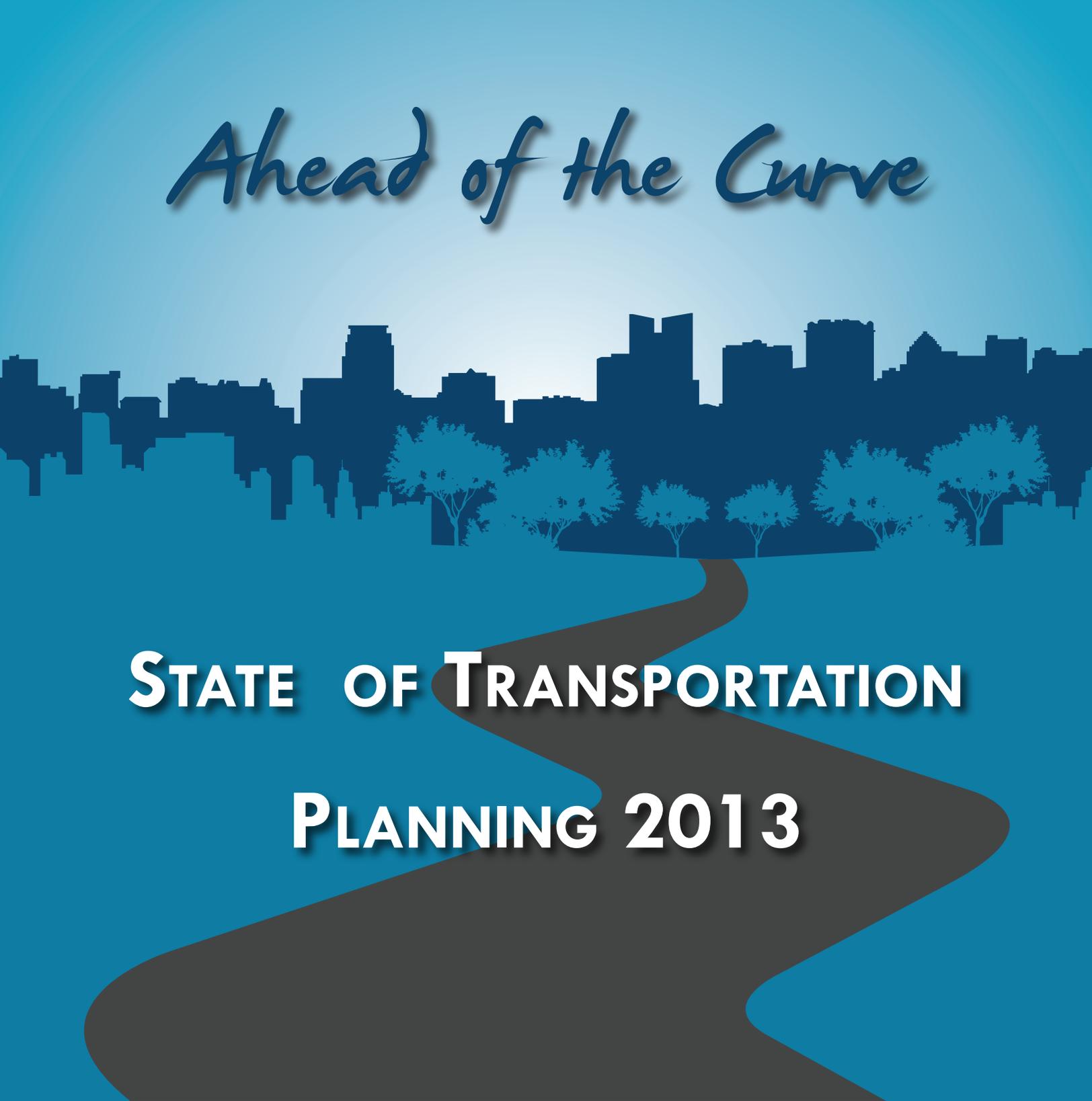


*Ahead of the Curve*



**STATE OF TRANSPORTATION  
PLANNING 2013**



American Planning Association  
**Transportation Planning Division**

*Making Great Communities Happen*



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*April 2013*

*Dear members of the Transportation Planning Division and friends of transportation planning:*

*Our theme for this edition of the State of Transportation Planning is Ahead of the Curve. As planners we are working with subtle and not-so-subtle changes in direction. Staying ahead of the curve through innovative ideas and practice, such as the articles in the publication suggest, will help us do our best for our clients and the public.*

*The articles show that planners are working with a variety of complex issues and concepts. The unifying theme is that many planners are far-sighted and oriented to staying ahead of the current issues that we face.*

*I hope this publication will give you some ideas for innovation and leadership in transportation planning. Please contact the author directly if you have feedback on an article.*

*For good planning,*

*Jo Laurie Penrose, AICP*

*Editor*



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# Resiliency and Recovery



## Hurricane Sandy and New York City: protecting people and protecting infrastructure

*By Amy Ford-Wagner, AICP*

New York City has been preparing for a storm like Hurricane Sandy for more than 15 years. At which time, the New York City Office of Emergency Management (NYCOEM) began trying planning from an evacuation point of view in which the transit system would eventually be shut down. Working with the Metropolitan Transportation Authority (MTA), based on modeling exercises to show evacuation demand in a worst-case scenario, the City discovered that about half the evacuation population would have to be transported by transit services, given that fewer than 50% of New York City households own a car. As a result of this exercise, planners realized that the City's subway network would have to be part of any evacuation plan, not just the bus system.

But how can a massive transit system balance the need for evacuation with the need for system protection and recovery? The City determined that the transit system would have to establish a "zero hour" at which time it would shut down entirely, after giving residents plenty of notice and providing evacuation services.

### ***Hurricane Zones***

The City has two broad types of evacuation plans: those for "no-notice events" and plans for coastal storm evacuation. Plans for no-notice events divide the city into zones and lay out a plan to evacuate that zone very quickly.

Coastal storm evacuation is very different from no-notice events. For coastal storms, the City has a set of zones based on the anticipated category of storm. The City models the clearance time to evacuate certain areas, and then schedules the timeline for preparation, evacuation, and recovery from that, adding a safety factor. This requires an early decision by the Mayor to order an evacuation.

With plenty of practice from Hurricane Irene of 2011, the City issued only the second mandatory in evacuation order in its history as Hurricane Sandy approached. By 7 o'clock on October 28, 2012 (more than 24 hours before Sandy was anticipated to make landfall) residents of low-lying areas – the 370,000 people living in the City's Hurricane Evacuation Zone A – were required to leave their homes. (New York City has three Hurricane Evacuation Zones – A, B, and C – that



correlate with the category of storm anticipated.) With people out of danger, the City would then begin shutting down its transit system to protect infrastructure and assets from the saltwater that would be driven inland by the storm's powerful surge.

### ***Avoiding a Shadow Evacuation***

When the City orders a specific zone to evacuate, people in other zones may not realize that it really wants only that zone to evacuate, and a “shadow evacuation” can result. In order for an evacuation to be as effective as modeled, the city wants to avoid the shadow evacuation by ordering schools and other public facilities closed.

### ***Shutdown as a Key to Recovery***

For many years, it was unthinkable that the subway and bus system would shut down entirely. Gradually, the idea developed that shutting the system down entirely would be a safety precaution for system workers as well as passengers.

Now, however, it is clear that without shutting down the system, it would be impossible to recover quickly. If the system continues to operate during a major storm, transit infrastructure and vehicles are left vulnerable to the effects of flooding and storm surge. By shutting down the system, the transit authority is able to move vehicles out of the way of damaging floodwaters and keep them relatively dry by placing them in areas of higher ground, not only to service yards but along trackways that might normally be operational.

Commitment to the idea of system shutdown also affects exactly how the evacuation and shutdown proceeds. For example, service to areas of the city on higher ground (such as the Bronx) might be shut down earlier so that equipment can be stored there while evacuation continues in other parts of the city.

While shutdown is now considered key to recovery, the transit authority recognizes that today's rich communications environment is key to letting the public know about an impending system shutdown, and lowering the risk of stranding people because they lack information. In

addition, because New York City is so dependent on its robust transit system, the shutdown is an invaluable means of “messaging” the seriousness of an approaching storm, and encourages people to take evacuation orders seriously.

In a city where hundreds of languages are spoken, official transit authority alerts can only reach a certain number of people. (Even Google's Translate function – which MTA links to on its web site – lists fewer than 80 language options.) Social media has stepped into the role of passing along the message to additional linguistic populations; MTA has promoted app development and message dissemination by becoming more open about sharing its data.

### ***Success?***

In general, the evacuation and transit system protection procedures worked well. Many bridges to Manhattan were open the day after Sandy made landfall, and the transit system was running limited services within three days and full commuter services within a week.

With a mandatory evacuation order, there is always a risk of residents believing the city is crying wolf, and the general public was somewhat skeptical about the mandatory evacuation order, given that Hurricane Irene, a year earlier, produced less damage than forecast. In addition, evacuation planners general acknowledge that it is impossible to get 100% compliance with a mandatory evacuation order.

With those caveats in mind, generally the evacuation order for Sandy was considered successful. Work remains to reach the homebound and other special needs populations – although services and transport exist specifically to help homebound people, they seem not to take advantage of them. On the other hand, the MTA was able to devote some services to special-needs audiences and requests from social services agencies – sending a bus to the door of a senior center, for example.

### ***Future Procedural Changes***



Transportation Timeline of New York City in Hurricane Sandy <sup>1</sup>		
Sunday, Oct. 28	7pm	Deadline for mandatory evacuation of Hurricane Evacuation Zone A (low-lying coastal areas of NYC, including parts of all five boroughs)
	7pm	Subway and commuter rail service suspension begins
	Evening	Brooklyn and Manhattan cruise ship terminals cleared out
	8pm	Staten Island ferry service suspended
	9pm	Bus service suspension begins
Monday, Oct. 29	12:01am	PATH train service suspended
	2am	New Jersey Transit service suspended
	Unspecified time	Amtrak service canceled on eastern seaboard
	2pm	Holland Tunnel, Hugh L. Carey Tunnel close
	Unspecified time in afternoon	Outerbridge Crossing, Bayonne Bridge close
	6pm	FDR Drive (south of 155 <sup>th</sup> Street)
	7pm	George Washington Bridge, Verrazano-Narrows Bridge, Throgs Neck Bridge, bridges to Rockaways close
		East River bridges (Brooklyn, Manhattan, Williamsburg and Ed Koch Queensboro Bridges) close North Channel Bridge (A trail bridge to the Rockaways) submerged
	Evening	LaGuardia, JFK, and Newark airports close
	8pm	<b>Sandy (no longer a hurricane) makes landfall at Atlantic City</b>
	After 8pm	Storm surge levels reach 14 feet
Seven subway tunnels under East River flood		
Hugh L. Carey Tunnel floods		
Queens Midtown Tunnel floods		
Tuesday, Oct. 30	Mid-day	George Washington Bridge, Outerbridge Crossing, Bayonne Bridge re-open East River bridges re-open
	4:30pm	Gil Hodges Memorial Bridge (to Rockaways) re-opens
Wednesday, Oct. 31	Morning	JFK, Newark airports reopen
		Limited service restored on Metro North and Long Island Rail Road commuter rail services
	1:30pm	Cross Bay Veterans Memorial Bridge (to Rockaways) re-opens
Thursday, Nov. 1	7am	LaGuardia airport re-opens
	6am	Service restored on roughly half of subway system
Friday, Nov. 2	Morning	Amtrak restores limited service into New York City
Monday, Nov. 5	Throughout day	Subway service nearly fully restored for commuters
Tuesday, Nov. 6	Morning	Limited PATH service restored
Friday, Nov. 9	6pm	Queens Midtown Tunnel reopens
Tuesday, Nov. 13	4pm	Hugh L. Carey Tunnel partially reopens
Monday, Nov. 19	6am	Hugh L. Carey Tunnel fully reopens (to all but trucks)
Monday, Dec. 10	Morning	Long Island Rail Road operates on a normal schedule
Monday, Jan. 14	Morning	New Jersey Transit to Manhattan fully restored
Saturday, March 2	Throughout day	PATH service to Manhattan fully restored

<sup>1</sup> “Hurricane Sandy: Covering the Storm.” *The New York Times*. November 6, 2012.  
[http://www.nytimes.com/interactive/2012/10/28/nyregion/hurricane-sandy.html?\\_r=0](http://www.nytimes.com/interactive/2012/10/28/nyregion/hurricane-sandy.html?_r=0)



The City's hurricane zones have historically been based on the storm category (for example, Zone B was equivalent to a category 2 storm). But in hurricane Sandy, New York City learned that directionality plays a role as well: a leftward storm (like Sandy) has a much greater impact than a rightward moving storm (such as a nor'easter). ("Leftward" and "rightward" refer to the storm's overall direction, from the storm's point of view.) In the future, OEM evacuation planners will incorporate directionality of a storm – and not just the storm intensity – in its zone designations.

Even though the City had been preparing for a long time, Sandy proved to be a very strange storm – starting off as tropical (drawing its energy from warm ocean waters) but eventually transitioning to extra-tropical (drawing energy from atmospheric temperature contrasts). Products and forecasts from the National Hurricane Center in the days leading up to landfall, including information on storm surge, served as a starting point, but did not ultimately represent the path of the weather event. This limited the value of the early information that the City received and required the City to change its response plan in real time.

### ***You Don't Have to Be Big to Do It Right***

New York City has a lot of people focused on emergency planning. While other cities and agencies may not be large enough to devote such a large emergency planning force, they can adopt some of the lessons that New York City has learned from Hurricane Sandy:

- Traditional transportation planning techniques, such as modeling transportation demand, origins, and use destinations, and applying them to the transit network to model system performance.
- Given federal funding and a new sense of urgency, everyone is looking at solutions to mitigate and harden assets – this has gone from being a hobby to being taken seriously. Cities and agencies can explore the funding available to see what sort of program they can establish for their situation.
- Prioritize protection of those assets that are most unique and irreplaceable; standard-issue parts can easily be replaced, while antique (but still functioning) equipment should be protected.

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## **Florida's Critical Infrastructure and Coastal Vulnerability**

*By Maria A. Cahill, MAURP, AICP, Julie A. Dennis, MSP and Lucas Lindsey*

In 2004 and 2005, Florida endured an extraordinary number of intense hurricanes, revealing the need to improve the resiliency of coastal infrastructure and evacuation planning across the state. Hurricane Ivan, a Category Three storm severely damaged both spans of the I-10 bridge over Pensacola Bay, causing major delays and traffic to be detoured north of the interstate.

More recently, in 2012, portions of a two mile segment of A1A in Ft. Lauderdale crumbled into the Atlantic Ocean from the effects of Tropical Storm Sandy, a storm which barely scraped the east coast of Florida. These events continue to underscore the vulnerability of Florida's coastal infrastructure.

Policymakers and planning agencies across the state are taking actions to reduce Florida's nearly unparalleled exposure to future storm events





Photo by Paul Krashefski, Broward County - Department  
Natural Resources Planning

Part of A1A in Fort Lauderdale was washed out by TS Sandy in  
October 2012.

and coastal climate trends through collaborative approaches to emergency management, hazard mitigation, and land use and transportation planning. In 2006, local, regional, state, and federal actors, including Florida's Division of Emergency Management and Regional Planning Councils (RPCs), partnered on a Statewide Regional Evacuation Study. This project resulted in detailed elevation, topographic and vulnerability data for each coastal community depicting storm surge to the parcel-level. In addition, the data coupled with significant transportation modeling outputs is being used to update countywide evacuation plans for emergency management purposes.

Taking the High Road, published by the Florida Division of Emergency Management in the partnership with Florida State University's Department of Urban and Regional Planning provides guidance on integrating hazard mitigation into long-range transportation planning. The project team modeled the vulnerability of transportation infrastructure to coastal flooding, including storm surge and sea level rise inundation projections through 2100 across three scenarios for Charlotte County. This guidance suggests that integration of hazard mitigation and long-range transportation planning will require

substantial coordination between emergency and transportation planners as well as scenario exercises that focus on vulnerability, tradeoffs, and community goals early in the long range transportation planning process. Metropolitan Transportation Organizations (MPO) around the state are encouraged to use this guidance when updating their plan.

The Southeast Florida Regional Climate Compact, a partnership between Broward, Miami-Dade, Monroe and Palm Beach Counties, began its efforts in 2009 to mitigate and adapt to climate change. In 2012, the Compact completed a Regional Climate Action Plan for Southeast Florida, including a greenhouse gas emissions inventory, unified sea level rise projections for use in the Compact's planning efforts and a vulnerability assessment of Southeast Florida's exposure to 1, 2, and 3 foot scenarios of sea level rise.

In support of these activities, in 2013 the Federal Highway Administration will be awarding two regions in Florida, Broward and Hillsborough MPOs, with the Climate Change Vulnerability Assessment Pilot grant. Broward partnered with Miami-Dade and Palm Beach MPOs, the Southeast Florida Regional Climate Change Compact, the South Florida Regional Planning Council (RPC), the Treasure Coast RPC, the Florida Department of Transportation districts, and the South Florida Regional Transportation Authority to create a regional effort in transportation adaptation planning. Hillsborough MPO partnered with the Hillsborough Planning Commission, the local Hazard Mitigation Section, the Tampa Bay RPC, and the University of South Florida.

The purpose of the Southeast project is to regionally coordinate transportation adaptation, pilot approaches to conduct climate change and extreme weather vulnerability assessments of transportation infrastructure and to analyze options for adapting and improving resiliency. Hillsborough County has been progressively planning for post-disaster redevelopment and hazard mitigation. Hillsborough MPO will build on these best practices to identify potential

adaptation and mitigation projects in the MPO's 2040 Plan to improve the resiliency of key transportation facilities.

Other statewide efforts include research by Florida Atlantic University (FAU) and the University of Florida (UF) GeoPlan Center for the Florida Department of Transportation. The first phase included a comprehensive analysis of sea level rise projections, studies, models and methodologies used in Florida to estimated sea level rise. The FAU report recommended using the US Army Corps of Engineers (USACE) guidance to forecast scenarios of sea level change and developed a recommended framework for analyzing potential impacts. The same USACE guidance was used by the Compact to generate projections of sea level rise their regional planning efforts.

UF GeoPlan Center is developing the sketch planning tool based on the framework recommended by FAU. This interactive geographic information system (GIS)-based tool incorporates standardized spatial data input layers to conduct a preliminary vulnerability assessment of predicted sea level rise and tide change, on state transportation infrastructure. It also includes a statewide digital elevation data, statewide and regional sea level rise and tidal inundation surfaces, transportation data layers and a visualization of inundation to identify and summarize vulnerable transportation infrastructure.

The sketch planning tool will provide the capability to identify potentially vulnerable transportation infrastructure and will assist and facilitate in the MPO long range transportation planning process. During the next year, several areas of the state including Hillsborough MPO and the Northeast Florida Regional Council will test the tool in their planning efforts.

The Florida Department of Economic Opportunity's Community Resiliency Initiative, funded by NOAA through the Florida Coastal Management Program, is working with the City of Ft. Lauderdale and Broward County to address "adaptation action areas" at the local planning level. An adaptation action area is an optional comprehensive plan designation for areas that experience coastal flooding and that are vulnerable to the related impacts of sea level rise for the purposes of prioritizing funding for infrastructure needs and adaptation planning. Based on recent experiences with critical roads such as A1A, it is likely that transportation infrastructure needs will play a significant role in measures taken to increase the overall resiliency of this community.

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## Community dialogue on resilience measures for transportation planning

*By Kelly Burnes*

The National Climate Assessment and Development Advisory Committee recently released their 2013 draft report for public comment<sup>1</sup>. Among the notable changes from 2000 and 2009, the science has improved, climate change is now being stated directly as a result of human activity and the report is more accessible

and understandable to the public at large.

This report can assist planners and local governments as they evaluate their risks and incorporate mitigation and adaptation measures to strengthen their communities. It can serve as a springboard for community conversations on the impacts of sea level rise to roads and ports,

<sup>1</sup> Federal Advisory Committee Draft Climate Assessment Report. Access report here: <http://ncadac.globalchange.gov/>



or the effects increased temperatures can have on bridges and rails. It also outlines options for adaptation.

How communities collaborate with science and government about the environment, sustainability and transportation is a hot topic and will continue to be. In terms of climate change and planning resilient communities, new thinking is needed to better prepare for future environmental disruptions.

### ***Engineering Community Resilience***

With Hurricane Sandy still fresh in our minds, city planners and urban designers must begin thinking more about how we engineer our communities and our transportation networks to withstand the dramatic stresses placed on them by natural disasters. Of course, socioeconomic factors in some areas may hinder or make redevelopment in that area unfeasible.

Therefore, in the face of extreme and more frequent weather events, we must begin to look at how we protect investments, not how do we avoid it, but how do we work with it once faced with the situation; how can our societal networks “adapt” to natural events.

We can begin to adapt by conducting vulnerability and risk assessments to identify facilities and systems, including impacts on vulnerable communities that may be at risk. We can place a renewed approach on the transportation-land use connection by identifying what to build and where in relation to anticipated weather events. We can design new infrastructure and adapt existing infrastructure to respond to current and anticipated climate conditions. And perhaps one of the most important elements for adaptation is to have an emergency management plan in place to address extreme weather events with an effective response capability.

### ***New Planning Paradigm***

Jane Jacobs in her book, *The Death and Life of Great American Cities*, wrote the way we plan cities is outdated<sup>2</sup>. Those thoughts were from the late 1950s; and one might wonder at what she

would think today.

While Ms. Jacobs was not an urban planner, she was an astute observer of city life. Historically we have based our land use and transportation plans on activity centers and primary uses as though they were independent of their environments.

Our natural, built and social environments are all one holistic infrastructure. Emphasis is now being placed on the connections between and among uses, from primary to tertiary uses and beyond. And we know our aging infrastructure cannot be ignored any longer.

Roads, buildings, bridges, sidewalks, subways, telephone lines and sewers that made modern life convenient are now outdated and deteriorating. They can actually make life more inconvenient if technology to keep the elements at bay does not keep up with the pace of increasing population<sup>3</sup> and service demand. It is a tough task to balance the needs of a community, but attention to reengineering our primary uses to address current and future needs should be part of this century’s new planning paradigm.

### ***Society and Communication***

Society has the mentality that just wants things to work and it grows cranky when things don’t work. Think about water pipes. An invisible zigzagging network buried underground. Much thought isn’t given to them until they burst and the faucets run dry. Adding to the problem is that the public doesn’t understand how antiquated our infrastructure is, be it water pipes, bridges, or telephone lines. And public refusal to pay for a system’s upgrading because water has always been cheap just adds to the complex ability to make change happen.

But it is our job as planners to communicate why adaptation and mitigation measures must be taken, because not everyone understands why

<sup>2</sup> Jane Jacobs, *The Death and Life of Great American Cities*, 1961

<sup>3</sup> United Nations World Population Prospects, world population estimated to reach 8.3 billion by 2030



systems dating back to the 19th century aren't adequate for the 21st century. Local governments have begun to incorporate resiliency measures into their long-range planning. The MPO of Charlotte County-Punta Gorda, Florida incorporated climate change into their transportation plans by looking at a "resilient growth" scenario<sup>4</sup>. Iowa has looked at ways to address increased flooding on roadways<sup>5</sup>. Caltrans has issued staff guidance on incorporating sea level rise into new project designs<sup>6</sup>.

Community dialogues such as these can go a long way in efforts to safeguard our towns and cities. So when floods, fires, and snowstorms do occur, we're better equipped to get back to "business as usual."

The municipal level has an opportunity to be a catalyst of change with local planning officials leading the charge. As local governments begin to assess their risks, identify weaknesses, and incorporate resiliency measures into their town planning, the population may actually be able to withstand disruptions from climate change.

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<sup>4</sup> CCMPO, 2010: Charlotte County-Punta Gorda Long Range Transportation Plan 2035: Summary Report. MPO report

<sup>5</sup> Iowa Climate Change Impacts Committee, 2011: Climate Change Impacts on Iowa 2010

<sup>6</sup> Caltrans, 2011: Guidance of Incorporating Sea-Level Rise: For Use in the Planning and Development of Project Initiation Documents.

# Funding



## MAP-21 and the future of federal transportation policy

*By Jason Jordan and Olivia Starr*

After nine legislative extensions over more than two years, Congress enacted a new federal surface transportation law, Moving Ahead for Progress in the 21st Century (MAP-21), in 2012. The legislation took effect in October 2012 and will guide U.S. transportation policy and funding through September 2014. MAP-21 made a number of important policy changes largely focused on consolidating programs, expanding state flexibility and modifying environmental reviews. The bill's planning provisions leave much of the transportation planning process unchanged. However, it does include an important step forward on performance-based planning and calls for new plans in some key areas, such as freight transportation.

Most of the extraordinary delay in crafting a new transportation authorization was related to the bill's funding. As of this writing, it looks like the funding levels promised by MAP-21 may be undermined by the larger debate in Washington over the federal budget. Mandatory across-the-board spending cuts for domestic discretionary programs established in the Budget Control Act, known as sequestration, kicked in on March 1. These cuts, still being defined by U.S. DOT and

estimated to be at least \$785 million, appear to fall most heavily on programs like safety and the New Starts transit program.

Despite the funding challenges and shorter than usual duration, MAP-21 makes important policy changes and reforms. The bill marks some important new directions in federal transportation policy and planning. The final verdict on these changes from the planning perspective is likely to be mixed. MAP-21 promotes some important innovations, most notably in performance measures, TIFIA funding, and freight. Many of the program consolidations will likely also mark improvements in the overall system.

At the same time, the law cannot be seen as progress for cities and localities given that most of the new flexibilities are given to states. Additionally, advocates for bike and pedestrian programs rightly see the potential for reverses in progress. Some experts have also expressed concern about erosion in focus on repair, maintenance and safety based on some of the program consolidations. As with any major legislation, there are a number of missed opportunities. The multimodal TIGER grant program favored by many communities is not mentioned, and localities are not directly eligible for the projects of national and regional

significance program.

## **KEY PROVISIONS**

### ***Planning***

For MPOs – at least in terms of their basic structure – not much will change. MPOs will continue to be established for any urbanized area with a population of 50,000 or more. That standard is consistent with current law. Interestingly, earlier versions of the bill proposed new population standards, but the final deal opted for more of the same. One structural change that was included is a requirement to include representation by public transportation providers on MPO boards.

The bill also dropped the idea of “tiers” of MPOs with different tiers required to meet various minimum standards. Another rejected element was the idea of eliminating or consolidating certain small MPOs. Ultimately, the “tiering” plan was dropped and all current MPOs will remain in place under the new law.

The bill also maintains the current timing and structure for required Transportation Improvement Programs and long-range plans. The biggest change in the planning process is the creation of a new performance measures as part of the planning process. The law establishes performance measures within highway and transit programs and directs states and MPOs to establish targets and track progress.

MPOs would set regional targets once statewide goals are set. Plans will have to include a description of performance measures and targets and a system performance report that evaluates conditions and performance with respect to the targets. TIPS would include the anticipated effect of included projects on reaching performance targets.

Scenario planning is referenced in the law as a voluntary activity for MPOs. DOT will conduct a cost-benefit evaluation of the use of scenario planning in meeting planning requirements, including an analysis of the technical and financial

issues associated with scenario planning.

The law calls for some new national planning by requiring a “national strategic plan” and a national freight plan. U.S. DOT and the states are required to draft a report identifying projects of national and regional significance. Unfortunately, there is no formal role for MPOs or local governments in this process. A new \$10 million planning pilot program for transit oriented development is created in the bill’s transit section. This program would provide grants to communities with a New Starts grant to do station area planning.

Metropolitan planning is funded through a set-aside of state funding. The amount of the set aside for MPOs is based on the Metropolitan Planning funding a state received in proportion to its total formula funding in fiscal year 2009. To distribute the funds to MPOs, MAP-21 requires that states establish their own formulas based on certain factors, including population, air quality, and status of planning.

### ***CMAQ***

Unlike previous surface transportation authorizations, MAP-21 does not use a formula to determine funding for the Congestion Mitigation and Air Quality Improvement Program (CMAQ), which helps states and metropolitan areas meet ambient air quality standards. MAP-21 allocates CMAQ funding by providing each state with a lump sum for all transportation programs, and mandating a set aside for CMAQ. The U.S. Department of Transportation will calculate the CMAQ set aside based on the relative proportion of CMAQ funding to total transportation formula funding a state received in fiscal year 2009.

Although formulas no longer play a significant role in determining the level of a state’s CMAQ funding, MAP-21 allows for increased flexibility at the state level. States now may transfer up to 50 percent of CMAQ funds to other federal-aid highway programs. Additionally, the state can transfer funds for a CMAQ-eligible transit project from FHWA to the Federal Transit Administration (FTA).

Starting in fiscal year 2013, the federal share

for CMAQ projects is now generally 80 percent, down from 100 percent under the previous authorization. The law has exceptions that would increase the allowable federal share, such as states that have public lands and eligible safety projects. States must continue to demonstrate eligibility for all CMAQ projects.

### ***Transportation Alternatives***

MAP-21 consolidates Transportation Enhancement, Safe Routes to School, Recreational Trails, and several other programs into the Transportation Alternatives Program (TAP). Projects eligible for TAP funding include those eligible under the previous programs, and in addition selected environmental mitigation and minor construction projects. As with CMAQ funding, the total amount of TAP funding is based on the related funding a state received in proportion to its total formula funding in fiscal year 2009. TAP funds must be awarded on a competitive basis, and FHWA has encouraged state DOTs to be creative in approaches to program structure and project implementation procedures.

Of course, there are some restrictions: States must distribute half of TAP funds to metropolitan areas according to relative share of population, although states and relevant MPOs can request approval on a different distribution formula. The other half of TAP funding is available for any part of a state, but increased flexibility allows states to transfer 50 percent of the funding to TAP-ineligible projects.

### ***TIFIA***

MAP-21 dramatically increased DOT's lending capacity under the Transportation Infrastructure Finance and Innovation Act (TIFIA), which provides credit assistance for qualified projects of regional and national significance. The program is authorized for \$7.5 million in fiscal year 2013 and \$1.0 billion for fiscal year 2014. DOT estimates that each dollar of budget authority can leverage \$10 in lending capacity, which puts the total TIFIA credit assistance at \$17 billion. Not only does the law increase the total lending capacity, it also increases the maximum federal share of project cost from 33 to 49 percent. Additionally, there is funding set aside for projects in rural areas at more favorable terms.

### ***Conclusion***

In response to growing public support and demand, local planners and other transportation leaders will have to increase their advocacy for good planning and important projects, particularly those funded through TAP, CMAQ. MAP-21 creates funding set asides for eligible projects, but supporters will have to exert pressure on state officials to prevent them from diverting CMAQ and TAP funds to other projects. Likewise, there will be battles ahead to shore up stable sources of future funding and continue working to improve and support good transportation planning that meets the needs of a changing nation.

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# Oregon Road Usage Charge Pilot Program

By Randal Thomas

Much of the revenue required to preserve, maintain, and operate the nation's transportation system comes from fuel taxes, which are included in the purchase price of gasoline at the pump. As vehicles become more fuel efficient, that revenue is dropping. Adding in vehicles that do not use gas at all, such as electric vehicles, results in a potential reduction in revenue in the not-so-distant future.

That's the situation Oregon's Road User Fee Task Force (RUFTF) was tasked with researching – and recommending solutions for – when it was created in 2001. The legislature anticipated long-term implications of more fuel efficient vehicles on the state's highways, so it began considering alternatives to the gas tax.

The concerns of Oregon lawmakers have proven to be right: fuel tax receipts have not kept up with the transportation funding needs at the state or national level. And this funding gap can only be expected to grow as more consumers choose highly-fuel efficient or electric vehicles. Through two pilot programs, the Oregon Department of Transportation (ODOT) has pursued RUFTF's initial recommended strategy – a per mile charge.

Between 2006 and 2007, ODOT conducted a year-long pilot with 299 participants that tested the per-mile fee concept. The study showed that the concept itself was feasible but that ODOT needed to address several key issues.

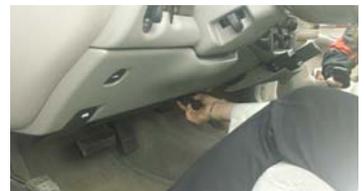
In 2012, ODOT implemented a second pilot, based on 'lessons learned' and using improved technology. The Road Usage Charge Pilot Program, which ran for three months and included 95 participants, further demonstrated that the concept is feasible.

## Pilot details

Development and design of the pilot included a concept of operations, system requirements,

vendor outreach, procurement (request for proposals), and evaluation. Pilot participants included volunteer residents from Washington and Nevada as well as Oregon state legislators, Oregon Transportation Commissioners, and other stakeholders. They chose how to report and pay for miles driven from among the following options:

- Basic plan: all miles were recorded using a mileage reporting device (installed in the vehicle's diagnostic port) that does not include GPS capabilities.
- Advanced plan: used a similar device, but is equipped with GPS capability to differentiate between the miles driven in Oregon (and chargeable) and outside of Oregon (not chargeable).
- Smartphone plan: used a similar device, but miles can be differentiated using an "app" and the Smartphone's GPS.
- Flat fee plan: used no technology, miles were not recorded, and participants paid a set monthly fee based on assumed maximum miles driven.



Payment (1.56 cents per mile) could be made with credit or debit card, or by check depending on the plan selected. Because the pilot is a replacement

for the state gas tax, participants (except those enrolled in the flat tax plan) received a credit for the estimated amount of fuel taxes paid during the pilot.

The purpose of the pilot was to demonstrate a revenue system that is simple, easy to use, accurate (correlates closely with odometer data), operates under an open system (allows for any vendor/technology to participate if they meet the system communications requirements), offers user choice, is accepted by the user, and establishes a user fee system based on something other than fuel efficiency. Overall the pilot was successful. Participants said the program was simple and easy. The plans provided a range of choices for how to report and pay for miles driven, the reporting devices were easy to use, and the miles reported correlated closely with odometer data. The pilot showed that the vendor community has the ability to provide an effective, efficient and open road usage charge system – a key element that ODOT learned would be vital to the success of any large-scale per-mile charge program.

The result of the pilot was the introduction of House Bill 2453 (HB 2453) in the Oregon State Legislature. This legislation would establish a road usage charge on mileage driven in Oregon only for vehicles rated at 55 miles per gallon and higher. The road usage charge would replace the

fuel tax for drivers of these vehicles beginning with the 2015 model year, so it would not apply to any vehicle currently on the road and still allow choice of vehicle type while also generating revenue for the transportation network.

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*More information on the RUCPP pilot can be found at*

<http://www.oregon.gov/ODOT/HWY/RUFPP/pages/index.aspx>

### *Suggested Reading on Road Usage Charging*

Paul Sorensen, Liisa Ecola, Martin Wachs; Rand Corporation; “Mileage-Based User Fees For Transportation Funding – A Primer for State and Local Decision Makers;” Fall 2012

GAO Report; “HIGHWAY TRUST FUND – Pilot Program Could Help Determine the Viability of Mileage Fees for Certain Vehicles;” December 2012

## **Mobility fees as a transportation funding source**

*By Karen Seggerman, AICP, CNU-A*

Across the nation, local governments are struggling to keep up with demand for multimodal transportation infrastructure, even as infrastructure funding continues to decline. Federal law, through MAP-21, provides increased flexibility in the expenditure of federal transportation dollars, yet offers little relief for local governments. Some local governments in Florida have begun to use mobility fees to address these challenges.

The mobility fee approach builds on local and regional planning efforts to coordinate land use planning with the provision of adequate multimodal transportation facilities and services. Like a standard transportation impact fee, the mobility fee recoups the proportionate cost of transportation demand generated by new development.

It differs in that it is more sensitive to vehicle miles of travel (VMT) and supports a greater variety of multimodal transportation improvements, as reflected in an adopted mobility plan. Revenue

from the fee is used to fund planned multimodal transportation facilities and services designed to meet a community's desired vision.

Pasco County and the City of Jacksonville are among Florida local governments that have implemented a mobility fee through an adopted mobility plan. Pasco County is a rural, high-growth county north of the Tampa Bay metro area. Rural areas rapidly developed as single-family housing suburbs throughout the 1990s until the housing bubble burst in 2008, resulting in traffic congestion to and from employment centers within Tampa and St. Petersburg.

In an effort to attract jobs and encourage compact growth in designated centers and discourage growth in outlying areas, Pasco County adopted a mobility plan in 2011<sup>1</sup>. The plan implements a variety of land use strategies including urban service areas, transit-oriented development, and designated market areas.

The Pasco County mobility plan includes a tiered countywide mobility fee that assesses higher fees in suburban and rural market areas due to longer trip lengths. Fee revenue is used to implement identified road, transit, bicycle and pedestrian projects. Tax increment financing is used to buy down mobility fees for preferred uses (e.g. office, industrial, lodging, TND, TOD) and/or development in urban market areas.

Jacksonville is a thriving city with over 800,000 residents that recognized its development pattern of radial/spread-grid was supporting medium to high intensity uses only in the core with the remainder of its area sprawling as low-density development. In 2011, the City adopted a mobility plan supporting multimodal transportation

and promoting compact, interconnected land development while reducing vehicle miles of travel and greenhouse gas emissions and improving the health and quality of life for Jacksonville residents<sup>2</sup>.

Planned improvements are funded through a mobility fee charged to new development within mobility zones in designated development areas using the average trip length within each zone. Jacksonville established a moratorium on its mobility fee soon after its passage and is currently contemplating extending the moratorium in hopes of encouraging growth.

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Further information on mobility fees and their potential applications is available at <http://www.dot.state.fl.us/planning/policy/growthmgt/mobility.shtm>.

<sup>1</sup> Pasco County Ordinance 11-08. Accessed March 5, 2013. <http://www.pascocountyfl.net/DocumentCenter/Home/View/322>

<sup>2</sup> Jacksonville 2030 Mobility Plan. City of Jacksonville Planning and Development Department. May 2011.

#### **References**

Jacksonville 2030 Mobility Plan. City of Jacksonville Planning and Development Department. May 2011.

Pasco County Ordinance 11-08. Accessed March 5, 2013.

# Performance Measures

Level of service headways reduced number of workshops held *new routes added*  
*number of hits on project website* miles of pavement surfaced crash rate reduced  
**projects funded** **INTERMODAL CENTERS CONSTRUCTED**  
*amount of ozone reduced* *ped signals installed* **pedestrian education programs**  
passenger boardings and alightings **miles of streetscaping** *amount of congestion reduced*  
**bicycle lanes constructed** presentations to civic groups *miles of vehicle travel*  
fees collected greenways opened in the last fiscal year number of days without a pollution alert

## Performance anxiety – the growing impact of performance measures on transportation planning

By Vlad Gavrilovic, AICP and Karen Kiselewski, AICP

Performance measures have been used in transportation planning for a long time. In the 1950s, when we were primarily concerned with building our system of interstates, performance was measured in simple terms such as the number of miles of road built each year. As transportation planning has become more complex, we now need to shift from the expansion of our highway network but to other modal networks, their maintenance and operations, safety records, the management of congestion, and increasingly issues such as accessibility and livability.

Our current resource-strapped age is looking more and more at performance measures to ensure wiser use of limited funds and a good return on transportation investments. The transportation planning profession is implementing performance measures and performance-based planning in several ways.

### **MAP-21 – Holding ourselves accountable at the federal level**

The new federal transportation law, known

as MAP-21, mandates a performance-driven, outcome-based process that has significant implications for transportation planning. MAP-21 reflects new fiscal constraints at the federal and state levels and responds to them with a demand for a more competitive, performance-based process for project selection and funding. In addition, MAP-21 gradually, but clearly, raises the bar for regional and local accountability.

To succeed, all levels of government must develop a stronger case for transportation projects and tell a more effective story about their value and benefits toward meeting desired regional outcomes and national goals. An excellent summary for transportation professionals and officials alike of the ins and outs of the MAP-21 legislation is available in an easy to read handbook from Transportation 4 America entitled “Making the Most of Map-21”: <http://t4america.org/resources/map-21/handbook/>

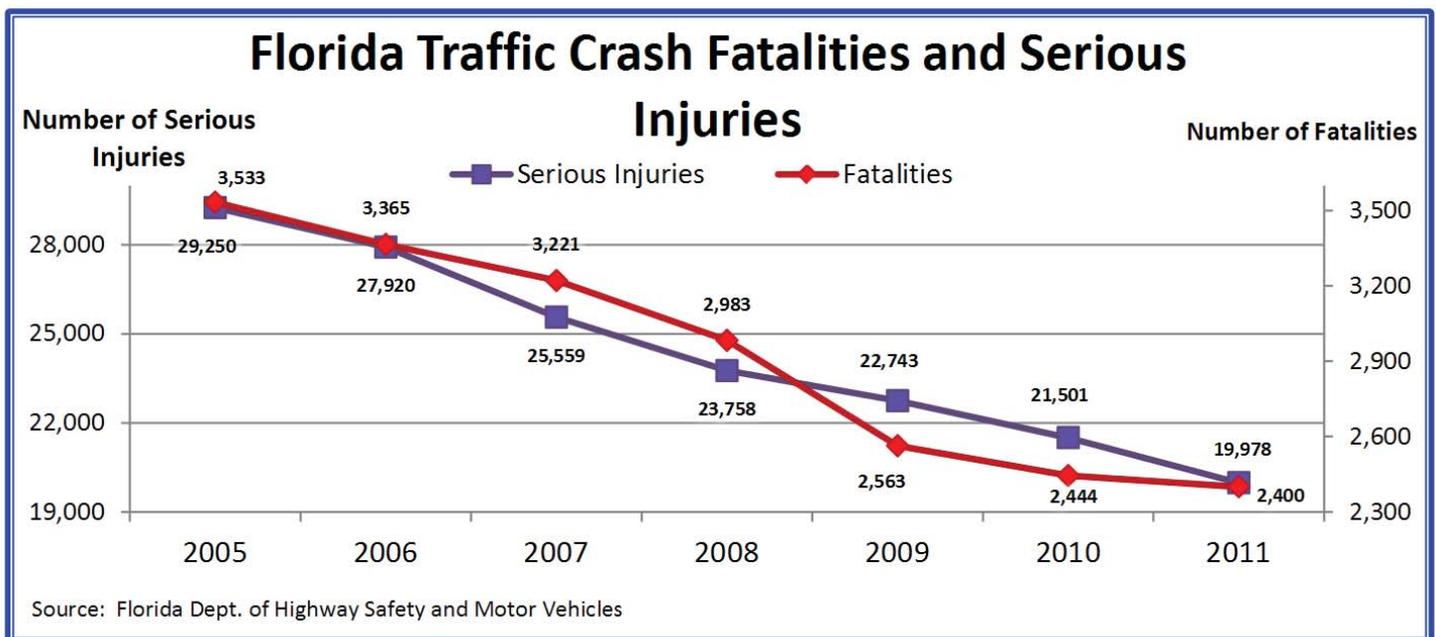
### **Performance Measures at the State Level – Linking Funding to Targets**

Performance measurement is nothing new at the level of state DOTs. Many states already measure their transportation networks through annual

“report cards”, “dashboards” or other user-friendly rating systems. Only rarely are these measures related to specific targets or measurable goals, however. Under MAP-21, states will soon be required to adopt targets and measure how the transportation systems perform relative to those targets over time, with the expectation that future funding formulas may someday be linked to how effectively they are reaching these targets. Two well established systems of statewide performance measurement are in Florida and Virginia.

In Florida, over a decade of refinement has led to the development of the Florida Mobility Measures System. Under the system, mobility performance measures are used to characterize the success of the system in terms of four dimensions. Further, the Florida Dept. of Transportation recently released its first MAP-21 Performance Report providing summaries on performance for safety, system performance, roadways, bridges, freight, transit, and air quality. This report and information about how performance measurement is used at the strategic, decision making and project levels are available at:

<http://www.dot.state.fl.us/planning/performance/>



In Virginia the state Dept. of Transportation publishes the Statewide Performance Report. The latest edition features a new interface and rating system that is tied to the statewide transportation vision and seven core goals: The Scorecard uses consumer report-style, filled in circles to show current performance, a graph of the previous year trends, and – most importantly – an arrow to show the direction of the desired trend. This report is available at: [http://vtrans.org/resources/StatewidePerformanceReport 2011.pdf](http://vtrans.org/resources/StatewidePerformanceReport%202011.pdf). Both Florida and Virginia show a move towards both broadening the range of measures used and to tying measures more closely to broad goals and policies.

### ***Performance Measures in MPOs and How they Influence Localities***

MAP-21 will also move MPOs to work in partnership with states to agree upon performance measures that align with national goals, statewide measures and system performance measures, and define performance targets to achieve desired outcomes for a region. In particular, the development of Long Range Transportation Plans will require greater alignment to MAP-21 by establishing specific goals, measures and targets for the development of a regional multimodal transportation network. Larger MPOs already do many of these things. For smaller MPOs, the move towards greater accountability in transportation investments and their documentation through performance measurement will

# 2011 Transportation Performance Scorecard

How is Virginia's transportation system performing?

## System Maintenance and Preservation

Preserve and maintain the condition of the existing transportation system.

### Key

Considerable improvement\* (10%+) from historical average



Measure	Score	Result	Target	Trend	Desired Trend
<b>Interstate Pavement Condition</b> Percentage of pavement on interstate roads estimated to be rated fair or better condition		80%	82%		
<b>Primary Road Pavement Condition</b> Percentage of pavement on primary roads estimated to be rated fair or better condition		78%	82%		
<b>Bridge Condition</b> Percentage of bridges in fair or better condition		91.8%	92%		
<b>Secondary Road Pavement Condition</b> Percentage of pavement on secondary roads estimated to be rated fair or better		64%	-		

undoubtedly be harder.

Finally, local governments, although not directly tied to new MAP-21 mandates, will likely feel the impact of performance based planning in the way they do transportation planning in the future. In Florida, for example, localities had already been accustomed to documenting traffic congestion through concurrency requirements. If local governments move closer to performance-based planning, the impetus will likely come from any of three sources; from their MPOs and Long Range Transportation Plans using performance metrics, from state legislation requiring local accountability for transportation investments (as in Florida), or even from local citizens themselves, calling for greater transparency and accountability in the return on investment of public funds.

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## Performance Measures for Multimodal Planning

By Ruth L. Steiner, PhD

Buried in Florida's 2011 Community Planning Act are enhanced requirements for multimodal transportation planning by local governments. Under the new law, the transportation element of the local government comprehensive plan must contain a plan for a multimodal transportation system that includes automobiles, public transportation, walking and bicycling, and coordination of the transportation system with land uses.

A multidisciplinary research team, composed of faculty at the University of Florida, has prepared a report for the Florida Dept. of Transportation titled *Expanded Performance Measures to Supplement Level of Service (LOS) for Growth Management and Transportation Impact Analysis*<sup>1</sup> that can assist planners in developing performance measures to match community planning objectives. The report was developed through a research contract funded by the Florida Dept. of Transportation.

This report develops a framework for assisting local governments in selecting a set of performance measures that are consistent with the community's overall goals for quality of life. An extensive list of performance measures is synthesized from the literature and categorized into seven broad objectives: (1) minimize ecological impact, (2) increase accessibility, (3) increase non-single-occupant-vehicle travel, (4) reduce congestion, (5) optimize freight movement, (6) enhance safety, and (7) reduce air pollution. Evaluation criteria, including the type and quality of available data, the compatibility of the measures with other agency processes, and the degree to which the measures encourage multimodal transportation, are established. The report provides an example of how an agency could apply these criteria in order to select performance measures consistent with its goals, policies and capabilities.

Two types of case studies are developed to understand the use of performance measures: four communities, which are widely recognized for their multimodal planning, are described to show which performance measures they incorporate in their plans, and two prototypical development scenarios with diverse urban designs (one a conventional suburban development, and the other a new urban development) are assessed using conventional and multimodal performance measures. The two scenarios yield similar results using congestion management as the primary agency objective, but show significant differences in their ability to support multimodal systems.

<sup>1</sup> Elefteridou, L., Srinivasan, S., Steiner, R. L., Tice, P. C., & Lim, K. (2012, October) Expanded Performance Measures to Supplement Level of Service (LOS) for Growth Management and Transportation Impact Analysis. Prepared for the Florida Department of Transportation under Contract BDK77 977-14. Available at:

[http://www.dot.state.fl.us/research-center/Completed\\_Proj/Summary\\_PL/FDOT\\_BDK77\\_977-14\\_rpt.pdf](http://www.dot.state.fl.us/research-center/Completed_Proj/Summary_PL/FDOT_BDK77_977-14_rpt.pdf)

Of great interest to practicing and citizen planners alike is Appendix B - Objectives and Characteristics of Performance Measures. This appendix provides a catalog of the performance measures that allows readers to understand their applicability in assessing the seven objectives listed above. It categorizes the numerous performance indicators by mobility dimension and identifies the characteristics of each indicator according to the scale of analysis (local, regional, or project), the targeted modes, and the process or outcome through which the indicator is developed (measured, estimated, indexed, or model-generated). If you are being asked to develop and implement multimodal transportation performance measures, this project offers some implementable strategies.

*Ruth L. Steiner, Ph.D. is an associate professor and director of the Center for Health and the Built Environment in the Department of Urban and Regional Planning at the University of Florida. Her research focuses on the interactions between transportation, and land use, with a particular focus on planning for all modes of transportation including transit, bicycling and walking. [rsteiner@dcp.ufl.edu](mailto:rsteiner@dcp.ufl.edu)*

# Environment



Photo by Hannes Grobe/Wikimedia

## Transportation energy beyond fossil fuel

By Kimberly Burton, P.E., AICP

For the past several decades the United States has consumed more energy from petroleum than from any other energy source. In 2011, total U.S. petroleum consumption was 36% of total energy consumed or 19 million barrels per day. The transportation sector consumed 28% of the total U.S. energy, and 93% of that energy came from petroleum. Almost 2/3rd of all petroleum consumed in the U.S. was from the transportation sector. U.S. oil consumption is centered in the transportation sector and is expected to continue increasing.

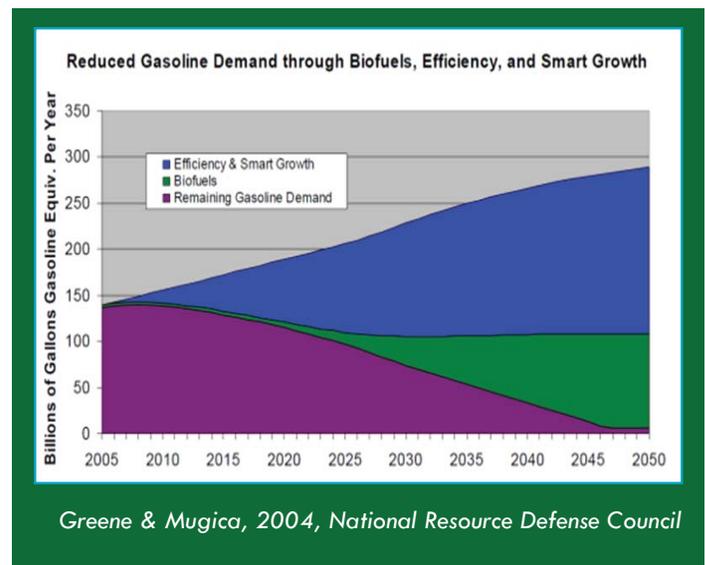
The three main issues with our current energy consumption patterns center on:

- Environmental Damage - climate change, air pollution & extraction
- Nonrenewable Supplies – supply limitations & price fluctuations
- Nondomestic Supplies – security & dependability concerns

There are three key ways we can address the problems associated with transportation energy use:

- Improve vehicle energy intensity
- Use low-carbon fuels

- Reduce vehicle miles travelled  
Can these types of changes to transportation really help? Yes. A study performed by the National Resources Defense Council (NRDC) study shows that improvements in these three areas could eliminate the need for vehicle gasoline by 2050 (Figure 1).



### 1. Vehicle Energy Intensity

This option involves improving the vehicle efficiency or fuel economy of a vehicle, including:

- Improving conventional gasoline engines via more efficient combustion technologies and transmissions.
- Developing advanced vehicle technologies, such as regenerative braking.
- Reducing the weight of materials and aerodynamic resistance in vehicles.
- Increasing alternative fuel vehicles – battery electric, hybrid electric, flex-fuel, fuel cells, and various combinations.

As of 2010, almost one million alternative fuel vehicles (AFVs) were in use in the U.S., and two-thirds were flex-fuel vehicles fueled by ethanol. Sales of these gasoline-efficient vehicles are continuing to increase.

We also can make some policy changes to increase vehicle efficiency performance standards, industry commitments, and purchasing incentives. The primary policies in place today that regulate vehicle efficiency are Corporate Average Fuel Economy (CAFE) Standards. From 1990 to 2011, the CAFE Standards for new cars were stagnant at 27.5 mpg. In 2011 President Obama developed new CAFE Standards with a goal of 35 mpg for new cars and light trucks by 2025. This goal will reduce our oil use by 3.1 million barrels per day; it will cut automobile carbon emissions in half; and it will create up to 150,000 American jobs.

## 2. Low-Carbon Fuels

The main low-carbon fuel options to using petroleum for transportation include:

- Electricity, especially from renewable energy sources
- Liquid biofuels, including ethanol and biodiesel
- Natural gas, typically used to fuel buses in metro areas
- Hydrogen, for fuel cells

Liquid biofuels can be produced domestically and have lower net GHG emissions than gasoline (10-20%). Recently, both fuel

ethanol and biodiesel have seen tremendous increases in consumption in the U.S.

However, there are some drawbacks to these liquid biofuels. Using them involves combustion, which results in some air pollution; using food for fuel results in supply shortages of food; and the supply is not that widely available. Solutions to address some of these issues include:

- Ethanol capacity must continue to grow.
- The fuel ethanol market must expand from just an oxygenate additive to E85 fuel (85% ethanol/15% petroleum mixture).
- Ethanol sources must transition from food-based products (i.e. corn) to cellulosic plants (grasses and inedible plants) so as not to impact food supply.
- Biodiesel conversion technologies must be improved to effectively use vegetable oils, animal fats and algae.

Policy changes can also increase the usage of low-carbon fuels, including:

- Biofuel blending mandates
- Low greenhouse gas (GHG) fuel standards
- Carbon tax on fuels
- Fleet incorporation of alternative fuels

Another major challenge to using low-carbon fuels is the oil industry. Instead of pursuing low-carbon fuel options, most oil companies are investing tens of billions of dollars in developing high-carbon unconventional fossil fuels. These fuels require more energy and are more costly to extract and process, resulting in higher environmental damage. Plus they are still nonrenewable and many sources are not domestic.

## 3. Vehicle Miles Traveled (VMT)

Travel reduction solutions include ways to influence people to make fewer trips and to use alternative modes of travel. There are many methods to influence less travel; some include:

- Congestion pricing
- Denser, mixed-use land uses
- Increased parking rates
- Increased cost of gasoline, vehicles & maintenance
- Telecommuting & flexible work hour options

To encourage alternative modes of travel, it is important to offer multi-modal options - if people do not have options, they cannot use them. Multi-modal options should incorporate public transit, bicycle routes, and sidewalks. The options also need to be interconnected and comfortable to use in order to encourage people to use these options, so incorporate techniques, such as:

- Complete Streets
- Context Sensitive Solutions
- Streetscapes
- Traffic Calming

For us to move towards more sustainable energy patterns for transportation, we need to take a multi-faceted approach:

- Reduce/eliminate the use of nonrenewable fossil fuels to power our vehicles.
- Switch to more efficient vehicles using low/no-carbon fuels.
- Charge plug-in vehicles by renewable energy sources.
- Develop liquid biofuels from non-food sources.
- Pursue measures that reduce the amount of travel.
- Pursue measures that offer multi-modal

options to travel by people and goods.

- Plan for denser and more compact 'smart' growth and urban redevelopment.
- Implement more programs, grants, and policies that encourage increasing vehicle energy intensity, using low-carbon fuels, and reducing vehicle miles traveled.

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### *Additional readings:*

#### Books:

- Plan B 4.0, Lester Brown, 2009 (Earth Policy Institute).
- Energy for Sustainability, John Randolph & Gilbert Masters, 2008.
- Reducing Climate Impacts in the Transportation Sector, Daniel Sperling & James Cannon, 2009.
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# Transportation's impact on climate change

By Bradley Flamm, PhD

Extreme weather events were clearly linked to climate change in 2012, in the scientific community<sup>1</sup> and in the broader popular culture. Super Storm Sandy and severe drought in the North America, record cold and flooding in Europe, and droughts, flooding, and heat waves in Australia, Africa, Asia and South America confirmed that some weather events are directly related to climate change.

That climate change is now established to be primarily human-influenced shines a spotlight on transportation, for the sector accounts for over an eighth of global emissions of greenhouse gases and 27% of US emissions<sup>2</sup>. Transportation is difficult to uncouple from GHG emissions in developed economies because petroleum accounts for over 90% of energy consumed in the sector. Research and practice related to climate change and transportation have thus focused on two main topics: methods of reducing greenhouse gas emissions from the sector and adaptation to expected changes in global and regional climates.

If recommended levels of GHG emissions of 50-80% below 1990 levels are to be achieved<sup>3</sup>, significant changes in both vehicle technologies and travel behaviors will be required. R&D efforts focus on developing more energy efficient vehicles and propulsion technologies that use less carbon intensive fuels. Federal and state policies in the US—such as the 2012 EPA regulations targeting Model Year 2025 fuel economy of 54.5 mpg for cars and light-duty trucks—are expected to lead to significant improvements in vehicle efficiencies.

Despite the positive effects of these current and expected technological advances, most studies conclude that technological change alone cannot lead to the emissions reductions needed to stabilize atmospheric concentrations of greenhouse gases.

Significant and wide-ranging travel behavior change will also be required to meet such goals. Such changes generally include: shifts from



drive-alone vehicular travel to shared modes (car- and van-pooling and public mass transit of all kinds); shifts from motorized vehicular travel to non-motorized travel by bicycle and on foot; and reductions in miles of travel. To achieve these goals researchers propose changes in pricing for motor fuels, parking, public transit, vehicle registration and insurance costs; policies to encourage shared and non-motorized travel through subsidies, incentives, investments, design and operations improvements; and land use changes towards higher-density, mixed-use developments clustered around multi-modal travel corridors.

Another factor in climate change is changes in the frequency and severity of precipitation leading to flooding, the extent and duration of high and low temperatures resulting in damage and reduced lifespans of infrastructure, and rising sea levels as ice sheets in Greenland, Antarctica and elsewhere

<sup>1</sup> See, for example, the January 2013 Draft National Climate Assessment report authored by the National Climate Assessment Development Advisory Committee, available at <http://ncadac.globalchange.gov/>.

<sup>2</sup> See the fourth Assessment Report (2007) of the United Nations' Intergovernmental Panel on Climate Change for more information (<http://www.ipcc.ch/>). A fifth Assessment Report will be completed in 2014.

<sup>3</sup> See the National Academies' Board on Atmospheric Sciences and Climate 2010 report entitled Limiting the Magnitude of Future Climate Change ([http://www.nap.edu/catalog.php?record\\_id=12785](http://www.nap.edu/catalog.php?record_id=12785)).

diminish. Indeed, most of these effects are already being experienced, creating challenges for those responsible for transportation infrastructure (including roads, rail, tunnels, bridges, and traffic control devices) and the safe and efficient operations of transportation systems.

More stringent design and engineering standards, redesign and, in some cases, re-siting of infrastructure, operations restrictions, and emergency preparedness and management planning are all approaches national, state, and local transportation agencies have adopted, or will need to adopt, as climate change affects transportation systems.

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#### *Additional readings:*

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# Roadways and Streets



Image courtesy of John Kaliski Architects

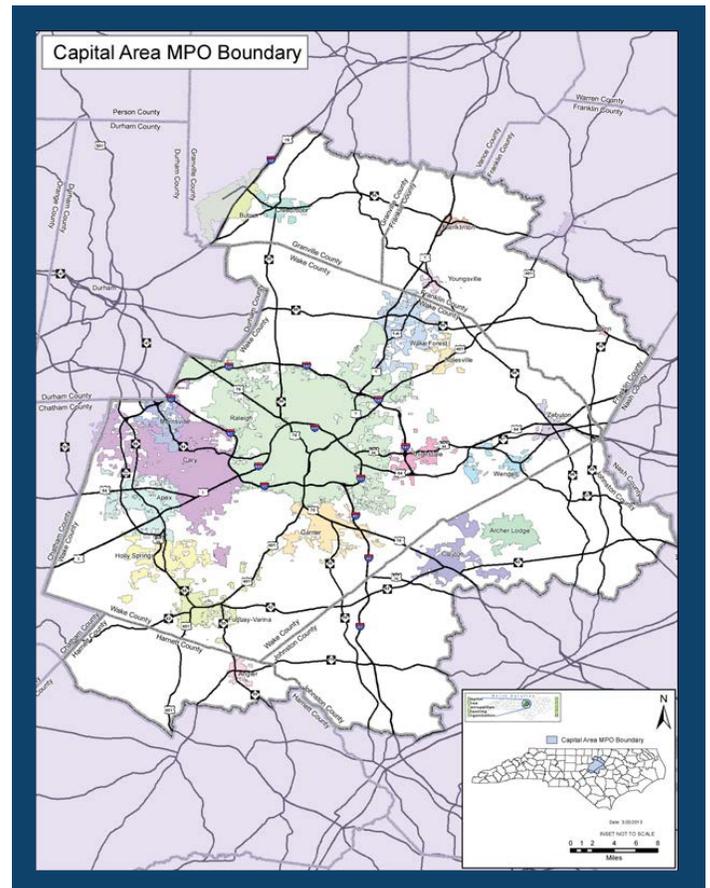
## Transportation planning in the NC Capital Area MPO: local priorities meet statewide goals

By Shelby Powell, AICP

When Beverly Purdue was elected Governor of North Carolina in 2008, she declared that politics would be removed from the transportation decision making process in the state. This caused a collective scoff from the transportation planning community across the state: “Remove politics from transportation? In North Carolina? Inconceivable!”

But Gene Conti, newly-appointed State Transportation Secretary, embraced the idea. He created the Strategic Planning Office of Transportation, or SPOT, to produce a statewide prioritization model for determining transportation programming priorities for all modes of travel.

The SPOT office was the NCDOT’s first attempt to use a transparent, systematic, and data-driven process for prioritizing the major transportation projects in the state and making investment decisions. This process evaluates transportation projects based on their merit through an analysis of the existing and future anticipated conditions, the benefits the project is expected to provide, the



project's multi-modal characteristics, and how the project fits in with local priorities<sup>1</sup>.

Meanwhile, in 2005, the Raleigh-based Capital Area MPO was completing the largest expansion in the organization's history, bringing in parts of four additional counties and six additional municipalities. Following the 2010 Census, the MPO gained another member municipality, bringing the grand total to 1,603 square miles, and a population of over 1 million people living nineteen municipalities and all or parts of five counties.

The growth in the Triangle area meant increased congestion for commuters. The largest traffic volumes tend to occur at the border of the Capital Area and Durham-Chapel Hill-Carrboro MPO planning boundaries<sup>2</sup>. To address this growth, as well as to take a more comprehensive look to the future of transportation demand, the two MPO's joined forces to develop their first joint Long Range Transportation Plan in 2009.

Thus, on top of the Capital Area MPO's members, this plan covered an additional four municipalities and all or parts of three more counties. Clearly, this was a high-level, ambitious effort that relied heavily on the regional travel demand model and the participation of staff from across the region to develop reasonable socioeconomic and traffic forecasts, as well as develop feasible recommendations to meet those projected demands through 2035.

In 2010, the Capital Area MPO took a step back and realized that some of the more localized concerns were not being addressed adequately, and the public at large was not able to be as engaged as they should be in their transportation plan. Further, the metrics being used for prioritization of projects at the state-level SPOT office were not necessarily being used to measure priorities in the

<sup>1</sup> North Carolina Department of Transportation. Strategic Prioritization. Connect NCDOT: Business Partners Resources. Retrieved March 10, 2013 from <https://connect.ncdot.gov/projects/planning/Pages/StrategicPrioritization.aspx>.  
<sup>2</sup> 2035 Long Range Transportation Plan, Capital Area MPO and Durham-Chapel Hill-Carrboro MPO, May 20, 2009.

plan.

The Capital Area MPO developed a new scaled-down strategy to develop its long-range plans, and embarked on its first sub-area study - the Southwest Area Study (SWAS). This study allowed MPO staff to work directly with staff from four municipalities and two counties to look closely at the issues that were driving transportation demand in the area – things such as land use, market forces, and availability of alternative modes of travel such as bicycle or transit facilities. The scenario planning process was employed to look at various land use alternatives in the area ranging from an intensive transit scenario to a sprawling large lot single-family residential development pattern.

Several of the metrics used to evaluate the development scenarios meshed with the SPOT prioritization metrics. For instance, the SWAS used vehicle miles traveled and vehicle hours traveled to measure anticipated mobility within each scenario; SPOT prioritization uses a benefit / cost ratio that calculates travel time savings resulting from a project as the benefit. Similarly, SWAS looked at percent of congested corridors within the study area to evaluate scenarios; SPOT prioritization uses volume-to-capacity and average daily traffic to score congestion on a project basis. SWAS used land use suitability to evaluate different levels of potential transit ridership resulting from the different development patterns in each scenario; SPOT prioritization awards points to projects that encourage multi-modal transportation through connections to bus shelters, transit bypass lanes and park-and-ride lots.

The public was engaged at two project symposiums where citizens and leaders from each town were engaged in conversations together about land use, economic development, and the need or desire for transit, pedestrian and bicycle facilities in addition to roadway improvements. This unprecedented level of outreach resulted in an updated set of recommendations and priorities within this study area that were used to inform the 2040 Metropolitan Transportation Plan.

One output of the SWAS was a set of Project Sheets for each recommended project in the study. Each project sheet outlines current and proposed road conditions, cross-section, ties to local planning efforts, and other details that essentially allow the reader to have an at-a-glance reference when considering entering a project for consideration into the State's SPOT system.

This planning effort resulted in multiple local and regional successes. Multi-modal project recommendations were able to be compared to one another on a technical basis and prioritized; roadway projects were prioritized using a more comprehensive effort that dug into local desires, land suitability, and anticipated transportation demand rather than primarily on a volume-to-capacity, model-driven basis; and both quantitative and qualitative measures of effectiveness were used to inform a local land use scenario that was ultimately utilized as the basis for the 2040 socioeconomic data for the MPO's long range plan. Groups of elected officials, planning staff, economic developers, conservation organizations, the State DOT, and the business community were able to discuss trade-offs that are necessary to achieve and afford the desired land use and transportation outcomes.

The SPOT evaluation methodology is currently being enhanced to more effectively prioritize roadway, bicycle, pedestrian, transit, and even ferry projects. The next iteration of SPOT prioritization is expected to begin in the summer of 2014. This

will be the first opportunity for the Capital Area MPO to submit priorities identified through SWAS and the resulting 2040 Metropolitan Transportation Plan for prioritization through SPOT.

Were politics completely removed from the planning process? Probably not entirely; however, the data-driven methodology, community-based discussions and multi-modal framework were certainly important steps toward that end. As the MPO embarks on its next sub-area study – this one covering eight municipalities and parts of two counties in the northeastern section of the planning area – lessons learned will be applied, and an even more robust outreach strategy will be employed. The in-depth conversations between all levels of stakeholders will continue to address the local needs in a far-reaching transportation plan that will result in priorities grounded in both technical merit and local support.

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More information on the Capital Area MPO's Southwest Area Study can be found online at <http://www.southwestareastudy.com/>.

More information on NCDOT's Strategic Planning Office of Transportation can be found online at <http://www.ncdot.gov/performance/reform/prioritization/>.

## What does it take to implement complete streets?

*By Tracy Newsome*

Since 2005, Charlotte, North Carolina has constructed approximately \$400 million in public street projects using its Urban Street Design Guidelines (USDG) for complete streets. Charlotte also updated key portions of City ordinances to ensure that new development helps to create better streets. As of 2012, implementing

Charlotte's complete streets guidelines on public projects has resulted in:

- Over 30 miles of new/modified complete streets (not counting connectivity or State projects), with another 10 miles currently under construction;
- An increase in bike lanes from 1 mile in 2003 to 70 miles;

- 45 miles of signed bike routes;
- 35 miles of shared-use paths (coordinating with Mecklenburg County greenway planners);
- 325 additional miles of sidewalks (not counting those built by the private sector); and
- A wide variety of improved intersections and crossings.

Implementing complete streets has allowed Charlotte to continually improve the street network and the walking and bicycling environment necessary for an active and sustainable community. The following include some key “lessons learned” from Charlotte’s experiences:

**All streets count** – The policies included in the USDG (and Charlotte’s comprehensive Transportation Action Plan) were meant to apply to all processes that create new or modified streets and intersections, whether this occurs through public projects or through private development. Charlotte’s area plans, which can ultimately affect both public and private projects, include cross-section and network recommendations based on the USDG. The City routinely applies the USDG designs on publicly-funded projects for everything from new thoroughfares to accessible ramp design. Even seemingly “small” projects incrementally create more functional complete streets. To ensure that streets built through private development are also complete, the City amended the Subdivision, Zoning, and Tree Ordinances to incorporate key elements of the USDG, including new cross-sections, revised street network requirements, and adjustments to setbacks and tree planting rules to help create street trees. By making complete streets part of the “routine,” Charlotte is working to incrementally and continually complete its street network.

**Robust street network matters** – It is easier to create better streets when you have more of them. When evaluating potential tradeoffs between motor vehicle capacity needs and better designs for bicyclists and pedestrians, nearby network alternatives can allow greater flexibility to the design team. If there are no nearby streets, then it may be worthwhile to create them.

For example, new streets and extensions of existing nearby streets have allowed for area-wide capacity improvements near Charlotte’s light rail line. This “parallel” capacity provides an alternative “relief valve” to the main thoroughfare, thereby eliminating the need to make capacity improvements (add through lanes) on the thoroughfare. To ensure network flexibility as the city continues to grow, Charlotte’s Subdivision Ordinance includes updated block spacing and street network requirements that are specifically tied to the type and intensity of development.



*This intersection, located near a light rail station, needed capacity improvements. Even with added capacity, the new design greatly improved pedestrian and bicycle crossings*

**“Prescriptive” and “flexible” are both important when developing complete street networks** – Designing good street networks requires setting clear and strong expectations, but with enough leeway to adapt to a wide variety of contexts. Charlotte uses a few very flexible cross-sections for thoroughfare-type streets. A well-structured planning/design process ultimately creates the “most complete street” for any given context. The local street cross-sections are more prescriptive, since these are generally built through land development and developers need to know what is expected as they plan a project. However, “prescriptive” doesn’t mean that local streets are one-size-fits-all, so several cross-sections have been made available to fit a broad variety of contexts. The updated Subdivision Ordinance includes clear language about the conditions under which each cross-section should (or may) be applied.



*This re-development project, Brightwalk, emerging near the Center City, incorporates context-based streetscapes and saves existing street trees.*

One of the biggest challenges that Charlotte faced was to develop ordinance language that provides clear rules about where new streets (network) would be required, while also providing appropriate flexibility. This effort was helped by the fact that the USDG included specific, Council-adopted, policy summary statements. These statements provided clear intent, which proved

helpful in turning the policies into ordinance. After confirming the intent, the process for drafting the ordinance amendments included extensive testing on actual site plans to ensure that the language worked and would have the intended results. The resulting ordinance text describes a step-by-step process to determine the need for new streets, working within the context and constraints of surrounding network, parcel size, and other variables likely to be encountered on development projects.

Ultimately, committing to implementing complete streets comes down to understanding the importance of streets. In most cities, the streets create the majority of the public space that residents and visitors see every day. The way your streets look, how they function, and the comfort and safety they offer to those who use them are vital to creating and maintaining a vibrant and desirable community.

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## **Transportation planning in the rapidly changing environment of western North Dakota**

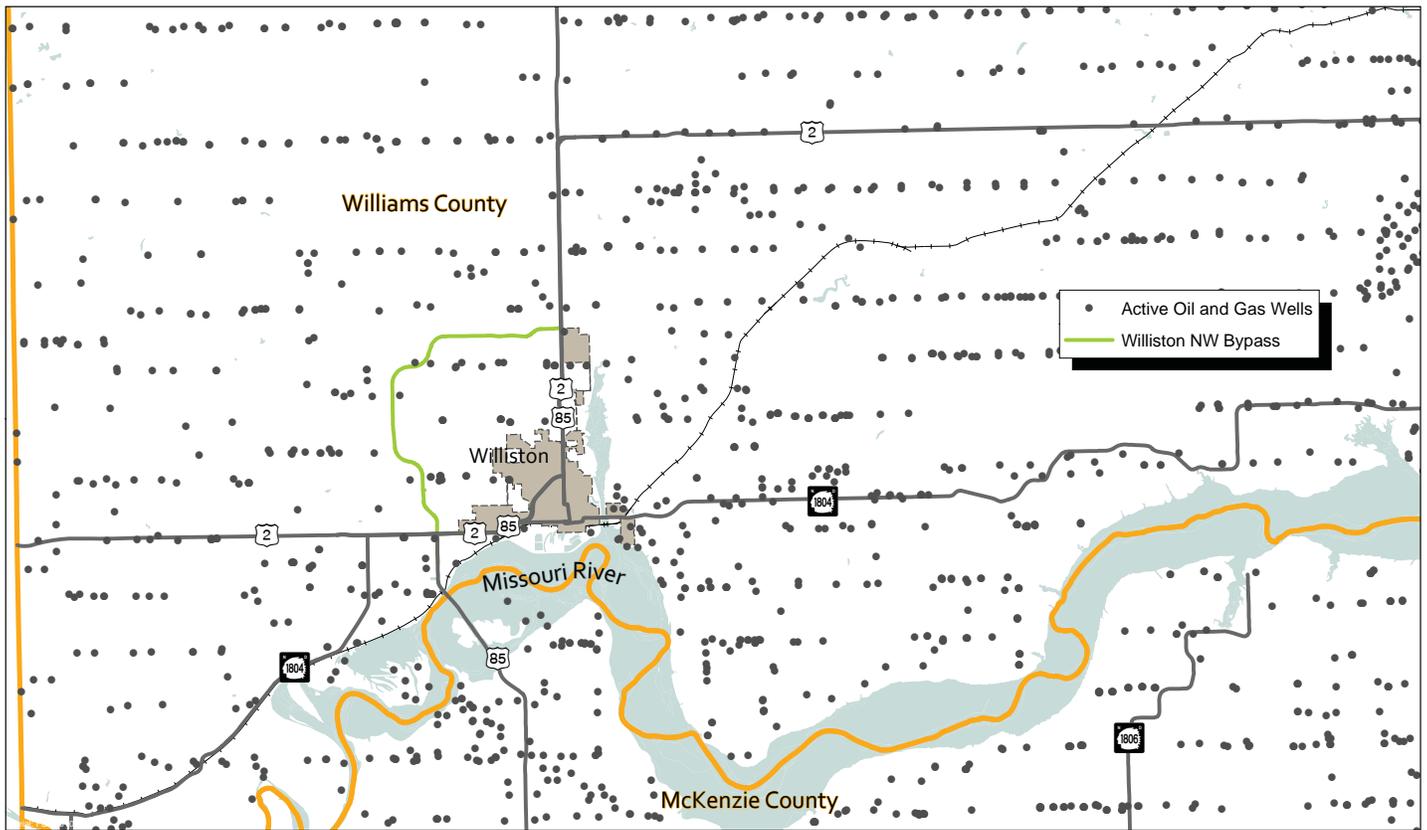
*By Cindy Gray, AICP, Michael Maddox, AICP, and Stephen Wilson*

The development of the Bakken oil fields in western North Dakota presents unique challenges to a transportation planning industry that is accustomed to process-driven outcomes. The nearest city, Williston, is at the crossroads of US Highway 2 and US Highway 85. It is the largest city, population 16,006, in the northwestern part of the state, and operates as a hub for the oil industry, oil drilling service and supply businesses, retail sales and services, medical services, housing, and cultural/religious institutions.

The nearest cities with any considerable size are

a minimum of 120 miles away. US Highways 2 and 85 provide the easiest opportunity for east/west and north/south movement in western North Dakota, allowing access across the state. US Highway 85 is particularly important in transporting oil and related goods throughout the Bakken, Three Forks and Tyler Formations. (See the map on the next page for Williston's location in relation to the oil fields.)

Traffic in Williston has increased by 300% since 2008. Annual Daily Traffic (ADT) on US 2/85 (the two roadways currently merge through Williston) in 2008 was between 9 and 10 thousand trips per day. In 2011 ADT on this very same roadway was between 27 and 30 thousand trips per day.



SRI Williston NW Bypass  
 Consulting Group, Inc.

Figure 1

A large percentage of that traffic is comprised of semi-truck traffic which rose from around 15 to 20 percent of ADT in 2009 to about 35 to 40 percent of ADT in 2011. In most urban areas in the United States semi-truck traffic is estimated to be between 1 and 5 percent on routes other than the Interstate System.

This dramatic increase, combined with the high volume of heavy truck traffic, resulted in the planning, study, and design of a highway bypass around Williston, referred to as the Northwest Bypass. The project is being led by North Dakota Dept. of Transportation, the City of Williston, and Williams County.

One of the major challenges in forecasting future travel in the Williston area has been determining the reasonableness of growth assumptions. Using historical growth rate data since the beginning of the oil boom and conventional projection methods tied to growth rates leads to 20 year traffic projections that are well outside the realm of possibility. Furthermore, current socio-economic conditions have been unclear, as

population estimates from the 2010 Decennial Census dramatically underestimated the actual populations living in and around the city at approximately 14,700.

To address this issue, the City of Williston worked with the North Dakota State University Department of Agribusiness and Applied Economics to conduct a study of permanent and temporary residents living in and around the city<sup>1</sup>, and arrived at an estimated 2012 permanent and service population of about 33,500, with the potential for nearly 44,000 permanent and service residents by 2017. Permanent residents are classified as those that had relocated to the area and temporary residents were identified as those staying in crew camps or recreational vehicles who are not officially residents and are not likely to stay in the area more than a few years. Some of these workers are only present in the community for two weeks at a time, being

<sup>1</sup> Hodur, Nancy M. and Bangsund, Dean A., Population Estimates for the City of Williston, Agribusiness and Applied Economics Report No. 707-S, January 2013.

rotated in and out of the state every two to three weeks by their employers.

Because of the rapid growth that is occurring in and around Williston, calibrating a travel demand model to “existing” conditions has been like aiming at a fast-moving target. In such a rapidly changing environment, it has been difficult to estimate the amount of residential, industrial, and commercial uses that correlate with recent traffic counts, let alone those that would be needed to serve future residents.

To exacerbate the problem, resources that are normally taken for granted, such as aerial photography, are out of date within a month or two. Another complicating factor is related to trip generation of large outdoor storage sites, such as pipe yards, that generate hundreds of truck trips per day, but have no on-site development that would normally be associated with trip generation. A well documented estimate of population, households, and jobs in Williston and the surrounding area was prepared, resulting in a travel demand model calibrated to 2012 traffic volumes. A projection of job and household growth was developed by using population projections and the city’s adopted land use plan to estimate future jobs and households in and around Williston, calculating acreages and estimating trips for various unusual industrial and temporary housing land uses.

The project’s modeling team sought out and received input from the agencies such as the North Dakota Department of Mineral Resources and the Upper Great Plains Transportation Institute to assist in estimating the type and amount of oil related traffic that is likely to manifest as drilling progresses. This information has been used to estimate the future potential for regional through traffic on the highway system.

The result is a travel demand model that projects 2022 and 2035 estimates of average daily traffic volumes on the roadway system through and around Williston, allowing for the comparison of the system’s ability to handle forecasted traffic with and without the Northwest Bypass. The bypass is scheduled for construction in 2013-14.

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# Public Involvement



Photo by tdd>hvr2007 / All rights reserved/Flickr

## Making transportation outreach effective across language and cultural changes

By Todd Barker

Gaining meaningful input from the public on transportation decisions rarely has been easy. During the past 20 years, emphasis has moved from public hearings to community outreach initiatives. Yet, during this same period, major demographic shifts have brought the new challenge of a growing minority population with multiple languages and cultural factors. Effective community engagement for transportation improvements will require bridging these barriers. In many urbanizing areas in the US, minority population increased and diversified between 2000 and 2010. A recent Brookings Institution study estimated that 98 percent of population growth in large metro areas between 2000 and 2010 is attributed to the non-white and Hispanic populations. As of 2010, 22 of the 100 largest metro areas had “majority minority” populations, where non-whites and Hispanics make up the combined majority (Brookings, 2011).

Agencies and community services are adapting to keep pace. One church in a metro Atlanta suburb began eight language services to support a diverse congregation. Since then, a service in Spanish has



Photo by Todd Barker

*Diversity of languages requires a broader public outreach in transportation planning*

grown to more than 100 members, with Chinese and Vietnamese services just trailing that number (AJC, 2010). The City of Duluth has created a task force to improve engagement with its rapidly growing Korean community. At the federal level, Executive Order 13166, “Improving Access to Services for Persons with Limited English Proficiency” (LEP) has been in effect since 2000. Federally funded agencies are required to have an LEP plan for overcoming language barriers to public information.

Outreach efforts for transportation planning should go beyond adding a Spanish newsletter or translator within traditional formats. Planners need to add or sharpen the tools in their outreach toolboxes. Several steps can enhance the success of multicultural outreach on transportation projects:

- Learn the community. Start with demographic and GIS research for languages, income, and education. Then close the laptop and visit the community—walk, talk, dine, shop, and observe. Collect copies of ethnic and neighborhood newspapers, often available along sidewalks and storefronts.
- Identify community leaders. Find trusted leaders within places of worship, activity/cultural centers, or other organizations who can serve as a liaison and facilitator.
- Use venues that are familiar, trusted, and accessible. Consider transportation access, time, setting, language(s) and tone to make outreach events culturally.
- Speak the language(s). In addition to Spanish, identify key language(s) that could benefit from a translator (familiar with local dialects). Simple tools such as I Speak cards support up to 20 languages.
- Identify relevant alternatives. Where practical, the transportation plan or project should include modes and options relevant to each affected community, such as widened sidewalks near ethnic market areas for increased pedestrian activity or additional bus waiting areas with targeted language support.
- Manage social media effectively. Simply posting a translated announcement may bring little value, given language issues and limited online access within many low-income populations. At the same time, many ethnic communities today are made up of highly educated professionals who are avid social media users. Confirm where social media is being used, then share translations within the online communities, ethnic news, and blogsites that serve those stakeholders.

Today's outreach plan must be even more dynamic than in the past and unique to local conditions, much like the diverse communities themselves. Tools such as the I Speak cards can serve a great purpose to convey the public involvement process across major languages. Yet, translating for every individual participant could be unrealistic, especially for a complex or large-scale study area. According to an intercultural task force report for one metro Atlanta county, more than 130 languages are spoken in its school district alone (DeKalb, 2001).

Given scope, budget, and schedule constraints, the key is to be more intentional in finding barriers to accessibility—whether related to language, income, or both—and bridging them with more creative tools. Language and cultural changes will continue reshaping communities and the role of transportation planning. Enhancing outreach approaches today will guide our long-term ability to build trust and consensus in any language.

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# Rail



Photo by Rickey Green, Capital Metro, Austin, TX

## Passenger and freight rail: positive connections

By Randall Rook

Until the latter half of the twentieth century, long-distance intercity passenger, short-haul commuter and freight rail markets were all served by the private railroads, who also owned the physical assets (rolling stock, stations, track, bridges, power and signal systems). This market blend began to separate during the 1960s through the 1980s, due to in part to intense intermodal competition.

As a result, commuter operations began to receive operating and capital subsidies and grants from local governments, transit agencies and the Urban Mass Transit Administration (which became the Federal Transit Administration or FTA). Eventually, many of the (predominantly passenger-related) physical assets were conveyed or sold to the agencies, who would either contract out operations (a frequent model such as Los Angeles' Metrolink) or establish their own rail operating divisions. This shift often allowed greater coordination with existing transit routes and fare collection systems. Operation of core intercity passenger routes was preserved through the creation of Amtrak in 1971, which also assumed ownership and operations of most Washington-Boston Northeast Corridor (NEC) trackage in 1976.



Photo by Randall Rook

A Baltimore-bound CSXT autorack train passes above an Amtrak equipment movement in Washington, D.C.'s Ivy City Yard, adjacent to the Northeast Corridor.

Despite the present-day passenger/freight rail owner and operator separation, many legacy factors such as physical track connections, train dispatching responsibilities, station and on-line industry locations often dictate a lingering interdependency between transit agencies, local governments, Amtrak and the freight carriers. It is notable that nearly a dozen each of new commuter rail and light rail operations have been launched in recent decades, many either sharing or utilizing light density or former freight rail corridors.



Photo by Randall Rook

A loaded coal train leaves Amtrak's Northeast Corridor and onto CSXT's Popes Creek Subdivision in Bowie, MD, while a Washington Union Station-bound MARC commuter train heads south.

Numerous recent studies indicate that effective cooperation between these multiple parties will be ever more necessary due to forecasts of increased demand for both passenger travel and goods movement, as the U.S. population is expected to grow to over 400 million during the next 40 years. Amtrak's systemwide ridership has grown by nearly 50% since its creation and NEC ridership has increased by 5% annually over the past five years. The carrier predicts an NEC train mile increase of 37% (over 2006 levels) by the year 2030 (including tenant commuter train movements). The American Public Transit Association forecasts a fivefold increase in public transit usage (all forms) by 2050 and the American Association of Railroads anticipates a freight rail traffic increase of 88% (by tonnage) by 2035.

There are numerous recent examples of government/freight railroad partnerships which have benefitted all parties. One of these was the 2012 commonwealth of Massachusetts-CSXT agreement which transferred ownership and operations of Worcester-Framingham-Boston trackage to the commonwealth for increased MBTA commuter rail service. Strategic asset redeployment by CSXT is enabling MBTA's

expansion. Cities such as Oceanside, CA and Austin, TX have followed San Diego's example of shared LRT/freight rail corridor usage, where both services successfully coexist in accordance with Federal Railroad Administration operating regulations.

Passenger and freight rail transportation will also continue to be an important component of the nation's efforts to address increasing vehicular traffic congestion and reductions in greenhouse gas emissions. The Obama administration is presently supporting both high- and incrementally-increased speed passenger services (which are in design and construction) in various parts of the country.

Through a combination of federal stimulus dollars and grants, and FTA New Starts, MAP-21 and local funding, transit agencies gain new equipment, facilities and increased ridership and freight carriers are able to gain upgraded physical plant and capacity improvements. Regions reap economic growth as businesses locate where robust and balanced transportation systems exist, and residents enjoy environmental benefits and less roadway congestion.

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## Rail-air mode split along major corridors

*By Jamie Simchik*

High-speed passenger rail is a topic that has received a great deal of attention in recent years and has been the subject of intense political debate. The economic recession and increase in gasoline prices contributed to this new-found interest and an all-time high in Amtrak ridership in 2012. Most of the news coverage has either focused on the California High-Speed Rail or Amtrak in the Northeast Corridor.

The California High-Speed Rail Authority is making significant progress given the logistical effort to assemble land for the rail alignment and stations as well as the financial cost, especially in light of this recent recession. Once in full operation, it will provide a new mode of transportation, allowing single-seat passenger

rail service between downtown San Francisco and downtown Los Angeles in two hours and 40 minutes by 2029. This service will directly compete with the existing air service between the two cities, which currently accounts for 533 weekly flights. It is inevitable that some degree of mode shift will occur, but only estimates can be made due to the fact that this will be a completely new service.

Amtrak has two routes that operate in the Northeast Corridor, the Northeast Regional and the Acela. While the Northeast Regional stops at all stations along the Northeast Corridor, the Acela only stops at major stations and is America's closest service to high-speed passenger rail. The Acela currently allows single-seat passenger rail service between downtown New York City and downtown Boston in three hours and 27 minutes

and between downtown New York City and downtown Washington, DC in two hours and 46 minutes.

In 2011, the Regional Plan Association released its report entitled *Upgrading to First Class: The Future of the New York Region's Airports*. It stated that in 2008, one-way rail trips (Northeast Regional and Acela services combined) accounted for 34 percent of all one-way rail and air trips between New York City and Boston as well as 48 percent of all one-way rail and air trips between New York City and Washington, DC. (This report, and others, did not compare inner-city bus routes, which are definitely growing in popularity along the Northeast Corridor and the rest of the United States.) It was further estimated that higher speed services could increase the proportion of one-way rail to air trips to Boston and Washington, DC from New York City.

Another factor weighing into the mode shift in the Northeast Corridor is that airport capacity (especially at LaGuardia, JFK and Newark) is almost maximized based on current configurations and air traffic controlling technology. In 2008, all three airports combined had approximately 100 million annual passengers and it is estimated that this could increase by 50 percent as early as 2030. However, a complete mode shift from air to rail in the Northeast Corridor in order to free up additional airport capacity is highly unlikely. This is because a large number of passengers flying between Northeast Corridor airports have connecting flights that are headed outside the area.

Better integration between airports and rail stations as well as integrated air/rail ticketing also has the potential to increase the share of rail trips, allowing a more efficient use of transportation modes within the corridor. However, an increase

in the share of rail trips (and bus trips) is necessary to meet this projected demand in order for airports to have the capacity to meet the needs of the region. A reallocation of trips within the Northeast Corridor is required to provide a more integrated transportation infrastructure that can meet the needs of passenger traveling from downtown to downtown within the corridor as well as those coming to and from the corridor.

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# Public Transportation



## Transit supportive development as a tactical tool

*By Jerome M. Lutin, PhD, PE, AICP, FITE*

Transit Supportive Development (TSD) is a term that encompasses not only Transit Oriented Development (TOD), but includes coordinated planning for transit and land use “strategically,” at a regional scale, and “tactically,” at the corridor scale. The goal of TSD is to increase transit ridership in order to maximize the efficiency and environmental benefits of the system.

Transit planning and land use planning should go hand in hand. During the 1980’s and 1990’s, however, this was not always the case, as the US experienced a boom in construction of even new light rail systems. Ridership on many of these lines proved to be less than projected, partially because uncoordinated development patterns along the lines did not generate many transit trips, and partly because highway and parking capacity kept expanding, giving driving an advantage over transit.

System planners began to look more closely at ways to increase ridership and economic benefits of new (and existing) transit lines by increasing the number of residents, jobs and shopping opportunities close to stations. TOD became a major focus in transit planning. TOD, however, is

not the only planning strategy needed to maximize the benefit of transit to a community.



*Transit-oriented development near Union Station in Denver*

### **Strategic Planning**

Transit systems function as networks of routes in which stations or stops are nodes where passengers board or alight from the system. The number of trips produced or attracted to a station will be proportional to the magnitude of development around it. The number of those trips that will be carried by the transit system,

however, will be proportional to the magnitude of the interaction between land uses for each pair of stations. Consequently, although mixed land use is a fundamental principle of TOD, using one land use typology at all stations may not maximize ridership on transit.

Transit ridership can benefit if each station along a transit route has a mix of uses, but also has a stronger concentration of one particular type. For example, a station area with a strong residential component would likely produce a significant flow of work trips to a station with a strong component of employment related land uses.

Traditionally, transit demonstrates the most significant ridership benefits in corridors anchored by strong central business districts acting as major terminals. In this context, new developments along a transit line could result in additional costs to the transit operator if new trips are added in the peak direction and peak period. Such trips may tax existing capacity and require additional vehicles and operating costs. If, however, new development generates off-peak transit trips and trips in the reverse peak direction, the transit operator can benefit from adding riders that use available capacity at little or no additional operating cost. Therefore, strategic planning for transit and land use should begin at the regional and corridor level, with conscious decisions made about different land use mixes and development typologies to be employed at all the stations along the line.

### ***Tactical Planning***

“Tactical” planning in TSD refers to planning for the physical configuration of the corridor in which a transit route operates. The main emphasis is on allowing the transit mode to operate reliably, at a competitive speed, and to insure that stations and stops have safe and convenient access for passengers.

Regular bus service, which carries the greatest share of transit riders in the US, has not been as effective as rail in stimulating TOD. Bus routes lack the visible presence and perceived permanence of



*Transit-oriented development in Arlington, VA*

rail, and a bus may be viewed as a less attractive mode of transportation. Nevertheless, buses can perform well as an efficient and environmentally beneficial mode of transportation if the service can attract more riders, especially those who have a choice between driving and taking transit.

Tactical planning to improve bus service involves managing traffic, on-street parking and the way abutting properties are accessed from the roadway. Such design considerations may be required under master plan approval or through zoning code requirements. Other tools that may be available are “access management” regulations which typically are administered by state and local highway departments. Managing traffic to improve transit reliability and speed may include implementing traffic signal priority for transit and enforcing no parking zones at transit stops.

Form-based zoning codes can be used to implement transit supportive development. Rather than being primarily focused on land uses, form-based codes regulate the physical form of buildings and their relationship to the street. Form-based codes create more attractive street frontage and address public space requirements such as sidewalk dimensions and design features that can encourage transit use.

## Site Access Recommendations

The following are excerpts from a series of recommended highway access code requirements for access permits for large new developments where transit service is available. The recommendations all focus on improving pedestrian access from buildings on the site and accommodations for bus stops.

- Driveways shall not interfere with the operation and stopping patterns of public buses currently operating on highways adjacent to the site.
- Sidewalks shall be provided along the entire frontage of the site bordering the highway. Such sidewalks shall include curb cuts where appropriate, and striping and appropriate signage where pedestrian paths cross driveways, and shall be accessible under the Americans with Disabilities Act (ADA).
- The developer shall designate a suitable location(s) for a public bus stop(s) on the highway so that no point on the parcel frontage is greater than 600 feet (183 m) from a stop location. Such locations will provide sufficient space to erect a bus shelter and shall be accessible under requirements of the ADA. Bus turnouts may be required, depending on traffic conditions and the absence of shoulders.
- If the developer is required to construct or improve a signalized intersection on the highway adjacent to the site to provide access, the intersection design shall include provisions for pedestrian crossings and bus stops on each side of the highway.
- The developer shall provide reasonably direct walkway access from bus stops to the main public and employee entrances of all buildings on the site.

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# Transforming Tysons: Northern Virginia's employment center looks to a less car dependent future

By Brian Lutenecker, AICP

Author Joel Garreau recognized Tysons Corner, Virginia as the classic example of sprawl in his writing on *Edge Cities*<sup>1</sup>. A country crossroads as recently as the end of World War II, Tysons has more office space today than downtown Atlanta and it rivals the District of Columbia for the region's employment center.

As of the 2010 U.S. Census, Tysons had a population of 19,627 and only 10,637 housing units<sup>2</sup>. It presently has at least 115,000 jobs and 25.6 million square feet of office space<sup>3</sup>. As Tysons does not contain nearly enough housing units within its boundaries to house its workforce, most employees working in these office spaces commute from other suburban areas in Virginia and Maryland. Tysons also contains 4.1 million square feet of retail space, including the largest mall in the region<sup>4</sup>.

Tysons has long been an automobile-centered area, unlike traditional central business districts which initially developed around non-motorized transportation or streetcars. With limited access to public transit, this land use has resulted in severe traffic problems in and around Tysons, including the major thoroughfares and Washington's infamous Beltway which passes through the area. However, with Phase 1 of DC Metrorail's new Silver Line expected to begin service by the end of 2013, including four stations in Tysons, this will begin to change. The Silver Line will initially connect Tysons Corner to Washington, DC and Arlington to the east, and the edge of Reston, Virginia to the west. Eventually, after the completion of Phase 2 in approximately 2018, the line will add stations to the west in Reston Town Center, Dulles Airport,

and Loudoun County.

Fairfax County, Virginia has created a comprehensive plan calling for transforming the area into a "walkable, sustainable, urban center that will be home to up to 100,000 residents and 200,000 jobs" by 2050. The plan envisions remaking Tysons into Fairfax County's "downtown" with three quarters of growth within ½ mile of the stations. As described below, other areas of Tysons will be connected to the stations via circulator bus routes.



Photo by Mario Roberto Durán Ortiz/Wikimedia Commons

Tysons Corner Metro Station under construction on Route 123 at Tysons Boulevard in Fairfax County, Virginia.

The comprehensive plan calls for numerous transportation improvements. These include:

- Transforming the current superblock street network into smaller, connected "Complete Streets," which provide infrastructure for safe walking and biking, in addition to driving.
- A circulator system will connect the Metrorail stations to other locations within Tysons Corner in addition to a feeder bus network running to nearby neighborhoods.
- Better highway connections and crossings, as well as a much improved traffic management system

<sup>1</sup> (Garreau, 1992)

<sup>2</sup> (U.S. Census Bureau, 2013)

<sup>3</sup> (Sully District Council, 2013)

<sup>4</sup> (Sully District Council, 2013)

The comprehensive plan recognizes the continued presence of automobiles in Tysons Corner. However, it notes that continual road improvements to benefit automobile trips are not sustainable, both environmentally and financially. In addition to increased reliance on transit trips to and within Tysons Corner, the study also calls for more robust transportation demand management programs, such as carpooling and telework.

As the comprehensive plan notes, the vision for Tysons Corner is to become a major residential neighborhood in addition to continuing its existing role as a jobs center. This major change in land use will have an impact on the generation of vehicle trips as more people walk, bike, or take transit from their nearby residence to their jobs.

Undoing the low density, auto dependent nature of Tysons Corner will not occur overnight. It will take decades of effort by Fairfax County and other stakeholders to make the vision outlined in the comprehensive plan a reality. But it seems clear that, regardless, Tysons Corner will remain a major employment center for the region, rivaling the District of Columbia itself.

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For more details on the Transforming Tysons plan, see

[www.fairfaxcounty.gov/tysons](http://www.fairfaxcounty.gov/tysons)

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# Community Health



## **Health Impact Assessment (HIA): An innovative tool for transportation planning**

### **Case Study: health impact assessment of the Atlanta Regional PLAN 2040**

*By Catherine L. Ross, Harry West, Sara Smith and Arthi Rao*

#### **Healthy Transportation Planning**

Public health has not traditionally been given explicit consideration in the design and planning of transportation systems. Planners and policymakers are now contending with increasingly difficult health related issues such as high rates of chronic disease, unhealthy food choices, few opportunities for an active lifestyle, overwhelming medical costs, and a growing elderly population; therefore, the need for consideration of public health in all policies is necessary. Since transportation systems affect all aspects of daily life, the design of transportation systems to support healthy choices is a critical component towards achieving this objective.

Health Impact Assessment (HIA) is one tool that is used extensively internationally and increasingly here in the United States to incorporate health proactively within planning and policy decisions.

The Center for Quality Growth and Regional Development (CQGRD) is a multi-disciplinary research Center within the College of Architecture at the Georgia Institute of Technology. As an applied research center, with expertise across a wide spectrum of disciplines that includes both public health and transportation planning, the researchers at CQGRD utilize analytic tools such as HIA to understand and evaluate how the larger context created by the built environment, particularly transportation systems, can promote positive health outcomes.

CQGRD had the opportunity (through a grant provided by the Health Impact Project<sup>1</sup>) to collaborate with the Atlanta Regional Commission (ARC), the Metropolitan Planning Organization (MPO) for the Atlanta region, to conduct a comprehensive HIA of ARC's PLAN

<sup>1</sup> A collaboration of the Robert Wood Johnson Foundation and The Pew Charitable Trusts.

<sup>2</sup> European Center for Health Policy, WHO Regional Office for Europe. (1999). Health Impact Assessment: main concepts and suggested approach. Gothenburg Consensus Paper.

2040, the long-term comprehensive plan developed by ARC for the region. PLAN 2040 was developed through a unique process that integrated land use and transportation policies such that both are considered together, and the subsequent HIA therefore represented an unprecedented opportunity to influence the long term health, sustainability, and prosperity of the region. The HIA of PLAN 2040 also comes at an appropriate time when there is a growing interest in incorporating health within transportation planning at the Federal level.

## **Definition of Health Impact**

### **Assessment (HIA)**

HIA has been defined by the World Health Organization as a formal methodology “...by which a policy, program or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population.”<sup>2</sup> Four values are integral to the HIA process: democracy, equity, sustainable development, and the ethical use of evidence-based analysis.

### **Standard HIA Methodology**

The research team determined that PLAN 2040 would have considerable health impacts based on initial screening.

The scoping for the PLAN 2040 HIA began with an extensive review of stakeholder feedback gathered from public meetings to gain

a better understanding of their perceptions of existing health concerns and priorities in the Atlanta Metro region. A stakeholder advisory group was also convened to gain insights into pressing health concerns. An extensive literature review was conducted to understand potential health impacts associated with land use and transportation planning. The PLAN was also reviewed to determine health impacts at different scales (regional and local) as well as establish geographic boundaries for the HIA. Cumulatively, all of these processes led to the development of five categories of health determinants.

The appraisal phase included document review and analysis of the PLAN 2040 elements.

The transportation section was critically assessed with respect to established policy and implementation frameworks. Geographic Information Systems (GIS) analysis was used to determine spatial location and distribution of health impacts. Existing evaluation and monitoring metrics were also closely examined to determine the potential to incorporate specific health-related dimensions.

While assessing the transportation component of the PLAN, particular emphasis was given to evaluating multimodal transportation and its ability to support active living. Policies, programs and urban form that encourage active transportation (walking, bicycling, public transit,

### **Health impact assessment methodology**

- 1. Screening phase: determine whether a program policy or project will potentially result in public health impacts (positive or negative).**
- 2. Scoping phase: establish the study area boundaries, identify possible consequences, and determine a management approach for the HIA.**
- 3. Appraisal phase: consider the nature and magnitude of health impacts and the affected populations.**
- 4. Recommendations phase: maximize positive health outcomes and mitigate any negative health outcomes that could result from the plan, program or a project.**
- 5. Dissemination phase: circulate the results of the HIA to decision makers, individuals implementing the plan/policy, and community stakeholders.**
- 6. Monitoring and evaluation phase: review the effectiveness of the HIA process and evaluate the actual health outcomes as a result of the project or policy.**

**World Health Organization**

and other travel modes that require energy expenditure by the traveler) potentially increase physical activity levels, improve air quality and lower rates of numerous chronic diseases.

Land use recommendations included identifying areas where mode share could be diversified and policies could be established to promote pedestrian-friendly environments that were safe and walkable.

Recommendations emphasized strengthening or expanding the scope of policies that were already supportive of health (high density, walkability, mixed income housing, and land conservation). The HIA also suggested policies to enhance the implementation of transportation projects that could potentially have a positive health impact.

A final HIA report was submitted to the ARC. The HIA was intended by the project team to be a pioneering effort to demonstrate how HIA methodology can be incorporated into regional planning. Currently, there is an active effort to disseminate a national practice-oriented framework for the incorporation of health in all policies to MPOs nationwide.

Although regional transportation planning frameworks have well established evaluation metrics embedded in their processes, the HIA demonstrated how new health metrics could be added and existing metrics could be modified to better incorporate health considerations preemptively. For example, equity measures, from a spatial and population-based perspective, developed at the beginning of the process can potentially further ensure that equity persists through each decision point.

The HIA recommendations for the “Plan Level Performance Measures” included additional means to assess pedestrian access, bicycle access, transportation cost, multimodal access for children and seniors, transportation costs, or other important health impacts. The performance measures relied primarily on traditional metrics, such as car and transit travel time, crash rates, regional emissions modeling, and driving speed.

Additional measures that evaluated distance were suggested as supplements to the traditional measures.

Several additional steps are in progress to enable the consideration of health from the very beginning of the planning process. These include providing an implementation framework for the recommendations, strategies for organizational change, and expanded regional health data collection efforts. Ultimately, the aim is to create a roadmap for regional planning agencies to move towards a national model where health is considered in all policies throughout the planning process.

### ***Connecting Transportation and Health at the National Scale***

A successful, replicable HIA framework for regional transportation and land use planning can be adopted for metropolitan areas nationwide, to guide future regional planning efforts. The HIA conducted by CQGRD can serve as a national model, representing one of the first efforts to integrate a formal assessment methodology and health metrics into regional planning efforts. Therefore, PLAN 2040 provides a unique opportunity to have a positive impact on the future health, sustainability, and prosperity of the region and by serving as a model for the nation.

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# Active transportation goals in adopted plans

By Jo Laurie Penrose, AICP

Transportation and community design have an impact on human health. The consensus now is that some of the obesity epidemic is caused by infrastructure design and by land use that discourages any travel mode besides a car.

Local planning departments are addressing this problem by changing the focus of their plans from car-centric to people-oriented. Policies and infrastructure that promote bicycling, walking, connections to public transit, and mixed use developments not only allow for more options for physical activity, they also may have economic benefits to cities and towns. Active transportation is the key in the efforts to hold back rising obesity levels.

Among the change of focus is the Nashville (TN) MPO, which has made active transportation the focus of its Long Range Transportation Plan. Sixty of the one hundred points on which transportation projects in the plan are scored are based on positive outcomes for air quality, provision of active transportation facilities, injury reduction for all modes, improvement to personal health and equity of transportation facilities in underserved areas.

In the final Regional Transportation Plan, 70% of adopted roadway projects include active transportation infrastructure, which is significantly more than the estimated 2% of projects in the 2030 plan. In January 2012 the MPO and its Bicycle & Pedestrian Advisory Committee announced \$2.5 million in projects to its local jurisdictions through the new Active Transportation Program included in the adopted 2035 Regional Transportation Plan.

Comprehensive plan goals, objectives and

policies can also lead to improved community health. Pitt County, North Carolina held a Community Health Summit in 2011 which was the momentum for the community health goals in its adopted land use plan. Overall, 72.7% of adults in Pitt County are overweight or obese, and more than one in three children in Pitt County is overweight or obese.

The goals and objectives for the Community Health section were developed to assist in implementing the Pitt County Health Department's Communities Putting Prevention to Work (CPPW) initiative, which aims to increase levels of physical activity, improve nutrition, and decrease obesity rates within the County. Community health goals and objectives in the comprehensive plan focus on four areas: 1) parks and recreational facilities; 2) access to healthy foods; 3) access to alternative modes of transportation; and 4) complete neighborhoods in a rural context.

Several goals focus on infrastructure and access, such as improving bicycle and pedestrian circulation, implementing priority projects in the Bicycle and Pedestrian Master Plan, creating more open space and adopting a Complete Streets policy. One of the first retrofits was a painted crosswalk and associated improvements across a two-lane road between a farmer's market on one side and a park with walking trails on the other. The county also worked with the Greenville, NC transit system to start a bus route to the farmer's market on Saturdays.

At the federal level, the Centers for Disease Control and Prevention have published a Transportation HIA online toolkit that includes measures from health impact analyses. Strategies for Health-Oriented Transportation Projects and Policies

***Pitt County held a Health and Environment Summit in 2011, which was the momentum for creating the community health goals in the comprehensive plan.***

HIAs makes evidence-based recommendations to promote positive health outcomes and minimize negative consequences. The strategies and evidence are divided into six categories:

- Reduce Vehicle Miles Traveled (VMT)
- Expand Public Transportation
- Promote Active Transportation
- Incorporate Healthy Community Design Features
- Improve Safety for All Users
- Ensure Equitable Access to Transportation Networks

[http://www.cdc.gov/healthyplaces/transportation/hia\\_toolkit.htm](http://www.cdc.gov/healthyplaces/transportation/hia_toolkit.htm)

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***Additional readings:***

International City-County Management Association:

Active Living and Social Equity: Creating Healthy Communities for All Residents

American Institute of Architects:

<http://www.aia.org/aiaucmp/groups/aia/documents/pdf/aiab096790.pdf>

# Bicycle Planning



Photo courtesy of alifayre www.flickr.com



## Carcentric metropolis moves over to the non-motorized lane

*By Claire Bowin, Jane Choi and Michelle Mowery*

On March 1, 2011, the Los Angeles City Council unanimously adopted the City's 2010 Bicycle Plan (Plan). As the first comprehensive update since 1996, the Plan is the blueprint for improving bicycling conditions for all types of cyclists, whether vehicular, recreational, experienced or recent, young or old. The Plan's innovations are geared towards increasing the mileage of bicycle facilities and making bicycling a natural part of the landscape of the City.

The Plan includes the designation of over 1,600 miles of bicycle paths, lanes, and routes/bicycle-friendly streets connecting the City. This includes over a quarter of the City's 6,500-mile street system. Its goals, objectives, policies and over 125 programs ensure equity for bike access of the streets, parking and transit, encouragement, education, enforcement, engineering, funding, evaluation and the environment. The Plan includes programs to effectuate "complete streets," encouraging "bicycle-friendly streets" which include features that calm traffic, thereby creating a more pleasant environment for bicyclists and pedestrians.

The Plan introduced the Five-Year Implementation Strategy to design and construct at least 200 miles of bikeways every five years and the creation of a Bicycle Plan Implementation Team, which establishes a mechanism for regular public participation and transparency. The City also adopted a comprehensive Technical Design Handbook to guide bicycle facility design.

The three-year process leading to the adoption of the Plan showed that inclusivity, clear communication and a path for implementation are instrumental in effectuating successful planning outcomes. The Plan was developed from the ground-up as many in Los Angeles' bicycling community stepped in to participate via the blogosphere. Planners built a coalition of supporters out of disparate groups of cycling advocates and bridged the gap between cyclists and the City's transportation engineers.

With limited resources, the use of technology, such as the Los Angeles Department of Transportation (LADOT) Bike Blog and webinars, helped reach a wide audience. Cycling photos submitted by the public were featured in the Plan, which promoted ownership. Existing cycling organizations, like the Los Angeles County Bicycle Coalition



*Photo courtesy of Los Angeles Dept. of Transportation*

*Cyclists stopped in a green lane on Spring Street in Los Angeles.*

and local bicycle co-ops were instrumental in facilitating public participation and disseminating information about the Plan.

City staff served as the “honest broker” in the development of the Plan, dissipating long-time suspicions of government within the cycling community and elevating the power of planning to promote legitimacy, transparency, and ensuring a fair process. Despite a collaborative process, the Plan was not embraced by the community at first. After a contentious hearing at the City Planning Commission, staff regrouped and worked continuously with the advocate community to address their remaining issues. This process began to change the public’s perception of the City from a bureaucratic log-jam to an entity effective in making positive change.

The momentum from the Plan and its adoption has carried forward into its implementation. Upon adopting the Plan, the Mayor issued a directive to each City department to implement the Plan in all relevant City projects. The City Council adopted the Bicycle Anti-Harassment Ordinance in July 2011, providing civil remedies for cyclists who have been harassed by drivers, and updated the zoning code to require additional short- and long-term bicycle parking in new developments. Within 15 months of adopting the Plan, LADOT installed over 100 miles of bikeways, bringing the total mileage of facilities to 55 miles of paths, 245 miles of lanes and 132 miles of routes, shared-lane markings (sharrows) and bicycle-friendly streets. Public service announcements educating motorists and cyclists to share the road are ongoing.

Resources were committed to establish a full-time bicycle planner position in the Department of City Planning to work side-by-side with LADOT’s Bikeways Team. The Los Angeles Police Department appointed four bicycle liaisons in its Traffic Division who are dedicated to bicycle safety and outreach. Through the Plan and its implementation, Los Angeles is continuing to build a city that is livable, bikeable and walkable, providing leadership for the region and beyond.

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## **Car sharing and bike sharing**

*By Alissa Barber-Torres, PhD, AICP*

Car sharing and bike sharing systems make cars or bikes available in multiple locations for short-term rentals by residents, employees, or visitors. They have become a popular option for communities trying to reduce vehicle congestion and carbon emissions, to encourage travel through downtown

and business districts, to support employees at large workplaces and university students, and to enhance the convenience and accessibility of transit systems. Car sharing also replaces the high fixed costs of vehicle ownership and operation with relatively low annual fee and cost-per-use rates, promoting transportation equity.

As of October 2012, carsharing systems are found in 27 countries, with an estimated 1.8 million members sharing over 43,550 vehicles. In 2012, there were 19 active programs in Canada and 26 in the United States, comprising over 908,000 members and 15,800 vehicles (Shaheen and Cohen, 2012). Walk Score Blog lists the top ten cities in the United States, with hundreds of car share locations in the following cities (Ceder, 2013):

- New York City;
- San Francisco;
- Chicago;
- Portland;
- Washington, DC;
- Seattle;
- San Diego;
- Austin;
- Miami; and
- Boston.



*Photo by Alissa Barber-Torres*

*Miami's car2go adds convenience and travel options to the Midtown Miami shopping district.*

Leveraging other sustainable transportation investments, San Diego has the nation's first all-electric car-sharing system, with 300 cars taking advantage of the city's existing 1,500 electric vehicle charging stations (Cournoyer, 2011). As another option, peer-to-peer car sharing (RelayRides, Wheelz, Getaround) and bike sharing systems (Liquid) have arisen in the United States,

with others found internationally. Peer-to-peer systems provide a platform for individual users to list their own cars and bikes as available for rental, rather than all cars and bikes in the system being provided by a corporate entity.

The car sharing market includes both private and non-profit providers and is expanding. In January 2013, the Avis car rental company spent \$500 million to acquire ZipCar, the world's largest car sharing company with operations in the United States, Canada, and Europe, which had previously merged with FlexCar, another major car sharing provider (PFM 2010). Connect by Hertz, Daimler's car2go, and BMW's DriveNow are other for-profit entities that have joined the car-sharing market in the past few years, with car2go and DriveNow anticipated to break even or earn a profit in the next year as they expand, largely in Europe, where the car sharing market is predicted to hit 15 million users by 2020 (LeSage, 2013). Non-profit providers include PhillyCarShare in Philadelphia and San Francisco's City CarShare, among others.

Bike sharing programs' origins are debated, but it is generally agreed that the establishment of Paris' successful bike sharing program in 2007 led to international interest in these systems. Since Washington, DC launched its bike sharing program, now called Capital Bikeshare, in 2008,



*Photo by Alissa Barber-Torres*

*Miami's DecoBike system has 100 solar powered stations and 1,000 bicycles available throughout the metro area by membership or hourly rental.*

many cities in the United States have followed suit, with established systems in Minneapolis, Denver, Boston, and other cities. Chicago, Portland, Los Angeles, and New York have announced plans to launch ambitious bike sharing systems with several thousand bikes in 2013, the largest being a planned 10,000-bike system in New York. (Kurtzleben, 2012). At the same time, smaller jurisdictions across the United States, such as Kansas City and Louisville, also have bike sharing programs, and others have systems under consideration or development.

New “third-generation” bike sharing systems are increasingly considering the capital costs of installing electronic docking stations/kiosks, equipping bikes with Global Positioning System/Radio Frequency Identification technologies for appropriate tracking and theft deterrence, operational costs of continually “rebalancing” or redistributing bikes between stations, and the inability to support operations by membership and rental fees alone. These factors have made government funding important and sponsorships an option for a number of systems. Private bike sharing system providers include Alta Bike Share, B-cycle, DecoBike, CycleHop, and Zagster, who normally partner with local governments or non-profit entities for implementation.

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### Resources

<http://www.carsharing.net/>

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# Pedestrian Safety



## Pedestrian safety: data challenges and future opportunities

*By Offer Grembek, PhD*

Over the past decade, pedestrians accounted for approximately 12 percent of all transportation fatalities in the United States, amounting to more than 4,500 deaths per year. Worldwide, pedestrians suffer the largest share of the 1.24 million yearly traffic fatalities. As people are being encouraged to walk more for their transportation needs in order to reduce environmental impacts and improve public health, transportation planners are obligated to make walking as safe as possible. Yet there are glaring gaps in the data needed to support these efforts.

In light of this, there is an urgency to increase the knowledge base available to public agencies and others for identifying the causes and prevention of pedestrian fatalities and injuries. To achieve this, it is vital to collect and communicate the essential pedestrian data that policy makers need to make informed decisions

regarding pedestrian safety improvements. These data sources are divided into three categories: (i) crash data; (ii) exposure/operations data; and (iii) infrastructure data.

***The countermeasure selection process is based on systemic improvements that would be applied to a selected facility type across the region of interest, as opposed to individual locations.***

Pedestrian crash data are necessary to understand the factors that contribute to these crashes. However, the data are often missing many necessary elements. For example, crash databases rarely are precise enough to reveal the specific crosswalk where a pedestrian crash occurred. In addition crash data is often not readily available for research and investigation.

Pedestrian exposure data are necessary for risk assessment, and countermeasure evaluation. Knowing the number of pedestrians travelers is required to estimate risk. Moreover, the distribution of resources must take into account the number of travelers that will be affected by any infrastructure improvements.



Photo courtesy of Seattle Dept. of Transportation

Seattle DOT's holiday safety campaign was *Slow Your Sleigh, Yield the Right of Way*

While there are numerous sources of vehicle exposure (i.e., volume) data, there are currently no such systematically collected data for pedestrians.

Pedestrian infrastructure data describes the elements of the built environment. It is also very limited because it is costly to collect, more so even, than automobile data. This limits both the quantity of the pedestrian infrastructure data, and the capability of its being merged with other data sources.

To date, these data categories are only collected as part of occasional local efforts, and are not systematically collected to allow agencies to

develop a long-term pedestrian safety agenda. The California Department of Transportation is currently developing a data-driven Pedestrian Safety Improvement Program that addresses these fundamental shortcomings. At the core of the program is developing the ability to collect and fuse crash, exposure, and infrastructure data. The data is used to monitor overall trends and also to identify what types of pedestrian facilities are riskiest. The countermeasure selection process is based on systemic improvements that would be applied to a selected facility type across the region of interest, as opposed to individual locations.

The coming decade brings many opportunities to alleviate some of the data challenges. GPS technologies allow pinpointing crash locations at very high levels of accuracy, while GIS mapping technologies facilitate spatial processing of crash data. The proliferation of mobile devices provides a framework to collect timely, consistent, and, accurate exposure data in real life settings. Semi-autonomous vehicles using radar or video processing are used for collecting road inventory data. Reducing the cost and improving the accuracy of the data across these three categories increase the knowledge base about pedestrian safety and would help in reducing pedestrian injury and fatality.

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## Creating a web portal for active transportation safety in California

*By Phyllis Orrick*

The California Active Transportation Safety Information Pages (CATSIP) is a website intended to provide a single, comprehensive, California-centric online destination for authoritative, evidence-based information on practices, methods, and resources to support efforts to improve the safety, efficiency, and attractiveness

of pedestrian, bicycle, and other types of non-motor-vehicle travel. It is in its third year of funding from a grant from the California Office of Traffic Safety.

### ***Background:***

There is growing interest in and pressure to increase the amount of walking and bicycling in the California transportation system. California

is home to numerous communities with well-developed walking and bicycling advocacy efforts, as well as its own Safe Routes to Schools program. This activity has in turn created a growing demand for information about methods to improve walking and bicycling options. A SafeTREC study conducted in 2009 found that most local agencies responding to the survey reported significant need for assistance in these areas.

For example, a majority of local agency representatives responded that their city has neither a Pedestrian, Bicycle, nor Pedestrian/Bicycle Coordinator. Very few agencies have a city-specific, formal review process to guide crosswalk location decisions, treatment toolbox components and selection procedures. Most survey respondents said they do not have staff or a department focused on school safety issues. Only 20 percent said they had a school safety program.

***As of August 2012, over 400 safety stakeholders from 170 public and private agencies and organizations work together to implement the plan under the direction of the SHSP Executive Leadership and a 13-member Steering Committee.***

A majority of local agencies do not have formalized traffic calming practices; nor do they have safety education curriculums for their schools or community centers. They recommended significant enhancements to the pedestrian and bicycle sections of Caltrans' website, with a more user-friendly interface and updated content.

Additionally, CATSIP helps support the work of the California Strategic Highway Safety Plan, a statewide, comprehensive, data-driven effort to reduce fatalities and serious injuries on public roads. Started in 2005, the SHSP is updated regularly to ensure continued progress and meet changing safety needs. As of August 2012, over 400 safety stakeholders from 170 public and private agencies and organizations work together to implement the plan under the direction of the SHSP Executive Leadership and a 13-member Steering Committee. The SHSP includes behavioral, infrastructure, and technology strategies addressing the "4Es" of safety: engineering, enforcement, education, and emergency services.

The SHSP applies resources in the areas where the greatest gains can be made to save lives, prevent injuries, and improve safety in the following Challenge Areas (CA). The initial goal for the SHSP was to reduce California fatalities to less than 1 per 100 million vehicle miles traveled by 2010, which was met a year ahead of schedule. Total fatalities and the fatality rate both continued to decline in 2010.

In regard to CATSIP, two of the 17 Challenge Areas (CAs) in the address pedestrian and bicycle safety: CA 8, Improvements in Pedestrian Safety, and CA 13, Bicycling Safety.



*Photo by jrmski/Flickr, copyright all rights reserved*

*Greenway near Mountain View, CA*

## ***Implementation:***

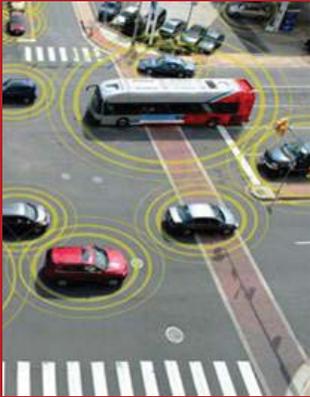
The content and structure of CATSIP was developed on three parallel tracks: 1) SafeTREC staff surveyed California and national online sources of evidence-based active transportation resources, including websites, blogs, Twitter feeds, as well as online data and research sites, 2) working with a small advisory group and a website designer, SafeTREC staff developed a basic architecture for the site, built around the concepts of Walking and Biking Safer (enforcement and engineering) and Walking and Biking More (encouragement and education) and 3) after identifying information needs via outreach to municipalities, counties and relevant state agencies, and agency initiatives and executive directives, SafeTREC staff developed a list of pedestrian and bicycle master plans and state agency sources and case studies and tools. There are now more than 600 items on the site, with at least one piece of content for each of California's 58 counties.

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*@transsafe on Twitter*

# Technology



## How technology is shaping the nation's interstate highways

By Derek Toups, AICP

In 1958, Walt Disney aired a television segment called *Magic Highway, U.S.A.*, that depicted what highways of the future might look like. Many of the concepts that first appeared in that colorful animation now exist.

For example, we have advanced signing, colored pavement markings and prefabricated segmental bridges. We use a variety of traffic sensing technologies. We routinely look at real-time traffic maps and vehicle navigation systems to chart our course, and increasingly we rely on rear-view cameras (as opposed to mirrors) to see behind our cars (pending legislation may require those in all vehicles soon).

While we don't use airborne emergency vehicles for standard incident response, we have dramatically improved our capabilities to quickly remove disabled vehicles from a congested highway. Continued efforts at the state and national level emphasize the important role that technology plays in shaping our national transportation system. This article points out some of the exciting initiatives that are underway

that will likely impact the daily lives of American commuters in the not so distant future.

### ***Smarter Highways***

After completing an international scan in 2006, the US Department of Transportation (USDOT) dubbed European-style active traffic management "the next step in freeway congestion management." Simply put, this means making our highways smarter so that traffic managers can more evenly distribute traffic and alert drivers of problems down the road.

Among the more popular strategies employed are ramp metering, congestion pricing, queue warning, temporary shoulder use, variable speed limits, dynamic signing and rerouting. When implemented effectively, these strategies help to improve safety and traffic flow.

Another USDOT initiative calls for Integrated Corridor Management (ICM). ICM challenges the convention of managing traffic in silos (e.g., separate highway, transit and arterial operations) in favor of building institutional partnerships and technical capacity to manage transportation corridors in a unified manner. With ICM,

transportation operators can anticipate changing traffic conditions and proactively implement appropriate strategies rather than as a response to an event.

### **Connected Vehicles**

Information and communication technologies are conspiring to change the world one industry at a time, and the transportation sector is emerging. Using a smart phone, you can find a vacant parking spot, reserve a shared car, or find out when your bus will arrive. Soon, with help from state and federal transportation agencies, the world's automakers will deliver wireless Connected Vehicles to market that will make our roadways safer, smarter and greener.

The cars and trucks of tomorrow will talk to one another via wireless networks and the sky is the limit in terms of the numerous applications they will use to improve the quality and quantity of traffic, transit, and parking data. Not only will travelers have simple tools to adjust their route, time, and mode of travel based on actual conditions, but the introduction and commercialization of collision avoidance and warning systems promise to save lives and minimize property loss too.

### **Autonomous Cars**

Another frontier in transportation involves self-driving autonomous cars. Autonomous cars may sound like science fiction but working prototypes such as Google's Driverless Car have logged thousands of miles without incident showing this technology has real potential. Autonomous cars could provide the same range and privacy of personal automobiles with the operating efficiency and safety of trains. To date, Nevada, California, Florida and Texas have passed legislation to permit the operation of autonomous cars on public streets and highways.

An intermediate step to fully autonomous cars is Personal Rapid Transit (PRT). PRT systems use a switched network with frequent merge/diverge points to permit nonstop, point-to-point travel (check out the system at London's Heathrow Airport). PRT systems don't require a mechanical

connection since modern vehicle guidance technologies can opt for sensors on the vehicle and in the roadway to provide the same level of steering and navigational control.

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### **Additional readings:**

#### *Smarter Highways*

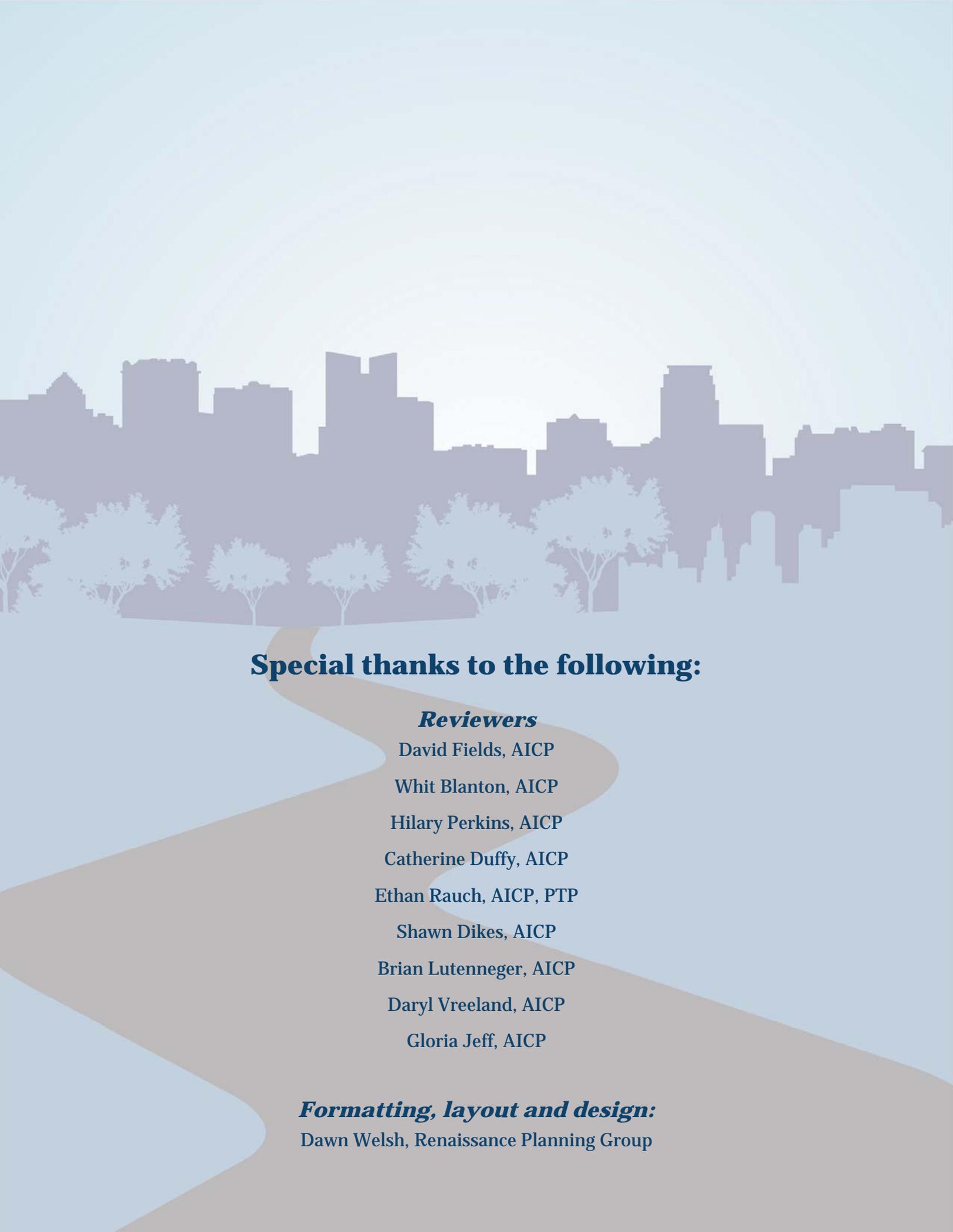
- Active Traffic Management <http://international.fhwa.dot.gov/pubs/pl07012/>
- Active Traffic Demand Management <http://international.fhwa.dot.gov/pubs/pl11011/pl11011.pdf>
- WsDOT Smarter Highways <http://www.wsdot.wa.gov/smarterhighways/>
- Integrated Corridor Management. <http://www.its.dot.gov/icms/>
- US DOT Priced Managed Lanes <http://www.ops.fhwa.dot.gov/publications/fhwahop13007/>

#### *Connected Vehicles*

- Connected Vehicle Trade Association <http://www.connectedvehicle.org/>
- Connected Cars 2013 Conference <http://connectedcarsworld.com/>
- US DOT Connected Vehicle [http://www.its.dot.gov/connected\\_vehicle/connected\\_vehicle.htm](http://www.its.dot.gov/connected_vehicle/connected_vehicle.htm)
- Connected Vehicle ITS America <http://www.itsa.org/industryforums/connectedvehicle>
- National Highway Transportation Safety Agency <http://icsw.nhtsa.gov/safecar/ConnectedVehicles/>

#### *Autonomous Cars*

- Google's Driverless Car [http://www.ted.com/talks/sebastian\\_thrun\\_google\\_s\\_driverless\\_car.html](http://www.ted.com/talks/sebastian_thrun_google_s_driverless_car.html)
- Ultra Global PRT London Heathrow Airport <http://www.ultraglobalprt.com/>
- Volkswagen Peoples Car Project in China <http://www.autoblog.com/2012/05/09/volkswagens-peoples-car-project-in-china-has-produced-three-co/>
- Fiat Mio Concept Car <http://www.fiatmio.cc/en/> and <http://www.youtube.com/watch?v=bmhjsdOFizM>
- Disney's Magic Highway [http://www.youtube.com/watch?v=e0q\\_oP9TPD4](http://www.youtube.com/watch?v=e0q_oP9TPD4)
- Also see the article by Alissa Barber-Torres on bicycle and car sharing in the bicycle planning section.



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