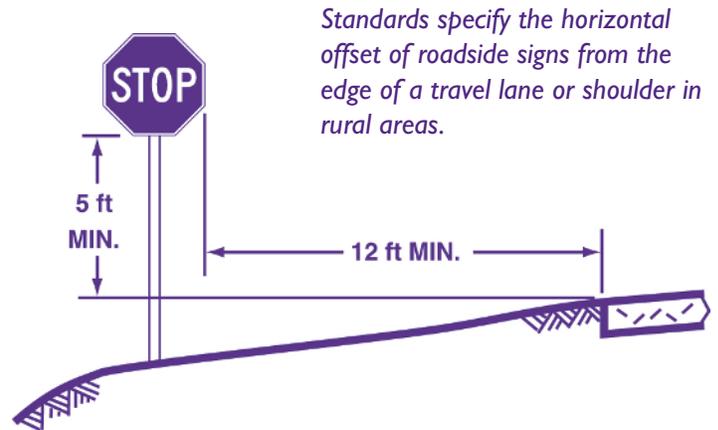


*Plaque in black on yellow background alerts drivers to a new turn restriction.*



*Red / orange flags call attention to a change in the posted speed limit.*

Changes in the 2009 edition strengthen requirements for signing horizontal curves to reduce crashes. A new table defines various approaches based on the difference between the posted or prevailing speed and advisory speed. Heydel suggests the information makes it easier to establish safe speeds under every condition and install signs that match.



One change that takes a broad stroke is the standards now apply to private roads open to public travel. The MUTCD covers roads within shopping centers, airports, arenas and other privately owned facilities. Berg notes some rules do not translate easily to conditions in parking lots and facilities so these are exempt.

### Roundabouts and setting speeds

In response to the growing use of roundabouts in the United States, the new MUTCD expands its section on signing and pavement markings for this new style of intersection. The manual introduces new directional arrow signs and circulation signs specific to roundabouts.

Speed studies get a strong endorsement in the 2009 MUTCD. According to Heydel, it emphasizes development and use of these engineering studies for setting speed zones. There is new guidance in the manual for establishing right-of-way control at intersections. Traffic volume on all legs of the intersection, approach speeds and approach angle, sight distances and crash data are among factors to consider.

## Signs and signals

Using studies that show growing public recognition of traffic control symbols, the 2009 MUTCD specifies them in many cases to replace language signs. Examples include “School bus stop ahead” and “Turning traffic must yield to pedestrians.” It also retires word signs like “HILL” or “DIVIDED HIGHWAY” in favor of universal symbols.



New “school bus stop ahead” symbol sign has a black legend on green fluorescent background with red to show flashing lights and stop sign on a standing bus.

Extensive research prompted FHWA to take a new look at determining signal warrants related to pedestrian volume. The provision requires road officials to examine a combination of vehicle and pedestrian volumes over a four-hour period or during a single peak hour. Berg says this makes it easier to meet Warrant 4 requirements with lower pedestrian volumes on streets with a high volume of vehicle traffic but harder to meet it on streets with low volume.

A new section on countdown pedestrian signals addresses application of hybrid beacons as an option at unsignalized crosswalks or where emergency vehicles cross traffic. Known as the HAWK, the

device combines features of a traffic control signal with a warning beacon and goes dark between activations.

## Legible street name signs

The anticipated update of requirements for street name signs is part of the 2009 edition. Sign legends must be a mix of uppercase and lowercase letters, see figure 1. Traffic speed dictates letter size: signs along a 45 mph or faster multi-lane roadway require 8-inch upper-case and 6-inch lowercase lettering versus 6-inch uppercase and 4 1/2-inch lowercase for lower posted speeds. For local roads posted at 25 mph or less, the 4-inch /3-inch standard still applies.



Figure 1

The new provisions allow the use of blue, brown or white as an alternative to green for the back-ground color of street name signs. The new standard for legend colors is white lettering on green, blue and brown signs, black letters on white signs.

With changes in sign sizes related to road speeds and other regulatory factors, the MUTCD also features a new Sign Size table to give street and road officials an easy reference for updating their signs.

Reprinted with permission Wisconsin LTAP, Crossroads Newsletter, Spring 2010.

## Getting on Board with Transit

The T3S newsletter has always included a wide variety of topics to meet the needs of a very diverse audience. Recent article topics have ranged from the technical in nature to traffic safety and worker safety issues, while other articles addressed sustainability, recycling, etc. One topic that has not been covered is transit issues.

Over the past year, T3S has developed a relationship with the Transportation Association of South Carolina (TASC), and decided to feature some articles on transit issues. We hope the two articles in this newsletter and future articles will be beneficial to the local agencies involved in transit and be informative to all of our readers.

Articles reprinted with permission from the July 2010 issue of the *Kansas TransReporter*, a newsletter of the Kansas Rural Transit Program (RTAP) at the Kansas University Transportation Center.

# How to Work With an Agitated Passenger

By Anne Lowder

## Practical tips for drivers in handling specific types of situations.

Whether you are assisting a passenger into a transit vehicle or driving down the road to a scheduled destination, a passenger may become agitated. There may be just one factor contributing to this agitation, such as a passenger with dementia imagining he or she missed an appointment or obligation. Or there could be other reasons (or a combination of them) for the agitation such as the inability to communicate basic needs, strange surroundings, medical conditions that affect brain activity, or just wanting to be somewhere else.

Passengers who are agitated may refuse to board the vehicle, perform distracting behaviors during the ride such as moving from seat to seat, attempt to leave the vehicle while in motion, and be or become argumentative. As a driver, keep in mind that there are ways to deal effectively with the behavior of an agitated passenger, but the same method may not work each time. Be ready to try different approaches.

## Transporting an agitated passenger

Customer management on the vehicle you drive is important. The majority of your passengers are most likely quiet, courteous, and easy to serve. Occasionally someone will present you with a problem, but the common denominator for transporting all your passengers is effective communication, which starts with remaining professional and keeping calm, cool and focused. As a transportation operator, you are the leader establishing a level

of communication that provides a quality ride for every passenger, including those who may be challenging.

A major barrier to effective communication can be our own tendencies to judge and then approve or disapprove of someone based on their actions or appearances alone. A second barrier is allowing emotion to take over. No matter how badly your passenger behaves, as a professional driver it is your responsibility to remain calm. You must match what you say with how you say it.

## What are strategies for good communication?

There are several strategies that can help you get your message across in almost any situation, and these are particularly effective with working with someone with a cognitive impairment:

- Be calm, or at least attempt to appear calm.
- Try to put yourself in the person's situation. Imagine how he or she might be feeling or is trying to express.
- Use positive and helpful body language.
- Offer as much reassurance as you can.
- Give extra time for the passenger to respond.
- Speak directly and clearly. Use short sentences and simple, easy-to-understand words.
- Keep directions clear by explaining one step at a time.
- Provide accurate, honest information.
- Empathize. Try to put yourself in their place, and tell them that you can see their point of view.

- Use pictures and objects to illustrate your words. Point to your ID picture as you say who you are, point to any safety equipment as you speak about it. Anticipate what you need the passenger to do, and connect those tasks to other common events. For example, “By lunch time...” “By the time the sun goes down...”

## Heading off agitation

So what do you do if your passenger repeats the same gesture, asks the same question over and over, switches from seat to seat, tries to blame you for something you didn't do, or becomes paranoid that you are plotting against him or her? How about when someone sees objects or people that aren't there, or says things that simply don't make any sense? Is your reaction to try and bring the person back to reality? No, that strategy generally does not work.

Passengers who are agitated often have a cognitive disability such as dementia and are living in a different time than you or I. When they talk about people or places from the past, go along with them instead of correcting them. This will help create a calming connection between you and your customer. Simply repeat back what they say and then ask them to tell you more about that person or place.

For example if your passenger becomes argumentative because he believes that he lives at a different house than where you are headed, it is often helpful to agree and act as if you are going along with his plan—even use it as a discussion topic—while you are proceeding to the original destination. This will help

him use the parts of his brain that are still working and alleviate anxiety by allowing him to re-experience his memories. This is usually more effective than arguing with someone with dementia, as he may not have the ability to understand the reality of the situation even after many attempts on your part to explain things.

Validate your passenger's beliefs, which will result in more cooperation. Validation is empathy; however, empathy is not sympathy, confrontation or being patronizing. The chart below outlines some role-playing ideas using validation that handle some of the more difficult situations you may face as a driver.

## Summary

As a driver you have an important job to not only provide your customers with a safe and comfortable ride but also to provide positive customer service. Skill in working with agitated passengers is not as much a natural skill as one developed by practicing responding to potential situations, evaluating how a given situation evolved, and making changes to the situation based on a desired outcome. The process must start with training in passenger assistance. Remember that working with agitated passengers is within your control; apply the various training tips to situations on your vehicle to find the tips that works best with each customer.

Reprinted with permission from the July 2010 issue of the Kansas TransReporter, a newsletter of the Kansas Rural Transit Program (RTAP) at the Kansas University Transportation Center.

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An agitated passenger will react more to nonverbal cues, such as tone of voice and your body language, than to the words you are saying. So when approaching an agitated passenger it is important to keep in mind personal space, body language and voice.

### Personal Space:

Invading a person's personal space can be thought of as a threat, especially if a person is already agitated. Look for clues from your passenger that you are invading this space, such as clenching of the fist or tightening of the facial muscles.

### Body Language:

Agitated people can feel threatened with a face-to-face confrontation. A better position is at a slight angle with 2 or 3 ft of distance between you and the passenger. Other parts of your body can deliver a mixed message such as clenching your own fist or frowning or scowling as you are delivering a calming message.

### Voice:

The meaning of a message can change with the tone and volume of the voice. It is true that some situations call for the need for you to raise your voice to get attention and response to your authority. Remember, though, that your voice and tone should never match the intensity of someone who is agitated or out of control. The better solution is to lower your voice; this distracts the person from their behavior and makes them listen.

## Tips for Handling Specific Behaviors of Agitated Passengers

### Passenger Behavior

- Attempts to leave the vehicle, or being argumentative because of a belief that they should be going somewhere else.
- Agitated or resists entering the vehicle.
- Agitated behavior while riding.

### Why the Behavior is Occurring

- Desire to meet obligations that don't (or no longer) exist.
- The agitation might have occurred before your arrival.
- The inability to communicate the need to use the rest room, or the environment of the vehicle, such as noise or temperature, is discomforting.

### Strategies to Work with the Behavior

- Often helpful to agree and even use it as a discussion topic while you are proceeding to the planned destination. In other words validate the passenger's beliefs as opposed to re-orienting those beliefs.
- Allow the passenger to calm down; often a short walk will help in this process. Also a person may have forgotten how to enter the vehicle; patience and simple directions will help.
- Be prepared with relaxing music, sunglasses, a piece of candy or a magazine to decrease the agitation through distraction. Another distraction is to start a conversation about your passenger's grandchildren or a hobby.

# Coordinating Rural Transit Requires Thinking Outside the Box

By John Elias

People rarely limit their destinations to political boundaries. Kansas pilot programs ask: Why should rural transit services be that way?

Regional transit coordination pilots under the direction of Lisa Koch at KDOT and facilitated by Joel Wright and Kathleen Harnish-Doucet of TeamTech, Inc., have yielded significant results in little more than a year. In our last issue we detailed how the Flint Hills and North Central pilots will begin coordinated dispatch this summer while the newest pilot in Southwest Kansas is seeking to emulate those two success stories. These Kansas pilots have developed a road map for coordinating transit in rural areas. What process should other communities follow?

## Identifying the region

Successful regional coordination requires an understanding of the travel needs in an area. People are rarely limited to city or county boundaries in the places they need to go. The Kansas process begins by determining the transit region through a broad market analysis of employment, education, human service and medical trip generators and destinations. A wide view of a transit market maps the relationships between:

- Journey-to-work patterns.
- Major employers.
- Population density.
- Regional medical centers and other medical care services (or their absence).
- Colleges, trade schools and educational centers.

The process establishes a transit “catchment area” of communities in a region with similar travel patterns and identifies the communities that may benefit from coordinated

transit in the pilot areas. The KU Transportation Center has provided the data collection and analysis to support this step in the process. Armed with an idea of regional travel patterns, organizers can reach out to stakeholders to try to bring together parties interested in better serving the region through coordinated transit.

## Who should be included?

The Kansas process depends on local leaders for its success. Market analysis can show the optimal service area but regional coordination cannot succeed without local leadership. The process seeks to involve interested parties in the catchment area early on through personal visits and meetings. Interested parties include:

- Area transit agencies.
- Other agencies with transportation (e.g., centers for aging or developmental disabilities).
- County/city commissioners.

Stakeholders in a region may see the need for coordinated transit, simply want to make a difference for the mobility needs of the community or wonder how coordination can better serve local residents.

The involvement of local transit providers is critical to the success of regional coordination. KDOT and Team Tech identified interested parties and made face-to-face connections with as many of those as possible to define the goals of regional coordination before early regional meetings were held. In regional meetings all stakeholders were invited to discuss the goals of regional coordination and work through concerns. Early efforts should be made to combat the fear of change and develop a different concept of what rural transit could

look like. In many communities transit is delivered by scheduled dial-a-ride vans, functioning like a taxi for many users. The coordination planning process encourages stakeholders to see the benefits of regionally marketed transit providing service to current mobility-limited populations as well as expanding service to the general public.

## Establish realistic timelines

After establishing the need and area for coordination and inviting stakeholders to envision a regional approach, KDOT and Team Tech established timelines for inventory and exploration. Each transit provider was tasked with sharing vehicle and route inventories. The process realizes that effective coordination builds on the successes of the present. Transit providers and agencies with transportation functions are encouraged to bring their governing rules and regulations to discussions so that the collaboration can take what works best in the region and incorporate it a new coordinated plan. Each person needs to know his or her assignments, with follow-up to meet the timeline.

## Committees can do it!

When stakeholders have an inventory and understanding of the current transit network, the real work can begin. Committees are then established to get people closer to the critical transit issues in their region and divide up the work. Periodic committee presentations to the group as a whole can help build a regional consensus about how to move forward. Stakeholders are chosen for committees based on interest and experience with an understanding

that each committee member has limited time and may have a large distance to cover to attend meetings. Committees must determine regional policies for:

- Fare collection.
- Coordinating funding streams.
- Creating budgets fair to all parties.

Some services may collect fares, a nominal fee or nothing at all. Fare committees must investigate regional fare policies make recommendations for a combined approach that works. Each agency and community will have its own funding streams and method for allocating transit funding. Committees must determine the fairest method to receive and allocate transit funding through a new regional budget. After committees investigate the current practice in the region and review case studies from successful efforts across the nation, they make recommendations to the larger group.

In the end, the regional group may need to begin with a phased roll-out. Some transit agencies may be

equipped to switch to a regional model more quickly than others while some may wish to see the success of a smaller scale first phase before opting to join in. A phased approach allows coordinated efforts to start small with the most enthusiastic agencies, providing a solid foundation to build regional coordination.

### Lessons learned

The Kansas process provides a model for rural transit coordination on a regional scale. Initial success in the North Central and Flint Hills pilot programs depended on stakeholder support and initial groundwork of the coordinating team. Transit providers who see the value of coordination are the key to success, according to Wright. Other key lessons include:

- Transit provider buy-in.
- Efficient, customer friendly centralized dispatch.
- Coordinated advertising.
- Maintain personal touch.
- City/county commissioner support.

Regional coordination can use centralized dispatch as a tool to gain the support of transit providers, encourage city and county commissioners to see the value of coordination and use those early supporters as enthusiastic phase-one adopters of regional coordination. Their success will encourage others to join in the collaboration and build a strong regional transit system that gets people where they need to go. Reprinted with permission from the July 2010 issue of the Kansas TransReporter, a newsletter of the Kansas Rural Transit Program (RTAP) at the Kansas University Transportation Center.

### Sources

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### Human Service Transit Coordination: A Rec

In 2005 under SAFETEA-LU, transit agencies that received Section 5310, 5316 or 5317 funds were required to develop Coordinated Public Transit-Human Service Transportation Plans. These plans sought to minimize duplication of service, encourage coordination and enhance transportation across regions. Regional coordination efforts can use the data and connections made during coordination planning to inform and strengthen collaborative efforts.

The Federal Highway Administration and the Federal Transit Administration hosted two roundtables in 2009 to share the lessons learned from coordination planning across the nation. Just as participants in the Kansas regional pilots learned, coordination planning groups across the US found their greatest challenges were coordinating providers with different missions. Some serve elderly individuals while others provide job access. Developing a coordinated mission involves sharing information and establishing a dialogue, as the Kansas process shows.

Public transit-human service transportation coordination also allows human service transportation providers who may lack the staff or expertise for long-range transportation planning to pool their efforts and develop a regional vision. Regional coordination efforts should use coordination plans to establish areas of overlap and areas of strength.

For more information on coordination planning contact Doug Frate, Chief Transit Planner, SCDOT 803-737-1444.

### One Year Timeline

Build the Case

- Work on understanding a regional transit concept
- Develop an appreciation for central dispatch benefits
- Identify transit needs in the region

Ask: What do we have?

- Current inventory of vehicles
- Case studies – best practices
- Current cost of operations

Develop Elements of a New Vision

- Future budget for regional plan
- Fare plan
- Coordinated route plan
- Plan for contracted services
- Governance plan
- Communication plan
- Evaluation plan

# Safety Zone



## Most teens still driving while distracted

By [Larry Copeland](#), USA TODAY

Nearly 9 in 10 teenage drivers have engaged in distracted-driving behaviors such as texting or talking on a cellphone although most of them know that their actions increase their risk of crashing, a new survey finds.

The survey by *Seventeen* magazine and auto club AAA highlights the difficulty of the nation's efforts to stop texting while driving, especially among young drivers.

"Teens do continue to drive distracted even when they recognize the dangers," says William Van Tassel, manager of AAA's driver training programs. "Driving is the first real adult responsibility, but let's face it, they're still teens whose brains aren't fully developed."

The online survey of 1,999 teens ages 16-19, conducted in May and made public today, found that 84% were aware that distracted-driving behaviors increase their crash risk; yet 86% have engaged in those behaviors, including texting and talking on cellphones, eating, adjusting radios, driving with four or more passengers and applying makeup. The margin of error was +/-2.2%.

The USA's crackdown on distracted driving — which has enlisted the efforts of Transportation Secretary [Ray LaHood](#), television talk show host Oprah Winfrey and other influential people — has focused on educating young drivers about the dangers of such distractions.

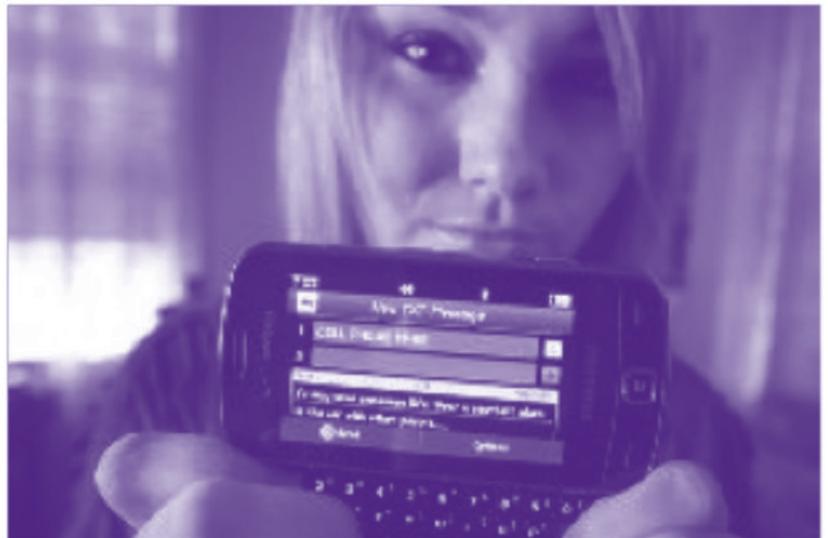
Almost 6,000 highway deaths each year involve distracted driving, the National Highway Traffic Safety Administration says.

Eleven states have enacted bans on texting while driving this year; 30 states and the District of Columbia now have passed such prohibitions for all drivers.

"Everybody has heard the message that distracted driving can raise your crash risk," Van Tassel says. "They're getting the message, but their personal experience may influence them in the other direction."

That's what happened to Cheyenne Tontegode, 18. She was a passenger in a car driven by a friend last year in their hometown of Lincoln, Neb., and both girls were texting, Tontegode says.

"She was either texting somebody else, or I was showing her something on my phone," she says. "I looked up and saw that we had started to get over into the other lane. I called her name. She looked up, overcorrected, and we hit an SUV head-on."



*Cheyenne Tontegode, 18, of Lincoln, Neb., was seriously injured in a car accident in 2009 when her friend who was driving lost control of the vehicle after being distracted by her cellphone.*

Tontegode, who wasn't wearing a seat belt, was in the hospital for 10 days. One of her legs was cracked in 14 places, and she had broken ribs and glass in her eye; her friend was hospitalized for 14 days, she says.

She says she had gotten the texting-while-driving message before the crash.

"Well, yeah. Of course you hear it. You hear it all the time from adults," she says. "But people don't think about it until it happens to them, unless they get the message from another teen. If it happens to another teen, then I think they listen."

Tontegode says she now wears her seat belt "all the time," and her friend "only texts when she's at red lights. The minute it turns green, she puts her phone down and doesn't look at it again until the next red light."

The survey indicates that focusing solely on texting while driving will not eliminate distracted driving among teens. The top three behaviors that respondents had participated in: adjusting a radio/CD/MP3 player (73%), eating (61%) and talking on a cellphone (60%); 28% had sent a text message.

What's "eye-catching" is all the other forms of distracted driving engaged in by teen drivers, says [Ann Shoket](#), editor-in-chief of *Seventeen*.

"We have to get teens to realize that when all their friends pile into the car, that's distracted driving," Shoket says. "When they're eating or using the cellphone ... all of that is distracted driving."

### Among the survey's findings:

- Drivers ages 18-19 are more likely to engage in distracted driving than those 16-17.
- Teens gave researchers startling reasons why they engage in distracted driving: It takes only a split second (41%); they don't think they'll get hurt (35%); it makes driving less boring (22%); and they're used to being connected to people all the time (21%).
- Teens driving their own vehicles are more prone to distracted driving than those who share an automobile with others. For instance, 20% of teens who share vehicles had texted while driving, compared with 35% of teens with their own cars.

*Reprinted by permission of Indiana LTAP.*

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## Safety-driven Software Aims to Block Texting While Driving

ATLANTA — Technology is emerging that could solve a growing menace on the nation's highways: texting while driving.

A Georgia company today announces a partnership with an Irving, Texas, firm to provide software to government agencies and businesses that disables the texting, e-mailing and Web-browsing functions of a wireless phone in moving vehicles. Manage Mobility, an Alpharetta-based management and logistics firm, will provide technology developed by WebSafety Inc.

"We are being asked by our customers what to do on this sort of thing, especially since October ... when President Obama issued the federal order banning federal employees from texting while operating government-owned vehicles," says Stacy Chisum, Manage Mobility's vice president of sales.

Thirty states and the District of Columbia have banned the practice, but the laws are difficult to enforce. The national movement to discourage it — aimed mostly at young drivers — is spreading to corporate employees and the U.S. government.

Several applications disable cellphones when a vehicle is moving, preventing texting or surfing the Web. These apps, including iZup, tXtBlocker, ZoomSafer and CellSafety, use a phone's GPS to determine when a vehicle is moving, and block the ability to text when the car is going faster than 5 or 10 mph. Some apps have opt-out features for passengers. The apps do not work on the iPhone.

# Keeping Trees in Tip-Top Shape

By Cindy Ratcliff

Compared to the rest of the landscape, trees are about as low-maintenance as you can get, which makes them easy to overlook. Sure, you remember to water and fertilize them with the rest of the grassy areas you care for, but they really need more than that to thrive. A regular maintenance program will add vigor and help prevent future problems—and you'll still spend less time on it than for the rest of the landscape, guaranteed.

1. At least once a season, perform an overall evaluation of the tree's health. Start by looking for any dead or damaged branches. If you find some, make a note so that you can follow-up to ensure there isn't a pattern indicating a more serious problem. Remove the damaged branches as quickly as possible. You want them off the tree because they are especially susceptible to insects and disease.

Also look at the growth pattern of the tree. You can examine a branch to determine yearly growth. Just find the new buds and then look for the scars from last year's buds. The amount of growth will vary by tree, so you'll need to compare it to what is normal for that specific type of tree. But you can also compare this year's growth to that over the past three years by evaluating the scars from previous years' buds. The growth pattern should be about the same each year.

Check leaves. They should be an appropriate color for the season and also have similar shape. If the leaves are oddly shaped, it could be an indication that there is a more serious problem with the tree. The leaves should also not be wilted. Wilted leaves can be a sign of something as simple as needing more water or as serious as disease.

The last—and most critical—element of the evaluation is to check for obvious signs of insects or disease. Look for holes in the bark and for visible insects themselves.

2. Plan for pruning, but not topping. The International Society for Arboriculture (ISA) is resolute in its warning against topping trees. Topping is a method used for reducing the size of a tree, sometimes by as much as 50 to 80 percent of the crown, by cutting branches back to stubs. Because the leaves are the food factory of the tree, removing them to this degree can starve the tree, sending it into survival mode. The result: The tree will be more susceptible to disease and more attractive to insects in its weakened state. It also weakens the subsequent replacement branches.

Proper pruning, however, removes excessive growth without the negative side effects of topping. Never remove more than  $\frac{1}{4}$  of a tree's crown in a season. All pruning should be done with these goals in mind: to improve tree structure, enhance vigor or maintain safety. The ISA instructs that no branch should ever be removed without a reason.

3. Fertilize. In ideal conditions, trees need little to no fertilizers. If they are healthy, planted in a place where they have ideal soil conditions, plenty of water and sunshine, they will thrive. But many roadside and median landscapes are less than ideal. For that reason, trees are typically going to require some nutrients they aren't getting in their existing landscapes.

It's important to note that typical weed-and-feed fertilizer that you may currently be using on turf may not be doing any favors for the trees. In fact, it may be harmful, according to the ISA. "Soil conditions, especially pH and organic matter content, vary greatly, making the proper selection and use of fertilizer a somewhat complex process. When dealing with a mature tree that provides considerable benefit and value to your landscape, it is worth the time and investment to have the soil tested for nutrient content."

## Micromanagement

Making sure that fertilizers and other chemical treatments reach an area where they can be used efficiently by the tree can be a challenge. Trying to spray chemicals on the tree canopy can result in as little as 50 percent actually reaching the tree. The overspray falls to the ground or, worse, can be carried by the wind and damage surrounding plants. If trees are planted too deep or have a weak root system, traditionally applied fertilizers will never reach the target, either.

This is where microinjection treatments can benefit. Through microinjection, you can inject pesticides or nutrients directly into the tree's vascular system, insuring a successful treatment is achieved and without having to depend on root function.

The equipment for microinjection is relatively low cost, and most manufacturers and suppliers of injection systems offer training on use.

Cindy Ratcliff is a freelance writer who specializes in landscape, trees, and chemicals. Ms. Ratcliff can be reached at [cindy\\_ratcliff@yahoo.com](mailto:cindy_ratcliff@yahoo.com).

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### Transportation Technology Transfer Service

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### Publications

- Crash Impact of Smooth Lane Narrowing with Rumble Strips at Two-Lane Rural Stop-Controlled Intersections*, FHWA. This techbrief describes a low-cost remedy to address crashes at unsignalized intersections on two-lane rural roads, the Federal Highway Administration (FHWA) developed and evaluated a treatment to reduce approach speeds by narrowing lanes using rumble strips in the median and on the right-lane edge.
- Factors Contributing to Pedestrian and Bicycle Crashes on Rural Highways*, FHWA. The goals of this study were to examine the differences between pedestrian and bicycle crashes in urban and rural settings in North Carolina and to identify problem areas (specific crash types and crash locations) on rural highways that are of high priority for safety treatment and treatment development.
- Addressing Safety on Locally-Owned and Maintained Roads*, FHWA. Locally-owned road safety remains a challenge to many States. Several States have shown measured success in addressing local road safety. Seven States were identified to participate in the Local Road Safety Domestic Scan, allowing a team of transportation professionals from the Federal, State, and local levels to visit and document their practices. The Domestic Scan report identifies and documents practices in the planning, programming, and implementation of efforts to improve local road safety. Practices are presented in data collection and analysis; local project identification; local project administration; funding; training and technical assistance; outreach and partnerships between State Departments of Transportation (DOTs) and local agencies. The report provides States with valuable information to launch a local road safety program or implement documented practices to improve an established program.

### Transit Publications

- Guidebook for Recruiting, Developing, and Retaining Transit Managers for Fixed-Route Bus and Paratransit Systems*, TCRP Synthesis 139. Addresses the needs of rural and smaller urban bus transit systems. It is organized in three sections, Recruitment Recommendations, Training and Development and Retention Recommendations.
- Effective Use of Citizen Advisory Committees for Transit Planning and Operations*, FHWA. This synthesis describes the state of the practice for involving advisory committees in transit planning and operations, exploring the experiences from a few agencies in detail. The purpose of this report is to provide practitioners with guidance about how their colleagues across the country are involving advisory committees and ideas for how to structure successful advisory committees.
- A Methodology for Performance Measurement and Peer Comparison in the Public Transportation Industry*, FTA. This report is an important resource that will be of interest to transit managers, decision-makers, and others interested in using performance measurement and benchmarking as tools to (1) identify the strengths and weaknesses of their organization, (2) set goals or performance targets, and (3) identify best practices to improve performance.



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