



# Motorists *Can* Grow Old Gracefully — With Some Help

*Reprinted with permission from the Nevada Technology Quarterly Newsletter, Milepost, Summer 2011.*

*This article focuses on transportation challenges that face an aging population. By the year 2030, one in five Americans will be over 65. To address the increasing mobility challenges confronted by senior motorists and pedestrians, the transportation community is looking at safety improvements in the design of highways and vehicles.*

Seniors practice many safe driving behaviors. They are more likely to wear seatbelts and obey the speed limit. They are less likely to engage in some of the risky behaviors more common among younger drivers, such as talking on a cell phone or drinking and driving. Once they become aware of changes in their physical abilities, older drivers often begin to limit their driving at night, in unfamiliar areas, on roads with heavy traffic or in inclement weather.



The average annual driver involvement rate in police reported motor vehicle crashes in the United States is 55 per 1,000 licensed drivers, while the corresponding rate for drivers aged 65 and older is only 28 per 1,000, according to the National Office of Traffic Records and Analysis.

For older people, however, crashes more frequently lead to death. Older motorists and pedestrians may be frail due to chronic medical conditions and may take much longer to recover from severe injuries.

## In This Issue

- 10 What Do RAP and HIP Have in Common?
- 13 Ask MRSC
- 15 Washington State's Process to Adopt the 2009 MUTCD
- 17 Buy America
- 19 NWPMA Conference
- 20 Asset Management: Bridge Assessment Annual Report
- 25 New FHWA Washington Division Bridge Engineer
- 26 WSDOT Lessons Learned
- 29 Research Office
- 35 LTAP Center Resources
- 38 Online Resources
- 41 Training Opportunities

## Activities and Programs

At the federal level, the U.S. Department of Transportation has identified priorities such as roadway designs that take into account the needs and limitations of older motorists, vehicle designs that protect fragile older occupants and effective assessments of senior-driver competencies. In addition, two decades of research by the Federal Highway Administration culminated in publication of the *Highway Design Handbook for Older Drivers and Pedestrians* (FHWA-RD-01-103), which focuses on safety for older drivers at intersections, interchanges, curves and passing zones, construction work zones and highway-rail crossings.



At the state level, one of the primary interests is driver licensing and testing. In addition, a number of states are looking at specific mitigation measures such as improved signs, signals and pavement markings to increase senior safety.

Professional organizations and academic institutions also are exploring ways to help older motorists. Activities include specialized training and conferences focused on mobility for seniors.

## The Aging Mind and Body

Medical and transportation officials agree that the focus of safety efforts should be on helping older drivers and pedestrians continue driving and walking, if they are able to do so safely, rather than restricting all older drivers regardless of ability. Changes in vision, cognition, and motor skills occur at different rates for different people, so it is incorrect to assume that all drivers of a certain age have deficits or are unsafe.

To deal with vision changes, one obvious step is to enlarge roadway signs and use certain fonts for lettering. Another is to determine the best configurations for retroreflective pavement markings to make curve detection easier. Advance signing enables drivers to focus on making a safe turn instead of having to look for a street sign at the same time.

To address changes in driver flexibility, it is important to avoid skewed intersections where two roads meet at an angle that is less than 60 degrees instead of at a right angle.

Older adults often find it harder to screen out unnecessary information, especially when they are in unfamiliar situations. Changeable message signs are one way that transportation agencies alert drivers to new circumstances.

Just as roadways can be improved for older drivers, so may the infrastructure be improved for older pedestrians. Median refuges provide a safe midpoint for slower moving pedestrians who may be unable to complete a crossing in one cycle.

“Most of the infrastructure changes that communities make for older road users benefit users of all ages and society as a whole,” says Elizabeth Alicandri, director of FHWA’s Office of Safety Programs. “There are very few, if any, infrastructure recommendations that benefit older adults but hinder other road users.”

## Signs, Signals, and Stripes

Visual changes affect the distance at which older drivers can see and recognize the writing on signs and may make it more difficult for them to detect signals and pavement markings. From an engineering standpoint, opportunities to improve drivers' abilities to see signs and comprehend sign messages include sign legibility, placement, brightness (retroreflectivity), and size.

In terms of legibility or readability, research has resulted in a new font, Clearview, which provides faster word recognition at greater distances. In the last decade, several in-depth studies have shown that the Clearview alphabet's legibility represents a 16 percent improvement in recognition distance by older drivers. The use of uppercase/lowercase letters also adds to enhanced legibility. In some instances, signs can be placed in the driver's direct line of sight.

Brighter sheeting materials make signs more conspicuous, especially at locations with high levels of visual "noise," such as guide and regulatory signs in the background. Research also shows that the detection distance for fluorescent signs is significantly greater than nonfluorescent signs for both younger and older motorists, although older drivers reaped the greatest benefit.

Twenty-nine state DOTs report that they use longitudinal pavement markings wider than the specified 4-inch minimum in at least some situations and cite visibility improvement as the primary reason. Also, some state DOTs are using high-contrast, black-on-white and black-on-yellow markings to increase the conspicuousness of their lane lines and centerlines on light-colored concrete pavements.

Although national standards do not mandate that pavement markings must perform well in wet conditions, many state DOTs are using a variety of strategies to ensure just that. The majority of state DOTs are using oversized glass beads in their paint markings to improve wet-night recognition of edge and centerline markings.

Probably one of the most overlooked and easiest remedies for making signals more conspicuous is the location of the traffic signal heads. Visual capabilities tend to diminish with age, which includes a reduction in the visual attention window, also known as the useful field of view — the area within which the driver can detect and respond appropriately to information. Placing or relocating signal heads within the visual attention window can be accomplished by placing them overhead near the center of the travel lane, preferably one per through lane.

Signal backplates (thin strips of material on all sides of signal housing) are commonly used by many states to provide a background for improved visibility of the signal indications, especially at locations where the lights are viewed against a bright sky or confusing background. FHWA's older drivers' handbook cites studies showing that backplates can increase the intensity of the signal face by 33 percent.

## Intersection Challenges

Maneuvering a vehicle through an intersection requires the visual acuity, physical dexterity, and rapid mental processing capacity to make simultaneous decisions regarding lane choice, vehicle speed and alignment, braking, acceleration, and continuous vehicle positioning relative to other vehicles in the intersection. Among the cognitive challenges is the need to constantly process and prioritize multiple streams of changing information at once, such as pedestrian movements, signs, pavement markings, and lane alignments.

Transportation agencies can employ a wide range of intersection design and operational techniques. For example, traffic signal visibility can be improved by increasing the size of the lens, adding new signals and repositioning existing ones. Another strategy is converting roadway corridors, under certain traffic loads, from four-lane to three-lane cross sections.

Several techniques are available to prepare motorists for intersections. Advance street name signs ease the burden on drivers by confirming location well before the turn. Advance lane use signs, indicating mandatory or allowable use of specific lanes, give early guidance to drivers so they do not find their vehicle in the wrong lane at an intersection. Finally, advance pavement-marking messages can be especially beneficial to road-weary drivers whose peripheral vision and sign-reading skills may be restricted, but who may still respond to messages painted on the pavement.

The FHWA older drivers' handbook lists several reasons why executing a left turn in the presence of oncoming traffic becomes more difficult for drivers as they age. Foremost among them is the age-related decline in the ability to detect a perceived change in the size of a moving object — and thus judge safe gaps in traffic.

Countermeasures include eliminating the direct left turn at intersections and routing left-turning motorists through a median U-turn, a right-bearing loop or some other method. Even though these strategies require vehicles to travel extra distance, research shows substantial safety benefits.

Other strategies include roundabouts and dotted-line markings to delineate the turning path. Exclusive left-turn lanes provide drivers with a safe haven in which to wait for an acceptable gap.

Providing a separate lane for right-turn traffic segregates the straight and turning traffic movement and has the potential to reduce rear-end crashes. Left-turning drivers use their turn-lane to wait for a gap; the right-turn drivers use their separate lane to lower their speed to make a comfortable turn.

#### Europe Emphasizes Pedestrians

Older pedestrians seem to have special difficulty in certain situations: at busy two-way streets; at intersections with heavy traffic, particularly where there is no center refuge; in complex situations where vehicles can come from several directions; at light-controlled crossings where traffic is allowed to turn across pedestrian routes; and in instances where right turn on red is permitted.

In Europe, the first and most straightforward strategy for protecting older pedestrians from vehicles is to separate the two modes of travel. Pedestrian streets involve directing traffic away from areas of high pedestrian activity.

Another strategy is land use planning involving designing communities so that pedestrians can travel between their homes, shops, work, leisure activities, and health care sites by short walks and without crossing major roads.

One of the most effective ways to improve surroundings for pedestrians of all ages is to reduce traffic speeds. Ways to reduce traffic speeds range from setting appropriate speed limits to automatic camera enforcement, traffic calming, and various engineering strategies such as street narrowing.

When employing traffic calming techniques, European countries commonly will narrow one-way urban roads to about 9.8 to 13.1 feet using posts to define the boundary between roadway and pedestrian space.

Short of using posts, curbs, or other physical obstructions, roads can be made to look narrower by painting boundaries on them using white lines and by hatching areas to indicate where motorists should not drive.

Other strategies are sidewalk extensions to narrow the roadway at pedestrian crossings and at intersections in residential areas, central refuges for pedestrians, pedestrian phases for traffic signals at intersections, midblock light-controlled crossings where a pedestrian can call for a green phase that stops traffic, speed control tables at pedestrian crossings, and speed tables to continue sidewalks across side roads where they join major roads.

Technology also can play a role. Light-controlled crossings reduce the need for judgment of speed and distance, people detectors at signals can match walk times to the actual pedestrians, and cameras can enforce speed limits and detect vehicles running red lights.

### **Cutting Edge Advances**

For advanced technologies to provide a benefit without creating new safety problems, their design and operation have to be compatible with the needs and capabilities of older drivers. In addition, some of these technologies might encourage older adults to continue driving beyond when they would ordinarily cease otherwise.

Until night vision systems are improved, older drivers — like all motorists — will have to rely primarily on headlamp illumination. Almost any attempts to increase the light to improve seeing distance will increase glare for other drivers. The National Highway Traffic Safety Administration is investigating the potential of adaptive front lighting systems to help resolve the tradeoff between visibility and glare.

Current lane departure warning systems use a camera to analyze road markings and provide a warning to alert a driver who has moved out of the lane.

To help prevent lane change crashes, technologies have been developed to detect and warn drivers of vehicles in their blind spots. If the warning systems enable older drivers to spend less time looking to the side when changing lanes, they can focus more on looking at the road ahead.

“Parking aids” marketed as convenience features include sensor-based systems that indicate to the driver the distance between the rear bumper and an object by means of an audio alarm or visual display.

In-vehicle navigation systems with voice directions can give older drivers more confidence when traveling in unfamiliar locations.

A system that alerts drivers when they are in danger of violating a stop sign or red light could reduce the occurrence of these crashes.

## **ITS Applications**

Most ITS applications relevant to human service transportation are proven and well-documented technologies with widespread deployment. However, field deployment is limited to fixed-route applications by a single agency. Even when used for human service transportation, existing ITS applications are largely related to fleet management and operations for efficiency gains and less to customer-oriented functions such as automated reservations and trip planning through simplified points of access.

A lack of relevant empirical evidence on lessons learned, returns on investment at the individual system levels, limited financial resources, and lack of technical expertise are the most common challenges facing local stakeholders in promoting ITS for human service transportation.

Eight sites around the country selected by USDOT for demonstration projects are exploring the technical and institutional feasibility of creating an ITS human service transportation system. The selections represent a variety of operational environments from large urban to rural areas, various lead agency types from transit agencies to local and regional government entities, and different levels of ITS deployment.

Key products on the demonstration are replicable and scalable models of ITS human service transportation systems. The model systems address three areas: (1) creating simple points of access for all, (2) embracing a comprehensive set of transportation services, and (3) utilizing ITS technologies to enhance efficiency and accessibility.

A successful model will differ from place to place and from system to system, depending on factors such as the type of area (urban or rural) and local, political, and institutional settings. Communities should attempt to broaden the level of stakeholder participation and establish a common vision for what the local human service transportation system should be like.

After conducting operational tests, workshops, and research, FHWA and other organizations have found a number of benefits from ITS applications in advancing human service transportation. These technologies can boost service productivity, facilitate service coordination, and enhance system accessibility.

## **Aging in Place**

It is widely known that Americans are living longer. What is not always known is how to make sure those additional years of life are productive and enjoyable. A major factor continually cited by seniors is their need for continued safety and mobility as they age.

The vast majority of seniors prefer to age in place, to grow old in the communities where they raised their families, where they have roots. Transportation that enables seniors to remain in their homes, to remain engaged in community life as active and contributing members, has been cited as the critical link that makes all else in life possible.

## Assessment and Accommodation

Transportation safety engineers realize that the “design driver” for the 21st century is no longer a 45-year-old male. It is someone in the 65-plus age group, and it may just be their mom.

New strategies include encouraging states to review and update procedures for assessing medical fitness to drive, including training license examiners and working with state medical associations to educate the health community about the important role that physicians can play in assessing and counseling older patients who drive.

Although some people can be helped to continue driving by appropriate restrictions on their licenses, others may require special adaptive equipment installed in their vehicles or evaluation and training by an occupational therapist or other specialist. Educational opportunities for older drivers can range from simple brochures and other print materials to self-assessment tools, refresher classes, or one-on-one behind-the-wheel evaluation and training.



*A senior citizen takes an eye exam at the Iowa DOT.*

## Action Plan Addresses Older Driver Issues

When *A Guide for Reducing Collisions Involving Older Drivers* (Report 500) was published in 2004, the Michigan DOT and partner organizations decided to address the report's strategies for possible implementation. The following bullets highlight current Michigan strategies that comply with Report 500's recommendations:

- Michigan DOT and its partners established a multidisciplinary action team and plan to address senior mobility in the state.
- To update the procedures for assessing medical fitness to drive, a medical advisory board addresses issues related to information gathered before, during, and after a driver has been reported as unfit to operate a motor vehicle.
- Michigan DOT emphasizes elder-friendly engineering practices and has made the following changes:
  - All traffic signal clearance intervals now are timed to coincide with Report 500's and Institute of Transportation Engineers' recommendations.
  - Brighter sheeting is now in use as background and legend for a variety of signs.
  - The Clearview font is now standard design for all guide signs.
  - 6-inch-wide edge lines are standard design.
  - Traffic signals now are suspended by box span, allowing far-side placement of traffic signals.
- Michigan supports the CarFit program, which helps older and disabled drivers to adjust their cars to fit them. Michigan has hosted an average of 25 events over the past three years assisting more than 500 drivers per year.
- State agencies have secured a grant to implement resource centers within each area agency on aging to promote safe mobility choices.
- Michigan offers a number of educational and training opportunities for older drivers and has hosted several national programs.



## Supplemental Transportation

Twenty percent of adults age 65 and older do not drive. Reduced mobility translates into 15 percent fewer trips to the doctor for non-driving older people and 65 percent fewer trips for social, family, and religious purposes.

To address this need, many communities and organizations have created Supplemental Transportations Programs (STP) for seniors. Similar to traditional services, they offer transportation to a variety of destinations. Most STPs also supply “supportive transportation” in the form of door-to-door and door-through-door assistance. They may even arrange for an escort to stay with a passenger at a destination. In many instances, the STP driver or escort is a volunteer.

In years past, family members or friends were expected to help older adults who no longer drive. But today in the United States, multi-generational homes are no longer common, and many older drivers live a great distance from family members. Therefore, fewer stay-at-home caregivers are available to fill the driving gap.

However, many communities do not offer these services, and even where they are available, older adults may be unable to use them because of the physical conditions that forced them to give up driving in the first place.

Although some STPs are large and costly to operate, the majority are relatively small and inexpensive. Thirty-three percent of them target rural areas, 44 percent use automobiles and 49 percent can provide escort service. Although 46 percent of the STPs charge fees, 75 percent draw on grant revenue, and 23 percent tap into funding from federal, state, or local government for some or all of their support. (The figures do not add up to 100 percent because STPs typically draw on a mix of funding sources.)



*Carson City's JAC transportation offers free rides to seniors.*



# What Do RAP and HIP Have in Common? Not What You're Thinking

---

*By Noel Brady, Communications Consultant, Washington State Department of Transportation (WSDOT)  
Reprinted, with permission, from the intranet WSDOT News article by the same name.*

Reduce, reuse, recycle. We've all heard it before; some of us hear it in our sleep. But what does it really mean at WSDOT?

A good place to start looking for answers is inside a two-story government building in Tumwater, where engineers and technicians are experimenting with ways to make the materials that go into bridges and highways last longer and live multiple lives. At WSDOT's State Materials Lab, a concrete panel that was part of I-5 in a former life could soon become part of a new highway ramp or a custom culvert to help eager salmon get to – ahem, wherever they want to go.

Reduce, reuse, and recycle add up to sustainability, said State Materials Engineer Tom Baker. He oversees the lab and its search for the most effective ways to make pavements and other building materials stronger and longer lasting with less production, consumption, transportation, and investment.

"It's not that sustainability costs more money," Baker said. It actually saves money."

## What's Sustainability?

It's nothing new around here. WSDOT has been recycling and reusing asphalt for nearly 35 years. Today, the agency is a leader in an industry that now recycles nearly 100 percent of asphalt pavement nationwide.

Sustainability isn't only about the environment and reducing the greenhouse gas that pollutes the air we breathe, said Jeff Uhlmeier, the lab's pavement design engineer. "It's making pavement last longer, so you don't need to resurface as much. How can we do it better for less money?"

WSDOT maintains more than 18,500 lane miles on state highways and another 2,000 miles on ramps and special-use lanes, almost enough to wrap a road around the globe. About 63 percent of those lane miles are topped with asphalt.

In addition to studying climate change and counting the greenhouse gas that our transportation system produces – we'll get to that in a future story – Baker and his team take a basic dollars-and-common-sense approach to their work. Simply put, the lab uses chemistry and physics to get bigger bangs for dwindling bucks.

"If you haul asphalt to a dump you're wasting about \$430 a ton," Baker said.

In today's climate, sustainability is just as important to the bottom line as it is to the environment. Innovations being refined and enhanced in the Materials Lab aim to trim the price of pavement by making it stronger.

Other DOTs design and build asphalt pavement to last 20 years; then they replace it completely, Baker said. WSDOT does it differently. Take I-90, for instance; that pavement is 43 years old, 3 to 4 inches thicker than the 20-year stuff and still going strong with resurfacing every 10 to 15 years.

“We recover the pavement just like the roof on a house,” Baker said. “We design asphalt pavements to limit the wear and tear to the surface, so we only have to replace the top layer. The rest of the pavement structure stays in place and remains strong for a very long time.”

Focus on lifecycle is one difference that has made WSDOT a leader in the industry. The agency’s pavement management system is recognized as one of the best in the nation.

“One of the toughest concepts for people to wrap their head around is lowest lifecycle cost,” Baker said. “Your upfront cost might be more, but the cost savings over the lifecycle is substantial.”

The lab is also studying ways to cut cost and greenhouse gas on new pavement when it’s necessary, by refining the technology behind recycled asphalt pavement (RAP) and testing new methods like hot-in-place (HIP), which recycles old asphalt and reuses it without ever leaving the work zone.

“We’ve been implementing sustainability in pavement for years,” Uhlmeier said. “The difference today is that we’re facing a much greater need for pavements that cost less, last longer and use less material. That’s why we’re looking for ways to increase the use of pavements like RAP and warm mix.”

### **Better Ways to Pave 101**

**Reclaimed Asphalt Pavement (RAP):** Coffee cups made with recycled material pale in comparison. The most widely reused material in the nation is asphalt pavement. More than 72 million tons of RAP go into the nation’s roadways each year. (Coincidentally, according to the Environmental Protection Agency, that’s about the same weight of all the packaging materials and containers that were trashed in this country in 2009, or 30 percent of all our trash.) In addition to used pavement, other recycled materials used by WSDOT include flyash, recycled concrete aggregate and ground granulated blast furnace slag (say that five times fast).

Old pavement gets milled from the road, crushed and sent to an asphalt plant to be mixed with new material and binder (the glue); then it goes back to the road as new pavement, and eventually to be reused again. WSDOT allows up to 20 percent RAP in the asphalt mix to ensure its strength and durability. Using RAP saves the agency as much as \$26 million per year. The environmental benefits are huge, considering the greenhouse gas from producing and trucking new asphalt. It saves projects 15 to 20 percent on their bottom line. The lab is studying ways to up the percentages.

**Hot-In-Place (HIP) Recycling:** Still in the testing phase, HIP reuses the pavement right on the work site, while it’s still on the road. Huge machines heat the old roadway, grind the surface and mix it with more asphalt; then crews compact the stuff back onto the existing pavement. HIP cuts costs, greenhouse gas emissions and fuel consumption from trucking the old stuff out and new asphalt back in.

So far, WSDOT has used HIP recycling on two projects – SR 97 near Yakima vicinity and more recently SR 542 east of Bellingham. Crews resurfaced SR 542 by reusing the existing pavement and added very little new material.

**Warm Mix Asphalt (WMA):** To make asphalt, you must first heat up some rock and binder to get rid of the moisture and make it pliable on the road. The most widely used method for busy highways, hot-mix asphalt (HMA) cooks the soup to 300 degrees or more. Warm mix asphalt uses new technology to mix asphalt up to 50 degrees cooler. Less heat means less fuel and greenhouse gas emissions. WSDOT tested WMA on highways roads in 2008 and 2009. Last year WMA went into wide use for our asphalt pavement.

**Cold-In-Place Recycling:** Inexpensive and perfect for low-volume roadways, cold-in-place recycling turns worn out pavement into sound new base. Crews mill the pavement onsite, treat it with a binding agent and compact it. The strong new base is overlaid with either new asphalt pavement or a chip seal (sprayed liquid asphalt with rock chips embedded).

**Asphalt Shingle Recycling:** Asphalt shingles -- that's right, the kind you sleep under -- are good for roads too. The lab is studying ways to use the asphalt binder in roof shingles to make new asphalt pavement. Using shingles for asphalt is relatively new, and only a few states allow it, typically no more than about 3 percent of the mix. WSDOT doesn't allow RAS in asphalt mix yet, but the State Materials Lab worked closely with King County on a test project in Enumclaw. That leaky roof could soon help you get to work on time -- so you can afford to repair that leaky roof.

# Ask MRSC

by John W. Carpita, PE, MRSC Public Works Consultant



This issue's column is a tad different, as I want to tell you about the APWA Forum Web page, which is somewhat of a misnomer at this point, since there is no "give and take" as you would expect a forum to be. When the new Web page (<http://www.apwa-wa.org/forums/forums.htm>) is revealed later this spring, there will likely be an actual opportunity for "live" interaction and the current Forum page will be renamed to something more prosaic like *MRSC Musings* or *Got Questions?, We Got Answers!*

When you go to the current Forum Web page, you will note this introduction:

"This Web page is intended as an information exchange forum for the Washington State Chapter of APWA and the greater Washington State public works community. John Carpita, Chapter Liaison, is also Public Works Consultant for the [Municipal Research and Services Center](#) (MRSC). As such, he responds to requests for information from city and county governments across Washington State.

On occasion, it is necessary to post these requests to appropriate APWA National INFO NOW communities and/or a cross section of Washington State city and county public works officials to gather sample documents or best practices. John summarizes these responses for the benefit of the inquiring party as part of his work at the Center. As many of these responses are of general interest and, invariably, people who respond want copies of the information, he has decided to post the responses on this web page.

In addition, you can email John at [jcarpita@mrsc.org](mailto:jcarpita@mrsc.org) with information requests or suggestions for research of use to the Washington State public works community. In addition, if your agency or company has done research or gathered information of general interest, please send it to John for possible posting on this Forum page.

Recent (2010-2011) postings include:

**2011:** [Traffic Calming Efforts in Our New Economy](#), January 2011

**2010:** Pedestrian Crossings at Unsignalized Intersections, December 2010

[MRSC Inquiry Summary File of Emails and Attachments](#)

[Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations](#)

Final Report and Recommended Guidelines

FHWA Publication Number: HRT-04-100, September 2005

[Improving Pedestrian Safety at Unsignalized Crossings](#)

[TCRP Web-Only Document 30/NCHRP Web-Only Document 91 \(Pedestrian Safety at Unsignalized Crossings: Appendices B to O\)](#)

[Maintenance of Natural Waterways or Drainage Channels](#), October 2010

[Leak Detection Survey](#), October 2010

[Stormwater Facilities Questionnaire](#), September 2010

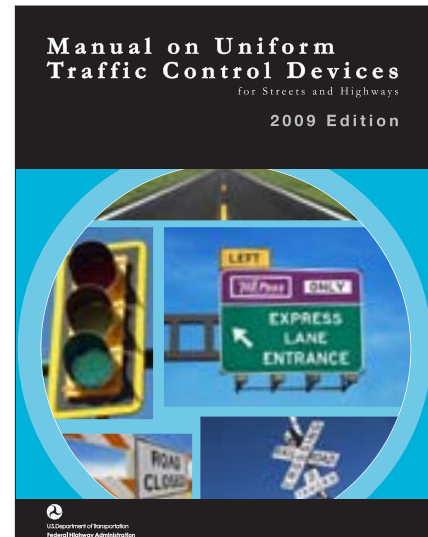
[Urban Forestry Survey](#), September 2010

The Municipal Research and Services Center serves Washington State local governments in a number of ways. MRSC is a private, nonprofit organization based in Seattle. Our mission is to promote excellence in Washington local government through professional consultation, research and information services. MRSC serves Washington local governments by providing: (1) Dependable advice from a multidisciplinary team of professional consultants; (2) A comprehensive website; (3) Access to thousands of sample documents; (4) Timely and informative print and electronic publications; and (5) Access to the largest local government library collection in the Northwest. For more information, go to [www.mrsc.org/about.aspx](http://www.mrsc.org/about.aspx).

# The Latest on Washington State's Process to Adopt the 2009 *Manual on Uniform Traffic Control Devices*

By Susan Bowe, P.E., WSDOT Highways and Local Programs Division and Rick Mowlds, WSDOT Traffic Operations Division

The [Fall 2010](#) issue of *LTAP News* presented a tentative timeline for Washington State to adopt the 2009 [Manual on Uniform Traffic Control Devices](#) (MUTCD). Adopting the manual means rewriting [Washington Administrative Code \(WAC\) 468-95](#). For more than a year, an adoption committee composed of cities, counties, WSDOT, and the Washington State Section of the Institute of Transportation Engineers reviewed the 55 subparts of the existing WAC and approximately 80 proposed new modifications. Transportation agencies and associations in Washington State had submitted these proposed modifications for review. Following set requirements, the committee brought 17 of the proposed modifications to Federal Highway Administration (FHWA), who approved 16 of them. WSDOT led the effort and is now in the process of preparing for a public hearing to change the WAC. After WSDOT receives and considers comments from this hearing, [WAC 468-95](#) will be officially modified. This means that Washington State will have adopted the 2009 MUTCD with these modifications. It also means that the 2003 MUTCD will no longer be valid in Washington State.



The original timeline has been revised to:

Step	Activity	Timeline
1	A committee forms and meets to propose modifications to the MUTCD by revising <a href="#">WAC 468-95</a> . Five meetings held.	March 2010 through November 2010. Completed.
2	WSDOT's State Traffic Engineer reviews and approves the modifications.	November 2010 through August 2011. Completed.
3	Federal Highway Administration (FHWA) reviews and approves the modifications.	November 2010 through August 2011. Completed.
4	A Notice of Proposed Rulemaking is published in the Washington State Register. This invites public comment to modify <a href="#">WAC 468-95</a> . An Agency Hearing will be held to adopt the revised WAC as Washington State's modifications to the 2009 MUTCD.	August through September 2011. Expected.
5	The 2009 MUTCD, as modified by <a href="#">WAC 468-95</a> , is adopted by WSDOT's Secretary of Transportation. The 2009 MUTCD and <a href="#">WAC 468-95</a> become effective in Washington State.	October 2011. Expected.

For more information about this process, please contact Rick Mowlds at 360-705-7988 or [mowlds@wsdot.wa.gov](mailto:mowlds@wsdot.wa.gov) or Susan Bowe at 360-705-7380 or [bowes@wsdot.wa.gov](mailto:bowes@wsdot.wa.gov).

For more information on the MUTCD and the changes:

- 2009 MUTCD  
[http://mutcd.fhwa.dot.gov/kno\\_2009.htm](http://mutcd.fhwa.dot.gov/kno_2009.htm)
- Final Rule for the 2009 MUTCD  
<http://edocket.access.gpo.gov/2009/pdf/E9-28322.pdf>

### **Comments on Proposed Amendments to the 2009 MUTCD Are Due in October**

The Federal Highway Administration (FHWA) recently proposed amendments to the 2009 MUTCD to make things easier for local and state agencies. They now want comments from these agencies and other interested parties on the following “Notice of Proposed Amendments” published in the Federal Register.

### **Definition of Standard and use of Engineering Judgment and Engineering Studies**

The 2009 MUTCD revised the introduction, Section 1A.09 Engineering Study and Engineering Judgment, and Section 1A.13 Definitions of the 2003 MUTCD. It removed the following statement, “The decision to use a particular device at a particular location should be made on the basis of either an engineering study or the application of engineering judgment.” It also expanded the definition of a Standard with the following new language: “Standard statements shall not be modified or comprised based on engineering judgment or study.” The proposed amendment removes the language from the expanded definition and returns the original statement to the manual. The Federal Register was published August 2, 2011 as FHWA Docket No.: FHWA-2010-0170. Comments are due to FHWA October 3, 2011.

Proposed changes to the MUTCD are shown here: [PDF](#) or [HTML](#)

Read or comment on the Federal Register: 23 CFR Part 655 Vol. 76, No. 148. [PDF](#) or [HTML](#)

### **Target Compliance Dates**

The introduction section of the 2009 MUTCD has a list of 58 target compliance dates. Some are dates for new requirements and others are dates transferred from the 2000 and 2003 MUTCD editions. The new proposed amendment removes 46 of these dates. When there is no target compliance date, page I-3 of the introduction section applies:

Unless a particular device is no longer serviceable, non-compliant devices on existing highways and bikeways shall be brought into compliance with the current edition of the National MUTCD as part of the systematic upgrading of substandard traffic control devices (and installation of new required traffic control devices) required pursuant to the Highway Safety Program, 23 U.S.C. (United States Code) 402(a).

The Federal Register was published August 31, 2011 as FHWA Docket No.: FHWA-2010-0159. Comments are due to FHWA October 31, 2011.

Proposed changes to the MUTCD are shown here: [PDF](#) or [HTML](#)

Read or comment on the Federal Register: 23 CFR Part 655 Vol. 76, No. 169. [PDF](#) or [HTML](#)

---

# Buy America

---

*Intro by Ruth McIntyre, WSDOT Local Technical Assistance Program Engineer*

The Buy America provision in a contract is one of the most misunderstood requirements we deal with on federally funded projects. In a nutshell, it says that all steel and iron permanently incorporated into a federal aid project must be “melted and manufactured” in the United States. There is an allowance of 0.01 percent of the contract price or \$2,500.00, whichever is greater.

*By Anthony Sarhan, FHWA Washington Division*

Anthony Sarhan of the Washington Division of FHWA has worked hard to help us maneuver through the ins and outs associated with this requirement. Whether you are a contractor, consultant, utility owner, or project manager, his Q & A below is a useful guide that can help keep your projects on track.

**Q** – What is Buy America?

**A** – Buy America is a domestic procurement requirement covering the use of iron and steel on Title 23 funded projects. Simply stated, U.S. law (23 U.S.C. 313) and FHWA regulations (23 CFR 635.410) require the use of domestic steel and iron on federally funded construction projects.

**Q** – Does that mean all iron and steel on a federal aid job must be domestic?

**A** – For the Buy America requirements to apply, the steel or iron product must be permanently incorporated into the project. Buy America does not apply to temporary steel items (e.g., temporary sheet piling, steel scaffolding).

**Q** – Are there any exceptions?

**A** – Some. Buy America does not apply to raw materials or certain equipment and machinery for ferryboats. Furthermore, FHWA regulations do allow a “minimal use” of iron/steel materials provided the total cost of all foreign sourced items is less than \$2,500 or 0.1 percent of total contract amount (whichever is greater).

**Q** – Wait, I thought there was some sort of exception for NAFTA?

**A** – There is no exception for NAFTA for FHWA’s Buy America provisions.

**Q** – What if I’m not paying for the foreign steel with federal funds?

**A** – It doesn’t matter. All iron and steel permanently incorporated into a federal aid project is subject to Buy America.

**Q** – What if I have a Public Interest Finding (PIF) for a proprietary item? Is it exempt from Buy America?

**A** – No. All iron and steel permanently incorporated into a federal aid project is subject to Buy America.

**Q** – What if the material is being supplied by an agency or utility company? Is it exempt from Buy America?

**A** – No. All iron and steel permanently incorporated into a federal aid project is subject to Buy America.

**Q** – I've gone over the minimal use threshold. Now what?

**A** – You must either obtain a waiver or remove and replace the non-domestic steel. Failure to do so will cause all federal funding to be removed from the project.

**Q** – How do I get a waiver?

**A** – All waiver requests must come through WSDOT, so start with your H&LP contact. H&LP will review your situation and if they feel it merits consideration will forward the waiver request to the FHWA Division Office. The Division Office reviews the request and determines if domestic material is not available. If the Division Office determines that the request is valid, the waiver is forwarded to FHWA HQ for further review. FHWA HQ conducts a second review of the waiver request to determine whether domestically produced material is available. Once FHWA HQ determines a waiver request is warranted, a notice is published in the Federal Register for a 15-day public comment period. If no domestically produced material can be found to be readily available, the waiver may be approved.

**Q** – That sounds like it takes a long time. How long are we talking about?

**A** – You should expect no less than 90 days. The last waiver processed for an agency in Washington State took nine months.

**Q** – Where can I find out more about Buy America?

**A** – FHWA's Buy America page has information on the law, regulations, rule makings, FHWA policy, guidance, and an expanded Q&A. You can access the page at [www.fhwa.dot.gov/construction/cqit/buyam.cfm](http://www.fhwa.dot.gov/construction/cqit/buyam.cfm).

Government and private agencies working together to improve our roads...



Register by  
September  
1st for a \$100  
registration  
discount

# NWPMA Conference

Northwest Pavement Management Association

This year's conference includes **presentations** and **classes** on the **latest innovative, cost effective strategies to manage our infrastructure.**



For registration information and agenda:  
[www.nwpma-online.org](http://www.nwpma-online.org)

**October 18-21, 2011**  
**Red Lion Jantzen Beach, Oregon**

*18 years of bringing Pavement Management Conferences to the Northwest*

# Asset Management: Bridge Assessment Annual Report

## Bridge Preservation – Local Agency Bridges

By Paula Reeves, Community Design Assistance, Highways & Local Programs Division, WSDOT

Within the state of Washington, there are over 3,900 locally owned and maintained bridges. The overall number of bridges fluctuates from year to year as new bridges are added to the system as part of construction projects, while some older bridges may be permanently removed. More than 90 percent of Washington's state and locally owned bridges are currently considered in good structural condition.

All bridges in Washington are designed and constructed with one primary thought in mind — safety for the traveling public. Additional considerations are longevity and contributions to community and regional economic vitality. Local agencies follow the same guidance for inspections as the state; bridges are inspected at least once every two years. Washington State Department of Transportation's (WSDOT) Highways and Local Programs conducts field reviews and provides training and technical assistance for municipalities in Washington, inspecting bridges along city streets and county roads. WSDOT and local governments closely follow federal guidelines in their bridge inspection and maintenance procedures.

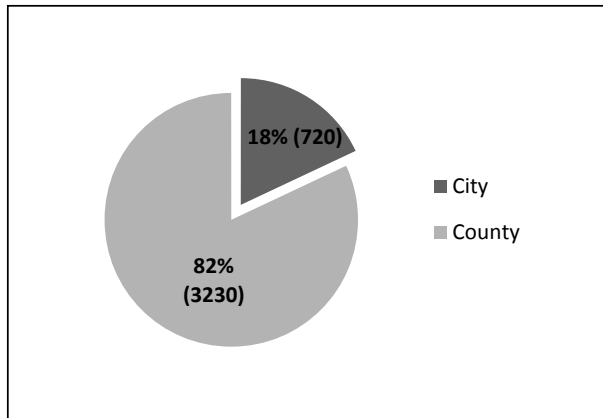


Chart 1. National Bridge Inventory – Local Bridges

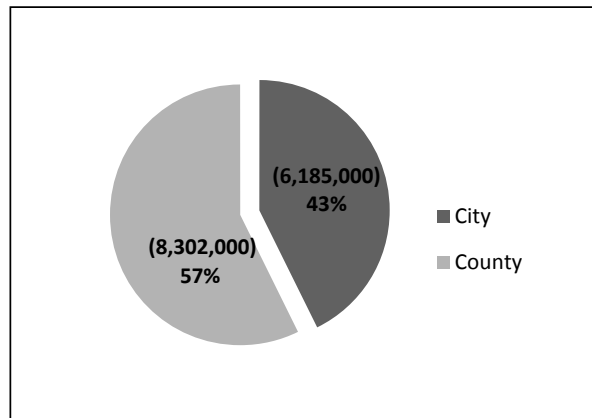


Chart 2. Total Deck Area (Sq. Ft.) of Local Bridges

As shown in Charts 1 and 2, counties currently own and manage 82 percent (3,230) and cities own and manage 18 percent (720). However, after analysis of the deck area that both maintain, it is clear that cities and counties both have a similar role in managing Washington's local bridges. The city owned and managed bridges account for 43 percent (6,185,000 sq. ft.) of deck area, while county owned and managed bridges account for about 57 percent (8,302,000 sq. ft.).

### What are the Conditions of Washington's Locally Managed Bridges

The Federal Highway Administration (FHWA) requires all states to report annual state, city, and county data concerning the structural condition and adequacy of all bridges statewide. A "structurally deficient" bridge is safe as long as all any restrictions are obeyed, but in need of costly repairs or replacement in order to carry current legal loads.

Additionally, following a thorough review, bridges are assigned a “sufficiency rating” number between 0 and 100. The rating takes into account some 75 factors reviewed during an inspection and also considers a bridge’s age, length, and width, and the average amount of traffic the bridge handles.

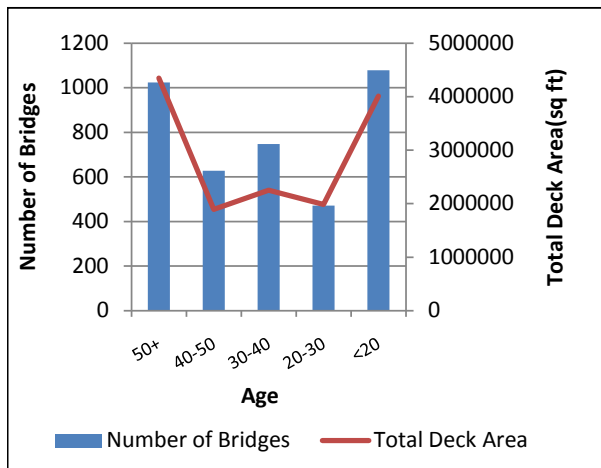


Chart 3. Age and Deck Area of Locally Owned Bridges

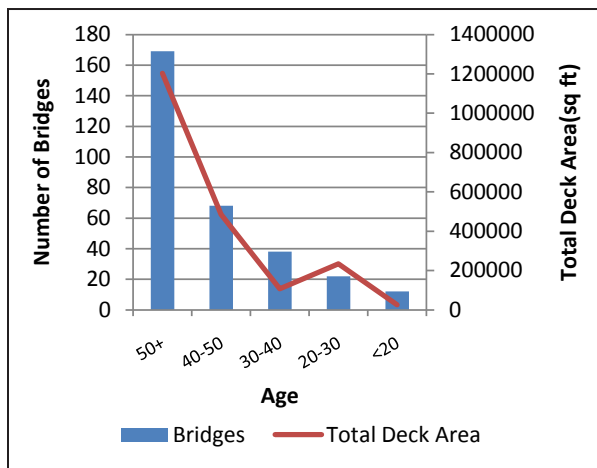


Chart 4. Age and Deck Area of Local Bridges With Sufficiency Ratings <50

The table below summarizes in more detail the current conditions of bridges owned and maintained by cities and counties.

Conditions of Local Bridges						
Condition	Number of Bridges	Deck Area Sq. Ft.	Number of Bridges Funded*	Deck Area Funded Sq. Ft.	Percent of Bridges Funded*	Percent of Deck Area Funded
Sufficiency Rating Less than 30 and Structurally Deficient	75	589,360	43	304,650	57%	52%
Sufficiency Rating Less than 50 and Structurally Deficient	154	1,029,890	56	329,230	36%	32%
Sufficiency Rating Less than 50	275	1,918,750	61	341,600	22%	18%
Sufficiency Rating Less than 50 and Weight Restricted or Load Posted	112	670,790	27	96,920	24%	14%
Weight Restricted or Load Posted	199	947,580	27	96,920	14%	10%
Total Inventory	3,950	14,500,000	65	350,000	2%	2%

\*Funded includes projects fully or partially funded from the Bridge Replacement and Rehabilitation Program and projects funded from the 2009 American Recovery and Reinvestment Act. Excludes Seismic, Scour, and Painting Projects.

## Top Five Challenges for Locally Managed Bridges in Washington

- **Age and Deterioration** – A number of bridges in the state, constructed before the 1950s and 1960s, need major repair or replacement. Usually built to last 75 years, about 30 percent of locally owned bridges are over 50 years old.
- **Congestion** – Some of Washington’s bridges have become bottlenecks for both freight and general traffic, particularly at interchanges and major river crossings.
- **Construction Costs** – The dollars available for bridges are buying less in the marketplace. With oil nearly quadrupling in price in the past four years, construction costs have risen. The costs of steel, asphalt, concrete, and earthwork have also risen. Additionally, replacing smaller bridges can mean construction of a new mid-sized or even larger bridge in order to repair impacts to streams and rivers and ensure environmental standards are met.
- **Maintaining Bridge Safety** – Nearly every state faces funding shortages which prevent them from applying the kind of ongoing preventive maintenance, rehabilitation, seismic strengthening, and replacement that would keep their bridges sound indefinitely.
- **Regionally Significant Bridge Replacement Needs** – The staggering costs of new bridges and their related intersections prevent many states, cities, and counties from making the larger bridge improvements that are needed to address congestion and serve economic growth. Massive costs far outweigh available resources.

## How Long Does a Bridge Investment Last

Bridges constructed over the past 40 to 50 years have typically been designed to provide 75 years of service. Bridges constructed over 50 years ago were not generally designed for the extended service life currently expected. Many older bridges are in remarkably good condition. However, many of these structures are not expected to remain in service given increases in local traffic volumes.

The actual useful life of a bridge depends a lot on the amount of stress the bridge is subjected to and how much preventative maintenance is done. Preventative maintenance activities, including painting the structural steel with a weatherizing sealer; replacing joints; resurfacing the deck to improve ride quality; sealing the deck to prohibit the infiltration of water into the surface; and replacing the pins and hangers used to connect the pieces of the bridge, can extend the life of a bridge in Washington State significantly.

Most of the bridges receiving funding through the WSDOT Local Bridge Program for reconstruction or rehabilitation are over 60 years old and most have sufficiency ratings of less than 25.



*Tolt River Bridge – King County*

## Washington's Regionally Significant Bridges

A regionally significant bridge is not necessarily on the National Highway System. These bridges typically carry higher volumes of freight and general purpose traffic to population centers both within and outside the state. Criteria commonly used to identify these often larger bridges with higher replacement and rehabilitation costs includes:

- a length exceeding 475 feet, and
- a deck area of 10,000 square feet or greater.

Based on this criteria, there are currently 40 of these regionally significant bridges that are owned and maintained by cities and counties in Washington State. Seven of these have received funding for rehabilitation through the Local Bridge Program. As shown in Charts 6 and 7, 62 percent of these larger bridges are managed by cities and 38 percent are counties responsibility. However, cities are responsible for 70 percent of total deck area for these bridges.

Due to the size and resulting higher replacement costs of these bridges, they are often in a severely deteriorated condition before being replaced. While this approach may maximize the life of the public investment, weight restrictions are often required which can impact the movement of freight. In extreme cases, a bridge may be closed to all traffic before funding is secured for replacement or rehabilitation.

The useful life of some of these bridges can be extended through preventative maintenance and rehabilitation. However, many of these bridges have width and capacity related needs that are limiting the potential freight and general purpose traffic they can carry. New partnership funding options are needed to address these bridges as capacity improvements do not fit well within existing funding programs.

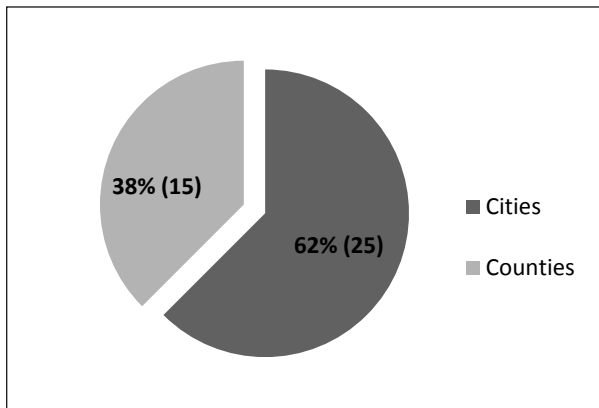


Chart 7. Regionally Significant Local Bridges – Total

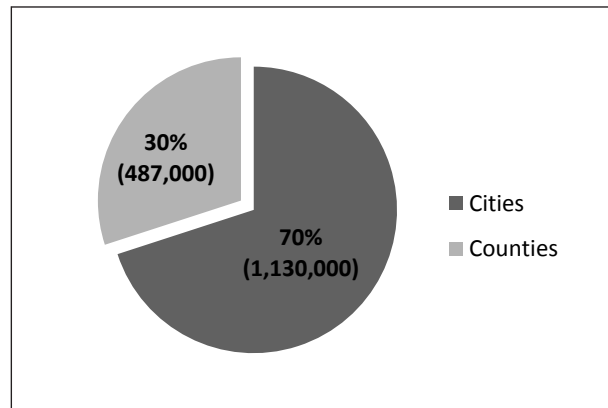


Chart 6. Regionally Significant Local Bridges Deck Area (Sq. Ft.)

## Bridge Length is Not a Measure of Importance...

A community access bridge is a smaller bridge that serves as a critical connection for one or more of Washington's communities. These bridges are not "NBI Reportable Bridges."

These bridges are critical links, yet often overlooked. Community access bridges are commonly even with the roadway and less than 20 feet in length. They don't have soaring spans or towering supports, so most people don't realize they are providing safe crossing over hundreds of small rivers and creeks, connecting communities, and serving as sole access routes.



*Fall City Community Access – King County*

Some of these shorter bridges may carry large volumes of traffic and freight and many are wider than they are long. They often connect homes, schools, and business areas, and often serve as the only access for pedestrians and bicyclists.

Community access bridges are not located on the state trunk highway system or on marked routes of the state trunk highway system. There are about 1,099 locally owned and maintained community access bridges across the state. Cities own about 164 of these bridges, or about 15 percent. Counties manage the bulk of these bridges, 85 percent. Nearly 50 percent of Washington's community access bridges are over 50 years old and many are constructed of timber.

## In Conclusion

### ***The Local Bridge Program Works – But Current Funding Levels Don't Address Regionally Significant or Community Access Bridges***

WSDOT's Highways and Local Programs Division is providing technical and financial assistance to help local agency partners manage bridges on county roads and city streets.

The current program administered by WSDOT's Highways and Local Programs Division addresses the replacement and rehabilitation needs of modest sized bridges needing structural improvements. However, the program is unable to meet capacity needs for regionally significant and other larger bridges. The current program is also unable to address the community access bridges, many of which are sole farm to market access for smaller communities, or seismic retrofit and other preventative maintenance for these bridges.

The Bridge Replacement Committee has a connection to and receives sponsorship from WSDOT's Highways and Local Programs Division staff who also provide oversight of the local agency inspection program. This coordination and connection has proven to be an efficient model for management and ensures the quality and consistency of the Local Agency Bridge Program.

---

# New FHWA Washington Division Bridge Engineer

---



Debbie Lehmann, P.E.  
Division Bridge Engineer  
FHWA Washington Division Office  
711 S. Capitol Way, Suite 501  
Olympia, WA 98501

Email: [Debbie.Lehmann@dot.gov](mailto:Debbie.Lehmann@dot.gov)  
Direct: 360-753-9482  
Main: 360-753-9480 x102

Welcome, to Debbie Lehmann, P.E., the new FHWA Washington Division Bridge Engineer. Debbie comes to Washington with over 13 years experience in project management, bridge inspection, sign structure inspection, and bridge design. Debbie's duties here in Washington are to provide technical assistance and oversight to the Washington Division and state on federally funded projects for bridges, tunnels, geotechnical, hydraulics, and major structures. She is committed to providing vision, leadership, policy direction, and assures accountability by the state, for the National Bridge Inspection and Bridge Replacement Programs while promoting new methods and materials for improved performance.

While Debbie can't get out to meet everyone in person this year, she is committed to meet all her bridge counterparts within the local agencies here in Washington over the next several years. She looks forward to hearing from each of you on your successes, challenges, and areas where she can offer assistance.

## Key Initiatives for 2011

1. Bridge Condition Inspection Training (BCIT) – Assist WSDOT Local Agency Bridge Engineer (Grant Griffin) in teaching the two-week Washington Inspection Course.
2. Annual National Bridge Inspection Standards (NBIS) Program Review for Compliance
  - a. Implementing Risk-Based, Data-Driven Oversight Process – 23 compliance determinations based on Title 23 Code of Federal Regulations (CFR) 650, Subpart C – National Bridge Inspection Standards.
  - b. Looking at frequency of all structures that are due for inspection. For example, if a structure was due for routine inspection on May 2008, then a check that the next inspection was completed 24 months later in May 2010.
  - c. Team Leader and Inspector Qualifications – Have team leaders that are listed on inspection reports indeed qualified as per 23 CFR 650. 309.
  - d. Data collected on all qualified structures. Are all of the structures within your jurisdiction inspected, reviewed for accuracy, and reported to the National Bridge Inspection inventory as described in 23 CFR 650.315.
3. Active Steering Committee Member for both Pac NW Bridge Inspectors Conference and Pac NW Bridge Maintenance Conference.

## WSDOT Lessons Learned

The Washington State Department of Transportation Lessons Learned system is an online, automated database designed to capture, present, and track lessons learned from WSDOT's project delivery program. The system is designed to collect and share information for a number of users. Lesson information is tagged with categories and keywords that allow a user to search and find data matching a user defined search criteria. The database is a tool to support and foster communication of what works and what does not for the purpose of improvement.

One featured lesson is below and on the following pages. Search the database at the following website: [www.wsdot.wa.gov/projects/delivery/lessonslearned/default.htm](http://www.wsdot.wa.gov/projects/delivery/lessonslearned/default.htm)

### Lesson Learned

**Contract Number:** 7495

**Design Number:** XL2827

**Library File Number:** N/A

**Submitted Date:** 02/02/2011

**SR/Terminal/Vessel:** I-5

**Region:** UCO

**Contract Title:** 5th Ave NE to NE 92nd St Noise Wall Stage 1

**Experience:** *Describe the particular situation or event.*

The design team included a special provision requiring that the Contractor submit a site access plan to the construction PE for approval and concurrence by the Landscape Architecture (LA) team. The Landscape Chief Inspector and designer reviewed the site access plan prior to approval. This allowed them to closely evaluate what trees would be affected by the access plan. In coordination with the construction office and landscape architects, the design team required the contractor to indicate on their access plans which trees they were planning to remove. They walked the site together and discussed which trees could be trimmed and saved. Following the completion of construction, the design team calculated that the project saved \$590,000 in direct costs due to reducing the footprint of the access road to retain trees. This savings was comprised of the following items:

- Reduced tree removal.
- Reduced clearing and grubbing.
- No need to stabilize steep slope to support an access road.
- Fewer new trees planted and maintained during plant establishment.
- Less Temporary Erosion and Sediment Control (TESC).
- Less traffic control.
- Fewer working days because of tree removal eliminated from project.

These documented savings don't even include the savings long term from reduced maintenance needs. Roadsides with newer plantings need more maintenance for 8 to 20 years following installation of the new plants compared to well-established roadside plantings. In addition to the cost savings, this approach improved WSDOT's relationships with local residents by demonstrating that WSDOT is interested in the environment and the appearance of the local area by maintaining well established vegetation. The public is much happier knowing that WSDOT is doing all we can to save trees. They understand that there are some trees that

have to be removed, but knowing that we are working so hard to preserve as much as possible seems to be a big relief for them. It also means that the contractors are not continually stopped because of concerns from the public. On this job, we did not hear any negative comments or concerns from the public during construction.

**Lesson: *Describe what knowledge was gained from the experience.***

Keeping the LA group involved through this process is important, especially if the location of the access road is unknown during design. On site, the LA team needs to be specific about how to mark which trees are to be saved and which trees are to be removed. Since there were hundreds of trees on site, it makes more sense to only flag or otherwise mark the trees that are approved for removal. Any tree not flagged/marked should be presumed protected. A better method is to demarcate the limits of work, where possible, with HVF or similar fencing. NW Region now promotes the use of HVF for all protected areas (not just sensitive areas such as wetlands). This becomes more difficult where save/remove trees or vegetation are interspersed. According to the Landscape Chief Inspector the Contractor was more conscious of the effort to work around existing desirable vegetation because of a variety of factors. The contract dictated in the special provision that the contractor must obtain approval for which trees they would prune and which they would remove. While the special provision was important, it is easily missed or ignored by contractors / inspectors who are focused on the hard construction/ engineering aspects of the work. In this project, the contractor was conscious of the vegetation issues because the construction office continued to raise awareness of its importance during preconstruction and weekly meetings. Unfortunately, a special provision alone is unlikely to 'raise consciousness'. The design team recognized that trees and vegetation are a resource during the design and construction phases. Mature trees in state ROW are state property and have not only intrinsic, environmental, and screening value, but they also translate into a dollar value. The engineering design office's interest in working to conserve the trees on site played a significant role in the success of this project. This example of calculating the construction costs, replacement costs, and anticipated cost of long term maintenance illustrated how much monetary value trees can have. Many decisions happen during the construction process, and construction offices and field inspectors need to ask themselves when changes happen, whether and how the change will impact existing vegetation and consider total costs to the state over time compared to short term expedience.

**Recommendation: *Describe how the knowledge gained can be used.***

- Require the contractor to identify the trees they propose to remove and to obtain approval of their plan prior to beginning work.
- Involve LA group in the site access plan approval along with the Construction PE to ensure minimal tree removal.
- Strategize how to minimize tree disturbance and removal. Calling for tighter specifications or planning the wall alignment while considering existing tree locations, may encourage the Contractor to not just plow through the project site to get the work done.
- Have a plan/process/approval contact person for situations that arise where a change is needed to the plan, e.g., the LA design office or other designated to approve all changes, which do arise in the field despite best efforts.

**Project Delivery Method:**

- Design-Bid-Build

**Design-Bid-Build Phase:**

- Design

**Categories:**

- Landscaping
- Maintenance
- Roadside Restoration



*Mature trees protected during noise wall construction.*



*Close placement of noise wall adjacent to mature trees.*



*Use of extra large crane to lift panels over tree tops in order to preserve existing trees.*



*Landscaping installed in cleared areas.*

## Research Office

# Research Note

## Quantifying Incident-Induced Travel Delays on Freeways Using Traffic Sensor Data: Phase II

*From the WSDOT Research Office, February 2011*

### Traffic Incidents Affect Safety, Travel Time, and Fuel Cost



Traffic incidents cause not only adverse safety impacts on roadway travel, but also approximately 50 percent of freeway congestion in metropolitan areas, resulting in extra travel time and fuel cost. Managing traffic incidents efficiently and effectively is crucial for congestion mitigation. The Washington State Department of Transportation (WSDOT) established its Incident Response Program (IRP) in collaboration with the Washington State Patrol, the Washington State Association of Fire Chiefs, and the Washington Traffic Incident Management Coalition (WaTIMCo).

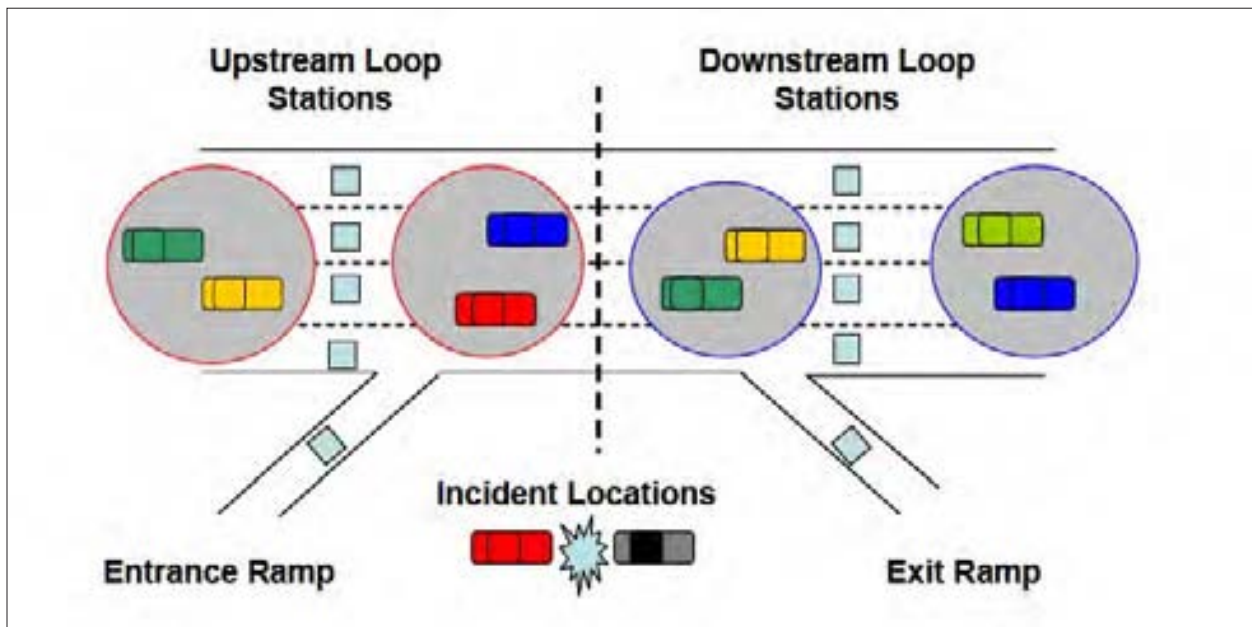
## WSDOT Needed a Practical Way to Quantify Freeway Delay Due to Incidents

To improve understanding of incidents and manage them more effectively, WSDOT launched this research project to develop a practical method for quantifying freeway Incident-Induced Delay (IID) using traffic sensor data. IID refers to the extra travel time, in addition to the travel time of an incident-free scenario, which all incident-impacted drivers take to complete a certain length of trip. Quantifying IID for an incident requires knowing both the total delay under the incident scenario and the recurrent delay under the incident-free scenario. The difference between total delay and recurrent delay is the delay induced by the incident.

A method that can accurately quantify IID is highly desirable for the following reasons:

- IID estimates are crucial for assessing the effectiveness of operational strategies of roadway network.
- IID estimates provide important information for traffic engineers to understand the impacts of various types of incidents under different traffic and roadway conditions.
- IID estimates are essential for optimizing the incident response program so that limited monetary and labor resources can be allocated to maximize its benefit/cost ratio.
- IID is a key component of incident cost calculations and hence is essential for the development of active traffic management and integrated corridor management strategies.

As an extension of the Phase I study, this research project aimed to improve IID estimates by developing a new algorithm that only uses traffic volumes as input. Such an algorithm is more suitable for WSDOT because single loop detectors are the most common type of traffic sensors in Washington and only traffic volume and lane occupancy can be directly measured by single loops.



Loop stations upstream and downstream of an incident.

## The Researchers Investigated a Better Approach to Measure Freeway Delays Caused by Incidents

To overcome the difficulties in IID estimation using the Phase I approach, a modified approach was developed. This new approach applies techniques to predict the unobservable downstream volumes under the incident-free scenario to eliminate the need of estimating the recurrent delay at the incident location (Figure 1). This new approach enables IID estimation at locations with only volume measurements.

Two techniques were investigated in this study for downstream volume prediction. Their prediction accuracies were evaluated and compared to help determine the best prediction approach. To predict the downstream curve accurately, a number of models were calibrated for applications under different scenarios featured by time of day, number of lanes, route, and direction.

To verify the accuracy of the new IID estimation algorithm, IIDs estimated by the proposed approach were compared with the ground-truth data. The ground-truth IIDs were extracted from video images captured by the WSDOT surveillance video cameras at two study sites, one on I-5 and the other on SR 520. The relative errors associated with the proposed approach were 1.4 percent and -5.6 percent for the I-5 and SR 520 cases, respectively, indicating that the new approach is able to produce fairly accurate IID estimates.

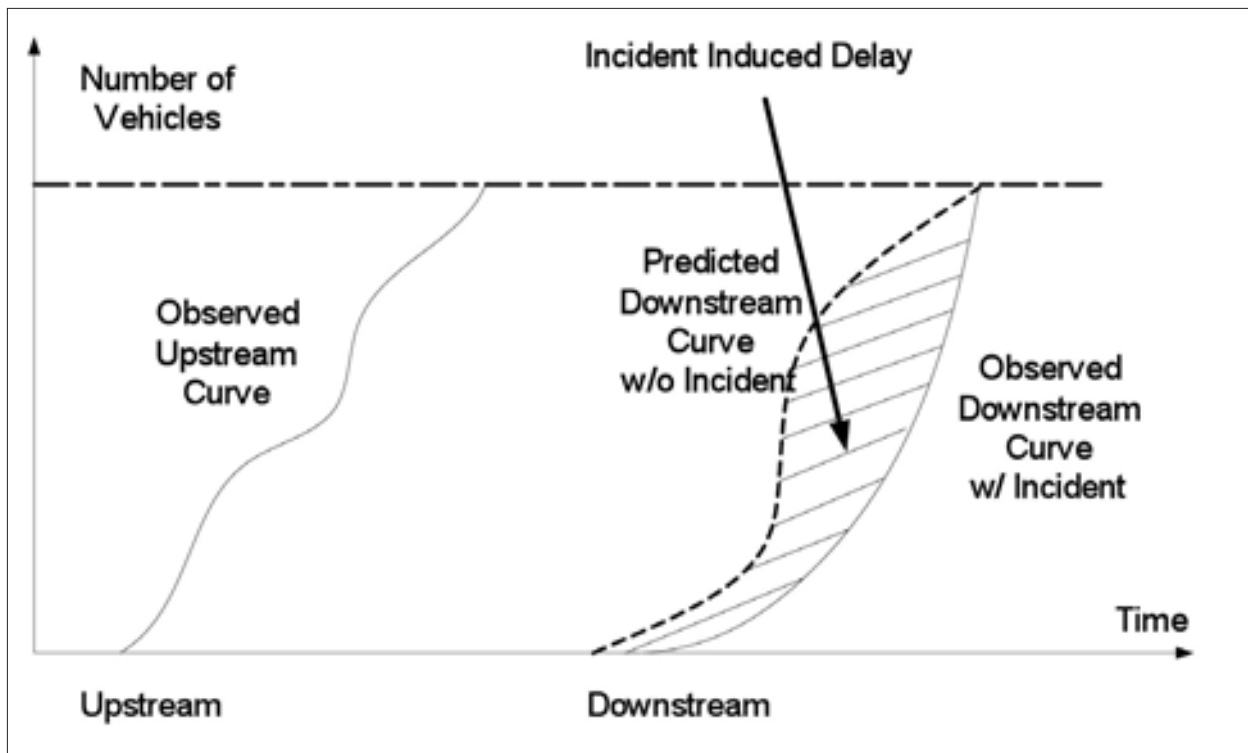


Figure 1: Illustration of the modified queuing diagram.

Researchers investigated the statistical patterns of incident occurrence frequency and incident duration based on the 2009 incident data archived in the Washington Incident Tracking System. A statistical analysis was conducted on the estimated IID and obtained valuable findings. The analysis results not only help people understand incident impacts on roadway travel, but also provide crucial information for WSDOT to develop countermeasures against traffic incidents and incident-induced congestion.

A prototype online system was developed to implement the proposed algorithm. It was integrated into the Digital Roadway Interactive Visualization and Evaluation Network (DRIVE Net). DRIVE Net is a regional map-based online platform for data sharing, visualization, modeling, and analysis developed by the Smart Transportation Applications and Research Laboratory (STAR Lab) of the University of Washington. Through the regional map-based user interface and the query tools provided by the online application, users can easily configure queries on the incident database of DRIVE Net. For example, a user can specify the time period and routes to define the incidents to display. All incidents that fit the query criteria will be marked on the regional map by balloon symbols. If a user is interested to know details of an incident, he or she can click the corresponding balloon and see the fundamental data of the incident in a callout textbox. To view the incident-induced delay, users can click the “Calculate Delay” button at the bottom of the callout (Figure 2) and IID of the incident will be presented in the callout.



Figure 2: Snapshot of the online system.

## **The Researchers Found Weekend Incidents and Traffic Accidents Cause Longer Delays**

By using the method developed in this study, users can automatically calculate IID with a good accuracy for a large-scale freeway network equipped with traffic counters.

Incident response on weekends should be strengthened. A case study on I-5 incidents revealed that weekend incidents have longer average IIDs than weekday incidents of the same type. This implies that more IRP resources may be needed for busy corridors during weekend days.

Traffic accidents were found to be associated with significantly longer IIDs than other types of incidents. More effective response to traffic accidents, particularly casualty accidents, would definitely be helpful in decreasing average IIDs.

## **Researchers Recommend Need for Better Location-Specific Models**

With IID estimated by the proposed algorithm, IID cost can be derived with value of time information. This enables the opportunity for optimizing the configurations of the IRP crew teams, including their scheduling, personnel allocation, and spatial deployment.

IIDs for a significant amount of incidents cannot be estimated because of missing or incorrect data. Improvement of data quality in both the incident database and the loop database are needed to further enhance IID estimation. Since ramp milepost information is currently missing in the loop detector database, the research team was not able to consider ramp volumes in the calculations. In the future, the milepost locations for on- and off-ramps should be added to the online system database so that the proposed algorithm can incorporate ramp volumes.

Accurately predicting the downstream volume under the incident-free scenario is critical for quantifying IID in this new approach. Since geometric factors, in addition to volume levels, are highly relevant to traffic movements, prediction models that take location-specific variables into account are likely to yield better results and should be investigated in future research. Further study should address this and develop more location-specific models for improved IID estimation accuracy.

## **WSDOT Plans to Use the Results in Freeway Operations and Infrastructure Investments**

### ***Implement the Algorithm***

The approach presented in the study does not require inputs other than traffic volumes, so it can be easily applied statewide. WSDOT will implement this algorithm for IID estimation.

### ***Improve the Online Platform for Information Query and Analysis***

The prototype online system developed in this study provides a great platform for WSDOT staff to query the incident database, visualize incident distributions, analyze incident characteristics, and quantify incident impacts. At the current stage, the system only has the 2009 incident data uploaded and limited analytical functions. With further improvements of the online system, important statistics of incidents can be more accurately and automatically calculated for various purposes. These statistics are greatly helpful for WSDOT to make optimal decisions on freeway operations and infrastructure investments.

## ***Use IID Results to Optimize the Incident Response Program***

With IID estimates and the value of time for a particular area, the congestion-related cost of an incident can be calculated. This will not only help understand total cost of an incident, but also improve analysis of options for location of IRP personnel and equipment to identify optimal placement.

### **Contact Information**

Quantifying Incident-Induced Travel Delays on Freeways Using Traffic Sensor Data: Phase II  
WA-RD # 758.1

[www.wsdot.wa.gov/research/reports/fullreports/758.1.pdf](http://www.wsdot.wa.gov/research/reports/fullreports/758.1.pdf)

### ***Researcher***

Yinhai Wang, Ph.D.  
Assistant Professor  
University of Washington  
[yinhai@u.washington.edu](mailto:yinhai@u.washington.edu)

### ***Technical Monitor***

Bill Legg  
WSDOT ITS Operations Engineer  
[leggb@wsdot.wa.gov](mailto:leggb@wsdot.wa.gov)

### ***Project Funding***

\$60,000 Federal  
\$15,000 State  
\$45,000 TransNow UTC

### ***Research Manager***

Doug Brodin  
WSDOT Research Office  
[brodind@wsdot.wa.gov](mailto:brodind@wsdot.wa.gov)

## LTAP Center Resources

### Free Publications for State of Washington Residents

Name		Agency	
Mailing Address	City	State	Zip+4
Phone	Fax	E-mail	

To order publications, check the items you would like and fax the pages to 360-705-6858; mail to WSDOT, H&LP/LTAP Center, PO Box 47390, Olympia, WA 98504-7390; e-mail [mcdonjt@wsdot.wa.gov](mailto:mcdonjt@wsdot.wa.gov); or phone 360-705-7355.

**Check the items you would like to order.**

### Free Hard Copy Publications

- Asset Management Primer, FHWA, 1999
- Common Roadside Invasives – Roadside Field Guide for Weeds, FHWA, 2003
- Distress Identification Guide, LTAP, 2005
- Entering The Quiet Zone, 2002
- General Field Reference Guide (pocket size), 2006
- Highway Rail Crossing Consolidation and Elimination
- How Long Does it Take to Secure Your Load, WSDOE
- Intelligent Transportation Systems – Peer to Peer Program, 2002
- Local Agency Pavement Management Application Guide, WSDOT, 1997
- Materials and Procedures for Repair of Potholes in Asphalt-Surfaced Pavements, LTPP, 2001

- Pavement Preservation Checklist Series
  - 1. Crack Seal Application, FHWA, 2004
  - 2. Chip Seal Application, FHWA, 2004
  - 3. Thin Hot-Mix Asphalt Overlay, FHWA, 2004
  - 4. Fog Seal Application, FHWA, 2004
  - 5. Microsurfacing Application, FHWA, 2004
  - 6. Joint Sealing Portland Cement Concrete Pavements, FHWA, 2004
  - 7. Diamond Grinding of Portland Cement Concrete Pavements, FHWA, 2005
  - 8. Dowel-Bar Retrofit for Portland Cement Concrete Pavements Checklist, FHWA, 2005
  - 9. Partial-Depth Repair of Portland Cement Concrete Pavements, FHWA, 2005
  - 10. Full-Depth Repair of Portland Cement Concrete Pavements, FHWA, 2005
  - 11. Hot In-Place Asphalt Recycling Application Checklist, FHWA, 2005
  - 12. Cold In-Place Asphalt Recycling Application Checklist, FHWA, 2005
  - 13. Slurry Seal Application Checklist, FHWA, 2005
- Pavement Surface Condition Field Rating Manual for Asphalt Pavement, NWPMA, WSDOT, 1999
- Prefabricated Bridges 2004: Good Business–Best Practice, AASHTO TIG/FHWA
- Retroreflectivity Requirements, 2007
- Road Symbol Signs, FHWA, 2002
- Serving Rural America
- Sign Retroreflectivity Guidebook for Local Agencies, FHWA, 2009
- Washington Bicycle Map, WSDOT, 2008
- Washington Highway Map, WSDOT, 2008–2009
- Washington Interstate Guide Map, WSDOT, 1997

### **Free DVDs**

- Danger Signs, ATSSA, 2004
- Driving Modern Roundabouts, WSDOT, Cities of Lacey and Olympia, 2002
- Lightly on the Land, FHWA, 2004

## Free CD ROMs

- Context Sensitive Solutions Documents, WSDOT, 2006
- Good Practices: Incorporating Safety Into Resurfacing and Restoration Projects, FHWA, 2006
- Gravel Roads Maintenance & Design Manual, S. Dakota LTAP, 2000
- Guide for Determining Design Resilient Modulus Values for Unbound Materials, FHWA, 2003
- Guidelines for the Selection of W-Beam Barrier Terminals, FHWA, 2006
- High-Performance Concrete Structural Designer's Guide, FHWA, 2006
- Pedestrian Facility Design Training – Reference Documents, WSDOT, 2006
- Winter Roadway Maintenance – Computer Based Training (8CDs – 43 hours), AASHTO, 2010
- Workzone Safety for Roadway Maintenance and Operations, 2000

## WSDOT Self-Study Guides

These non-credit WSDOT self-study guides, on CD, may be obtained from the LTAP Center.

- Contract Plans Reading Course Guide – 2002
- Basic Surveying – April 2009
- Advanced Surveying (Metric) – April 1998
- Technical Mathematics Course Manual – 1988
- Technical Mathematics II – March 2001

### **Retired Professionals Website**

The Retired Professionals program provides a listing of retired public works individuals interested in part-time or full-time employment with agencies needing experienced professional employees.

[www.wsdot.wa.gov/localprograms/ltap/retired.htm](http://www.wsdot.wa.gov/localprograms/ltap/retired.htm)

## Online Resources

### Bridge

- WSDOT Highways & Local Programs Bridge Section  
[www.wsdot.wa.gov/localprograms/bridge/default.htm](http://www.wsdot.wa.gov/localprograms/bridge/default.htm)

### Environmental

- WSDOT Highways & Local Programs Environmental  
[www.wsdot.wa.gov/localprograms/environment](http://www.wsdot.wa.gov/localprograms/environment)
- *Environmental Procedures Manual* (M 31-11)  
[www.wsdot.wa.gov/publications/manuals/m31-11.htm](http://www.wsdot.wa.gov/publications/manuals/m31-11.htm)
- National Marine Fisheries Service Species Listings and Info  
[www.nwr.noaa.gov/](http://www.nwr.noaa.gov/)
- U.S. Fish and Wildlife Service Endangered Species Listings and Info  
[www.fws.gov/endangered/](http://www.fws.gov/endangered/)
- FHWA's Environmental Home Page  
[www.fhwa.dot.gov/environment/index.htm](http://www.fhwa.dot.gov/environment/index.htm)

### WSDOT Highways & Local Programs Listservs

For the following listservs, sign up at [www.wsdot.wa.gov/localprograms/ltap.htm](http://www.wsdot.wa.gov/localprograms/ltap.htm)

- Pavement Technology
- LTAP News
- LTAP Training
- Traffic Engineering and Operations  
[www.wsdot.wa.gov/localprograms/traffic/](http://www.wsdot.wa.gov/localprograms/traffic/)

### WSDOT State Materials Lab

- [www.wsdot.wa.gov/business/materialslab/default.htm](http://www.wsdot.wa.gov/business/materialslab/default.htm)

### WSDOT Technical Manual Online Index

- [www.wsdot.wa.gov/publications/manuals/index.htm](http://www.wsdot.wa.gov/publications/manuals/index.htm)

### Legal Search

- Search Bills, RCWs, and WACs  
[www.leg.wa.gov/lawsandagencyrules/pages/default.aspx](http://www.leg.wa.gov/lawsandagencyrules/pages/default.aspx)

### Local Agency Guidelines (LAG) Manual

- [www.wsdot.wa.gov/publications/manuals/m36-63.htm](http://www.wsdot.wa.gov/publications/manuals/m36-63.htm)

### Pavia Systems – Online Training Center

- <http://training.paviasystems.com/catalog/>

## **Pavement Management**

- Pavement Publications and NWPMA Links  
[www.wsdot.wa.gov/localprograms/ltap/pavement.htm](http://www.wsdot.wa.gov/localprograms/ltap/pavement.htm)
- NWPMA – Northwest Pavement Management Association  
<http://nwpma-online.org/2.html>
- Asphalt Institute  
[www.asphaltinstitute.org/](http://www.asphaltinstitute.org/)
- National Asphalt Pavement Association  
[www.hotmix.org/](http://www.hotmix.org/)
- FHWA Resource Center  
[www.fhwa.dot.gov/resourcecenter/teams/pavement](http://www.fhwa.dot.gov/resourcecenter/teams/pavement)

## **Project Development**

- Federal Aid and State-Funded Progress Billing Forms  
[www.wsdot.wa.gov/LocalPrograms/ProgramMgmt/forms.htm](http://www.wsdot.wa.gov/LocalPrograms/ProgramMgmt/forms.htm)
- STIP (State Transportation Improvement Program)  
[www.wsdot.wa.gov/localprograms/programmgmt/stip.htm](http://www.wsdot.wa.gov/localprograms/programmgmt/stip.htm)
- TIP (Local Agency 6-Year Transportation Improvement Program)  
[www.wsdot.wa.gov/planning/metro/](http://www.wsdot.wa.gov/planning/metro/)

## **Research**

- WSDOT Research Office  
[www.wsdot.wa.gov/research](http://www.wsdot.wa.gov/research)
- TRIS Online Transportation Research Board National Transportation Library  
<http://ntlsearch.bts.gov/tris/index.do>
- Transportation Research Board  
<http://gulliver.trb.org>
- Municipal Research and Services Center of Washington (MRSC)  
[www.mrsc.org](http://www.mrsc.org)

## **Traffic and Safety**

- WSDOT Statewide Travel and Collision Data Office  
[www.wsdot.wa.gov/mapsdata/stcdo\\_home.htm](http://www.wsdot.wa.gov/mapsdata/stcdo_home.htm)
- Washington State Patrol  
[www.wsp.wa.gov](http://www.wsp.wa.gov)
- Washington Traffic Safety Commission  
[www.wtsc.wa.gov](http://www.wtsc.wa.gov)
- National Highway Traffic Safety Administration  
[www.nhtsa.dot.gov](http://www.nhtsa.dot.gov)

## Training

- Washington State LTAP Current Class List  
[www.wsdot.wa.gov/localprograms/training/ltap.htm](http://www.wsdot.wa.gov/localprograms/training/ltap.htm)
- Washington State LTAP Class Registration  
<http://eefmapps.wsdot.wa.gov/fmi/xsl/ltaptraining/registration.xml?-db=web%20registration&-lay=web%20layout&-view>
- Washington State County Road Administration Board  
[www.crab.wa.gov/](http://www.crab.wa.gov/)
- American Public Works Association  
<http://www.apwa-wa.org/training/training.aspx>
- University of Washington Engineering Professional Programs  
[www.engr.washington.edu/epp](http://www.engr.washington.edu/epp)
- National Highway Institute – Web Based Training  
[www.nhi.fhwa.dot.gov/training/list\\_catalog.aspx?cat=&key=web%20based&num=&loc=&sta=%&tit=&typ=&lev=&ava=&str=&end=&drl](http://www.nhi.fhwa.dot.gov/training/list_catalog.aspx?cat=&key=web%20based&num=&loc=&sta=%&tit=&typ=&lev=&ava=&str=&end=&drl)

## WSDOT Local Programs Engineers

- Eastern Region (Spokane), Keith Martin, 509-324-6080, [martink@wsdot.wa.gov](mailto:martink@wsdot.wa.gov)
- Northwest Region (Seattle), Ed Conyers, 206-440-4734, [conyere@wsdot.wa.gov](mailto:conyere@wsdot.wa.gov)
- Olympic Region (Olympia), Neal Campbell, 360-357-2666, [campben@wsdot.wa.gov](mailto:campben@wsdot.wa.gov)
- North Central Region (Wenatchee), Paul Mahre, 509-667-3090 or 667-2900, [mahrep@wsdot.wa.gov](mailto:mahrep@wsdot.wa.gov)
- South Central Region (Yakima), Roger Arms, 509-577-1780, [armsr@wsdot.wa.gov](mailto:armsr@wsdot.wa.gov)
- Southwest Region (Vancouver), Ken Hash, 360-905-2215, [hashk@wsdot.wa.gov](mailto:hashk@wsdot.wa.gov)

## Miscellaneous Washington State Online Resources

- Community Design Assistance  
[www.wsdot.wa.gov/localprograms/planning](http://www.wsdot.wa.gov/localprograms/planning)
- Bicycling in Washington State  
[www.wsdot.wa.gov/bike/](http://www.wsdot.wa.gov/bike/)
- Walking in Washington State  
[www.wsdot.wa.gov/walk/](http://www.wsdot.wa.gov/walk/)
- Washington Scenic Byways  
[www.wsdot.wa.gov/localprograms/scenicbyways/](http://www.wsdot.wa.gov/localprograms/scenicbyways/)
- Retired Professionals Program  
[www.wsdot.wa.gov/localprograms/ltap/retired.htm](http://www.wsdot.wa.gov/localprograms/ltap/retired.htm)
- Governor's Office of Indian Affairs  
[www.goia.wa.gov](http://www.goia.wa.gov)
- Association of Washington Cities  
[www.awcnet.org/](http://www.awcnet.org/)

## Other Online Resources

- Pacific Northwest Interagency Cooperative – Grounds Equipment Maintenance (GEM)  
[www.gematwork.org](http://www.gematwork.org)
- National LTAP and TTAP (Local and Tribal Technical Assistance Program)  
[www.ltapt2.org](http://www.ltapt2.org)
- Institute of Transportation Engineers  
[www.ite.org](http://www.ite.org)

## Training Opportunities

### LTAP Center

The class fees shown apply to both public and private sector students. For further information on these courses and a link to online registration, visit [www.wsdot.wa.gov/localprograms/training/ltap.htm](http://www.wsdot.wa.gov/localprograms/training/ltap.htm), or contact Judy McDonald at 360-705-7809.

#### **Basic Traffic Sign Retroreflectivity Measurement and Management**

November 1, 2011, Everett; November 3, 2011, Vancouver; November 8, 2011, Moses Lake. **Free.** Instructor: Dan Carruth. This course will train local agencies in the methods to measure and manage their traffic signs to ensure that signs meet minimum retroreflectivity levels. This course will delve into detail about the need for nighttime visibility, the principles of retroreflectivity, and the requirements of the MUTCD regarding managing sign retroreflectivity and management methods. Students will be provided details about conducting sign inspections including the various maintenance methods, equipment, and procedures that are addressed in the MUTCD. This is a classroom only training session but will provide several demonstrations and hands on opportunities to assist you when conducting a field inspection. The target audience is field technicians and those who will be conducting nighttime field inspections.

#### **Highway Runoff Manual Training**

October 18–19, 2011, Yakima. **Free** to WSDOT and local agencies, **\$200** consultants. Instructor: Mark Maurer. In 2008, WSDOT made substantial changes to the *Highway Runoff Manual* (HRM), which is the primary source of stormwater planning and design requirements for highway-related work in the state of Washington. The HRM updates, combined with a high volume of transportation work occurring in the state, led WSDOT to develop an internal agency training program for their employees on the revised HRM. WSDOT is now offering this same training to consultants and local agency representatives whose responsibilities require them to use WSDOT's HRM.

#### **Purchasing Bidding and Contract Management**

September 21–22, Ellensburg; November 16–17, 2011, Tacoma. **\$100.** Instructor: John Carpita, MRSC. Local agencies must purchase supplies, materials and equipment, solicit services and contract for public works in accordance with confusing and ever changing state statutes and regulations. The Washington State LTAP Center and MRSC offer this fast-paced workshop to all local agencies and municipal governments to help them spend scarce dollars in accordance with state statutes and to improve their project and contract management skills. Attendees will take home handouts covering a wide range of purchasing, bidding and contract management issues and will gain access to useful online resources that include sample and model documents.

## Preparing Your ECS for NEPA Approval On Demand

**Free.** This six-hour class will be scheduled when 20 participants have registered at a location: Shoreline, Olympia, Vancouver, Wenatchee, Spokane, and the Tri-Cities. This course will provide a basic overview of the National Environmental Policy Act (NEPA) and a step-by-step explanation of the process and documentation requirements of the Environmental Classification Summary (ECS). Participants will learn about the triggers for analysis of each of the environmental disciplines and the appropriate level of documentation necessary to obtain approval by FHWA.

### ***Upcoming Classes***

We are just beginning to schedule classes for this fall. If you want to subscribe to our LTAP Training Listserv, you will be notified of training classes as they become available. Below is the link to the LTAP web page. Just click on the box in the upper right-hand corner to sign up. [www.wsdot.wa.gov/localprograms/training/default.htm](http://www.wsdot.wa.gov/localprograms/training/default.htm)

## WSDOT Construction and Design Courses

**Free.** WSDOT courses are available for public agencies and consultants acting on their behalf. Attendance is very limited. Classes are offered in Seattle, Olympia, Vancouver, Yakima, Wenatchee, and Spokane. All classes are posted on the LTAP training website as they become available and registrations are accepted online. You will find more information on our website: dates, locations, and availability of scheduled classes with a description for each course. The Design courses run from September to March; Construction classes are scheduled for January through May. The courses offered are:

- **Design**

- Contract Provision Preparation (BGN)
- Roadside Safety (B74)

- **Construction**

- Construction classes for Winter 2012 are not yet scheduled.

- **Traffic**

- Work Zone Traffic Control Plan Design (DBK)

Please note that availability of the above classes is very limited.



## TRANSPEED

Fees are for public agency employees in Washington State. Standard fee for all others.  
TRANSPEED website and registration: [www.engr.washington.edu/epp](http://www.engr.washington.edu/epp).  
Program Manager, Julie Smith, 206-543-2310, [jsmith@pce.uw.edu](mailto:jsmith@pce.uw.edu).

### **Pavement Design**

Online, Continuous Enrollment. \$400

## Other Training Programs for Local Agencies

### **Engineering Professional Programs (EPP)**

University of Washington, Seattle

Civil and environmental professional development, engineering review courses in preparation for PE exams.

206-685-8936

[www.pce.uw.edu/engineering/epp/](http://www.pce.uw.edu/engineering/epp/)

### **Washington State Department of Ecology**

Certified Erosion and Sediment Control Lead (CESCL)

Training and Certification Providers

[www.ecy.wa.gov/programs/wq/stormwater/municipal/workshops.html](http://www.ecy.wa.gov/programs/wq/stormwater/municipal/workshops.html)

### **Washington Environmental Training Center (WETRC)**

Green River Community College, Auburn

Water, wastewater, and other courses of interest to public works departments.

1-800-562-0858

[www.greenriver.edu/wetrc](http://www.greenriver.edu/wetrc)

### **Washington State Emergency Management Division**

Professional Development Series courses, Advanced Professional Series Courses, and training that will prepare individuals for disasters ranging from floods, fires, weather storms, earthquakes, and other natural or technological hazards.

253-512-7048 or 253-512-7000

[www.emd.wa.gov/training/training\\_index.shtml](http://www.emd.wa.gov/training/training_index.shtml)

### **Washington State Department of Personnel (DOP) Human Resource Development Services**

Local agencies are invited to attend DOP training classes. Courses on health and safety, information technology, leadership, meeting facilitation, oral and written communication, personal development, customer service, and many other topics.

360-664-1921

[www.dop.wa.gov/training/pages/default.aspx](http://www.dop.wa.gov/training/pages/default.aspx)

### **Evergreen Safety Council**

Customized and onsite training, First Aid/CPR, forklift training, health, and safety training.

206-382-4090 or 1-800-521-0778

[www.esc.org](http://www.esc.org)

## **Washington State Department of Labor and Industries**

Online safety courses, employee training kits, video library, videos online, and workshops.

360-902-5800, 1-800-547-8367

[www.lni.wa.gov/safety/traintools/default.asp](http://www.lni.wa.gov/safety/traintools/default.asp)

## **Click, Listen, and Learn**

### **American Public Works Association**

The National APWA's series of interactive Internet educational programs for one person or for a group. Hear it through your speaker phone; see it on your PC. Each program is led by experts in the field who convey new ideas, new methods, and new technologies in a two-hour time frame. Over 75 past programs can be purchased.

1-800-848-APWA

<http://www2.apwa.net/events/?filter=Click%2C+Listen+%26+Learn>

#### *Now Scheduled:*

- Sustainable Utility Construction: Methods and Techniques (rebroadcast), September 13, 2011
- Selection Success (Rebroadcast), September 27, 2011
- How to be FEMA Ready When Disaster Hits (Rebroadcast), October 11, 2011
- Leadership in Changing Times, October 14, 2011
- Got Potholes? Infrared Asphalt Restoration May Be Your Solution (Live), October 20, 2011
- Liquid Usage in Winter Maintenance (Live), October 27, 2011

## Washington State LTAP Center

### LTAP News

is published quarterly by:

WSDOT Highways & Local Programs Division  
Washington State LTAP Center  
310 Maple Park Avenue SE  
PO Box 47390  
Olympia, WA 98504-7390  
[www.wsdot.wa.gov/localprograms/ltap.htm](http://www.wsdot.wa.gov/localprograms/ltap.htm)

Article contributions, questions, or comments are welcome. Contact Ruth McIntyre at [mcintyr@wsdot.wa.gov](mailto:mcintyr@wsdot.wa.gov), 360-705-7352, fax 306-705-6858, or the address above.

To request a subscription to this publication, go to [www.wsdot.wa.gov/localprograms/ltap/news.htm](http://www.wsdot.wa.gov/localprograms/ltap/news.htm) and subscribe to the LTAP News listserv.

Editor reserves the right to refuse to publish and to edit articles to conform to the standards of our publication.

### Secretary of Transportation

Paula Hammond, P.E.

### Deputy Secretary

Dave Dye, P.E.

### Chief of Staff

Steve Reinmuth

### Highways & Local Programs Division Director

Kathleen B. Davis

### Engineering Services Manager

Aaron Butters, P.E.

### Technical Services Manager and Managing Editor

Matthew Enders, P.E.

### Technical Editor

Ruth McIntyre

### Design

Publications Services

The Local Technical Assistance Program (LTAP) is a national program financed by the Federal Highway Administration (FHWA) and individual state transportation departments. Administered through Centers in each state, LTAP bridges the gap between research and practice by translating state-of-the-art technology into practical application for use by local agency transportation personnel.

Any opinions, findings, conclusions, or recommendations presented in this newsletter are those of the authors and do not necessarily reflect the views of WSDOT or FHWA. All references to proprietary items in this publication are not endorsements of any company or product.

