

Transportation in North Carolina

Case Studies and Commentary from NCAPA Contributors

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With an introduction by Fleming A. El-Amin II

Editors' Note: Carolina Planning regularly publishes a feature highlighting projects from members of the North Carolina Chapter of the American Planning Association (NCAPA). This year's submissions focus on initiatives and trends that encapsulate larger national movements within the transportation field. From case studies highlighting complete streets in Charlotte and partnerships with the public health community in Wilmington, to broader discussions like context sensitive solutions and the renewed concern about the environmental justice implications of highway infrastructure, these writers provide valuable insight in their areas of expertise.

Before the mass production of private automobiles in the early 1900s, many cities throughout the southeastern United States maintained bustling urban centers with electric streetcars running along major corridors. North Carolina was no exception, with more than a dozen cities and towns across the state acquiring streetcars between 1886 and 1948. In the late 1890s alone, the state's five largest cities at the time – Asheville (pop. 10,235), Winston and Salem (pop. 10,729 combined), Charlotte (pop. 11,557), Raleigh (pop. 12,678), and Wilmington (pop. 20,056) – were the first to implement streetcars. Thriving central business districts emerged as the primary locations for working, shopping, and entertainment during the early 1900s, with streetcars serving as an intricate part of the urban transportation fabric.

The flight from urban centers to the urban fringe and suburbs that began during the years following World War II promoted auto-dominated neighborhood designs throughout many cities. This ultimately had a significant impact on our transportation infrastructure, urban form and development patterns as cities and towns expanded outward. Eventually, streetcars and much of the intercity passenger rail services were discontinued, and in some

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instances rail tracks were paved over to better accommodate various types of rubber tire motor vehicles.

Since the adoption of the Federal Aid Highway Act in 1956, a majority of federal and state transportation funds have been devoted to highway planning and construction. This act facilitated the construction of the Eisenhower Interstate System, which today consists of nearly 47,000 miles of limited access freeways across the country. During the 1960s and 1970s, transportation planning was synonymous with highway planning, but today mobility enhancements are typically planned with multimodal transportation considerations in mind.

Transportation Funding and Legislation

The North Carolina Department of Transportation (NCDOT) was created in 1915 as the State Highway Commission, and today has evolved into a multi-modal agency providing a wide range of services to meet the transportation needs of the state. In recent years, however, the state's revenue for transportation infrastructure improvements have not kept pace with funding demand. To help address this issue, Governor Beverly Perdue worked with the N.C. General Assembly to create a mobility fund as a way to generate more revenue for transportation projects of statewide and regional significance that help relieve congestion and enhance mobility across all modes of transportation. The Mobility Fund is anticipated to generate \$173 million from fiscal year 2011 to fiscal year 2014 and will appropriate \$58 million each fiscal year thereafter.

Re-Emergence of Intercity and Regional Passenger Rail in North Carolina

In 1998, Mecklenburg County passed a bond referendum for a one-half cent sales tax to significantly expand bus transit service and construct a light rail system that would provide rapid transit service within several congested corridors throughout the city. The Charlotte LYNX light rail system opened in 2007 and has been a great success with higher-than-anticipated daily ridership. In 2009, the General Assembly passed House Bill 148 Congestion Relief Intermodal Transport Fund, which provided the authority for urban counties in the Charlotte metropolitan area, Triangle, and Triad to levy a sales or use tax (with voter approval) for the purpose expanding transit services. The bill also granted authority to other local governments across the state with options to secure funding to improve and expand transit service. Comprehensive regional rail studies are currently underway in the Triangle and Triad.

At the state level, NCDOT is working in collaboration with FHWA, Virginia DOT, and the Federal Railroad Administration to design and construct the Southeast High Speed Rail between Raleigh and Richmond. In 2010, North Carolina was granted \$545 million in federal stimulus funds for rail enhancements, with the majority of that obligated for improvements in the Raleigh-to-Charlotte corridor. Additional federal funds have been requested, but the current status of heated budget and deficit discussions

in Washington, D.C. will likely delay, if not preclude, these funding sources from consideration.

Contributions from NCAPA Authors

Over the last one hundred years, the nation has come full circle from implementing streetcars and intercity rail systems, to focusing almost exclusively on planning and constructing highways, and now today returning to a much greater focus on accessibility and multimodal transportation planning. The NCAPA-contributed articles in this feature discuss these critical components of multimodal transportation planning and implementation, both in case studies and larger contexts.

Complete Streets — The Charlotte Experience

According to the National Complete Streets Coalition, “complete streets” are streets that are designed and operated to enable safe and convenient access and travel for all users. Complete streets promote multimodal transport within a given right-of-way whereby motorists, pedestrians, cyclists, transit users, and mobility-challenged persons are all safely accommodated. When implemented properly, complete streets can help spawn economic development, enhance access and connectivity between different modes of travel, and increase safety and mobility for all users.

In North Carolina, the City of Charlotte was the first major city to adopt a comprehensive complete streets policy. In their contribution to this feature, Benjamin Miller, Tracy Newsome, and Dan Gallagher discuss how the Charlotte City Council adopted the Urban Street Design Guidelines (USDG), as well as the implementation tool for planning and designing Charlotte's complete streets. Their article provides case examples of implementing complete street policies in the actual design and construction of several streets. The authors provide information on the early road diet projects, details of the framework established with the USDG, challenges and successes of implementation throughout the city, and lessons learned.

Bicycle and Pedestrian Investments and Innovative Partnerships — The Wilmington Experience

With the passage of the comprehensive Bicycle and Bikeway Act of 1974, North Carolina established the first state bicycle program in the nation, quickly becoming a national model. The legislation granted authority for the N.C. Bicycle Program (now the Division of Bicycle and Pedestrian Transportation – DBPT) to undertake comprehensive bicycle planning and programming. Using planning grants offered through the DBPT, over 100 communities in North Carolina have developed and adopted bicycle and/or pedestrian plans.

Adrienne Walters (City of Wilmington) presents a case study on the extensive bicycle and pedestrian plans in Wilmington and elaborates upon her city's methods of leveraging funds to expand bicycle and pedestrian infrastructure through innovative partnerships with the

public health community. Walters provides an overview of Wilmington's process for goal setting, stakeholder involvement, cultivating partnerships, and securing alternative funding sources to complete the River to the Sea Bikeway system.

Context Sensitive Solutions

Ann Hartell (N.C. State University) discusses the importance of "context sensitive solutions" (CSS) in helping ensure that improvements to highways, roadways, and various transportation facilities are designed in keeping with the surrounding character of the affected environment. CSS helps stakeholders involved with designing and implementing transportation improvements to understand the landscape, community, valued resources, and role of all appropriate modes of transportation in each unique context before developing engineering solutions. Hartell details the core CSS principles and how federal and state DOTs utilize CSS to implement projects within existing constraints.

Environmental Justice

Brian Byfield raises important questions on the status of environmental justice (EJ) federal- and state-level monitoring efforts in transportation projects. EJ is the fair treatment and meaningful involvement of all people in decision-making processes, regardless of race, color, national origin, or income. The ultimate goal of EJ is to establish the same level of protection across resident populations from environmental and health hazards, as well as to provide equal access to the decision-making processes for development, implementation, and enforcement of environmental laws, regulations, and policies. Byfield provides a historical perspective on this subject matter and offers his perspective on environmental justice issues in North Carolina as they pertain to transportation infrastructure investments.

Complete Streets in Charlotte: Turning Policy into Projects

Benjamin Miller, Tracy Newsome, and Daniel Gallagher, City of Charlotte

Editors' Note: The annual NCAPA conference will be held in Charlotte this year. This article highlights some of the city's ongoing efforts aimed at improving transportation options for all residents.

Neighborhood residents had mixed feelings about East Boulevard, a minor arterial street and important shopping and dining destination in the heart of the City of Charlotte's Dilworth neighborhood. The four- to five-lane undivided street was seen by some residents as a separating barrier within the community. Wide crossing distances, high vehicular speeds, and daily traffic counts of 20,000

to 22,000 vehicles created an intimidating environment for residents trying to cross East Boulevard by foot or travel by bicycle. The street did not fit the context of the neighborhood, nor did it accommodate the needs of walkers, bicyclists, and transit users.

After neighborhood meetings and careful analysis, the City decided to take on East Boulevard as one of its earliest "road-diet" projects, with the first phase completed in 2004. The new cross-section eliminates two motor vehicle lanes and provides bike lanes, center-turn lanes, built-in traffic calming, and numerous pedestrian refuges. While the project was not without controversy, the Mayor and City Council continued to provide their support throughout planning and construction. The end product not only improved conditions for pedestrians and bicyclists, but also reduced automobile crashes while carrying the same volume of traffic as before. East Boulevard is now a successful example of how Charlotte has embraced a "complete streets" philosophy.

Why Complete Streets?

The City of Charlotte has many streets similar to East Boulevard – streets that were built or widened in the post-WWII era when maintaining vehicle 'throughput' was the primary consideration. Rather than focus on traditional road widening, the interest in complete streets arose from the recognition that Charlotte would need more creative ways to accommodate growth, support economic development, and improve access to expanding transit services. Complete streets provide transportation choices because they are designed to serve all users rather than just automobile drivers. As described by the National Complete Streets Coalition, "pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be able to safely move along and across a complete street."

By the 1990s, the public also began to demand better streets that were safer, more comfortable for all users, and fit the urban context in which they were built. For example, a biannual telephone survey of city residents routinely finds that roughly 80% of Charlotte residents believe streets should be designed to accommodate all users. A visual preference survey conducted in 2004 found that residents preferred the tree-lined streets of Charlotte's historic streetcar suburbs over those built in more recent subdivisions. In addition, concerns about speeding and a lack of pedestrian and/or bicycle facilities have been a recurring theme voiced during neighborhood meetings and by local advocacy organizations.

This local input complements recent national studies that show an increasing preference for walkable communities. A 2007 survey by the National Association of Realtors and Smart Growth America found nearly 90 percent of respondents believe that "new communities should be designed so we can walk more and drive less, and that public transportation should be improved and accessible" (Smart Growth America 2007). A Brookings Institution report predicted that, with changing



East Boulevard, Charlotte. Before and after complete streets improvements. Images courtesy of Charlotte DOT.

demographics, mixed-use walkable neighborhoods would be part of the next real-estate boom (Leinberger and Doherty 2010).

Projects on the Ground

Charlotte ultimately responded to the community's desire for better streets with the development of its Urban Street Design Guidelines (USDG). With the adoption of the USDG policy in 2007 and changes to city ordinances in 2010, Charlotte is now able to implement complete streets through the full range of activities that affect city streets,

such as public sector capital projects, area planning, public/private sector partnerships, and private sector development.

The City began implementing its complete streets philosophy into capital projects (as best practices) three years before the USDG became official city policy. To date, Charlotte has constructed \$88 million worth of complete streets projects designed using the USDG. One of the first series of projects was the South Corridor Infrastructure Program (SCIP), built in conjunction with the construction of Charlotte's first light-rail line in order to improve access in the station areas. As part of SCIP, the City modified the Woodlawn/South Boulevard intersection, through which 50,000+ vehicles travel daily. The context warranted improved motor vehicle capacity while also enhancing pedestrian and bicycle access to the Woodlawn Station.

In the past, intersection widening to increase motor vehicle capacity often resulted in decreased levels of service for pedestrians and bicyclists. At the improved Woodlawn/South Boulevard intersection, the City increased both motor vehicle capacity and pedestrian and bicycle levels of service with landscaped medians, pedestrian refuges, wider sidewalks, planting strips, and bike lanes.

Streetscape and road-diet projects, such as the East Boulevard project discussed earlier, also provide excellent opportunities for creating complete streets. Before removing travel lanes to address speeding problems, improve safety, and provide better facilities for pedestrians and bicyclists, Charlotte DOT carefully analyzes traffic patterns to ensure that the project will not significantly degrade motor vehicle travel. The growing number of streetscape, road-diet, or lane-diet projects has greatly contributed to the over 50 miles of bike lanes now striped within the city.

The City works to ensure that complete streets are implemented through a broad variety of city projects and plans. For example, the City applies the USDG block length and street-type recommendations during the area-planning process, as planners work with the public to identify future street connections to support the plan. Charlotte has also been careful to ensure that even smaller-scale street-related projects advance the goal of better streets. For example, sidewalk retrofits, handicap-accessible ramps, and pedestrian countdown timers are small but important contributions to creating complete streets.

Charlotte has also created complete streets through public-private partnerships. For example, the Metropolitan redevelopment replaced a traditional indoor shopping mall and surrounding surface parking lots with a 16-acre mixed-use development incorporating national retailers, office space, and residential condominiums. The scale of the project provided an opportunity for the City to coordinate with the developer for transportation network improvements, including street and bridge construction, complete street cross-sections, and the daylighting of a creek to help extend a regional greenway. An internal private street built by the developer provides additional connectivity. The City also worked with NCDOT to reconfigure nearby interchange ramps to better accommodate pedestrians and bicyclists and tie the Midtown area to Uptown.

While some development projects provide an opportunity for public-private partnerships, the majority of land development is affected most directly by the City's land development ordinances. Since the early 2000s, the City has required wider sidewalks and planting strips in certain pedestrian-focused zoning districts. City staff was able to achieve appropriate transportation improvements on conditional rezonings, such as complete street cross-sections, on-street parking, or increased connectivity within and to adjacent parcels. In late 2010, after a review process with local developers, the City Council formally adopted changes to Charlotte's ordinances to further implement complete streets through private development processes.

Lessons Learned

Charlotte has learned many valuable lessons during its years of applying complete streets. The lengthy implementation timeframe was a lesson in itself, as it illustrates that a change in philosophy can take time. The Charlotte DOT benefited from strong leadership and open-minded designers and engineers who were willing to consider and adapt to a complete streets approach.

Getting projects on the ground is critical to building community awareness of and support for complete streets. Through its capital improvement program, Charlotte established a five-year track record of implementing complete streets that enhance neighborhoods and provide transportation mode choices while allaying fears of increased congestion or negative impacts to property values.

Achieving development industry acceptance was also important to the recent adoption of subdivision ordinance changes. Private sector feedback led to practical improvements in the proposed ordinance language. One of the main challenges of writing this ordinance was providing for appropriate design flexibility while ensuring that expectations and requirements are consistent and predictable for all developments.

Implementing complete streets requires that designs (and designers) must be flexible to fit within existing urban contexts. A variety of cross-sections and design treatments are essential, as well as thoughtful processes for applying

them. For example, providing a hardscaped amenity zone instead of a grass planting strip in areas with frequent loading or unloading of passengers, or providing dedicated on-street parking adjacent to apartments but not large lot single family homes, are relevant design tradeoffs built into the USDG. Staff also was careful to create subdivision ordinance language that specified context-based street design requirements based on the development type.

Finally, it is important to recognize that complete streets are about providing effective transportation choices that serve all users, including motorists. For example, intersection projects can increase capacity while using designs that improve service for pedestrians and bicyclists. Likewise, road-diets in some contexts can be an efficient way to improve service for bicyclists and pedestrians, while maintaining appropriate levels of service for motorists.

Charlotte's experience with complete streets is reaping positive results. The early question of "why complete streets?" is rarely raised now that these effective practices have been demonstrated on the ground across the city. Adopting a complete streets philosophy and implementing it into all projects, both public and private, that affect Charlotte's streets represents a significant step towards improving the public realm and expanding transportation choices for all residents.

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Wilmington Achieves Bike-Ped Facility Improvements via Non-Traditional Partnerships

Adrienne Walters, City of Wilmington

The City of Wilmington, located in New Hanover County, is defined by the Cape Fear River and the Atlantic Ocean. This setting lends itself to recreational opportunities such as surfing, sailing, kayaking, and skateboarding. Until recently, however, bicycling safely around Wilmington proved to be quite a challenge. While Wilmington still has a long way to go, the City is taking a step in the right direction with two evolving bikeways: the River to the Sea Bikeway and the Cross-City Trail. This article focuses on the River to the Sea Bikeway (the Bikeway), an 11-mile on- and off-road bicycle route that runs from downtown Wilmington to Wrightsville Beach. The Bikeway is comprised of multiple segments that fit together and adapt to the specific urban context – congested

roadway, sidewalk, park-like setting – in which they are found. Successfully linking downtown Wilmington would have not been possible without community input and a unique partnership between transportation agencies, the public health community, and other private and non-profit organizations.

Soliciting Community Input

The Cape Fear Commutes 2035 Committee, which manages the long-term transportation plan for the Wilmington-area Metropolitan Planning Organization (WMPO), worked hard to develop a survey for area residents from January to March 2009. The purpose of this survey was to ascertain the community's transportation needs and values, solicit new ideas for transportation projects, and gauge public opinion regarding alternative funding sources for such projects.

The responses from community members regarding bicycle and pedestrian facilities were overwhelmingly positive. When asked how the City could encourage people to bicycle more often, 71.9% of respondents wanted more off-road multi-use paths constructed, while 68.6% wanted more on-road bicycle lanes and 46.1% wanted better information about existing safe and comfortable bicycle lanes. When asked how the City could encourage more walking, 81.3% of respondents wanted more sidewalks and multi-use paths constructed, 62.5% wanted safety

improvements of roadway crossings, and 58% wanted improved connections between nearby homes, stores, and offices. Also, 40% of respondents who make less than 10% of their trips by bicycle reported a preference to cycle more often.

Partnerships Make the Bikeway Happen

To respond to these community desires, multiple partnerships were created between public, non-profit, and private organizations and agencies throughout the Wilmington region. The City's Transportation Division, the lead agency in constructing the Bikeway and Cross-City Trail, partnered with public agencies including the Obesity Prevention Initiative at the University of North Carolina Wilmington (UNCW), the County's health department and parks and gardens department, the WMPO, the public transportation authority, and two neighborhood organizations: The Residents of Old Wilmington and the Bottom Neighborhood Association. Non-profit partners included Cape Fear Cyclists (the local cycling group), several committees dedicated to facility improvement, and healthy eating and lifestyle activist groups. In addition, partnerships were formed with local bicycle shops including Two Wheeler Dealer, Bike Cycles, Long Leaf Cycles, and Try Sports.

These groups worked together to form a coalition to address bike-ped issues in Wilmington. The development



Community Bike Day in Wilmington. Residents enjoy the city's bike/ped infrastructure along the River to the Sea Bikeway. Image courtesy of Adrienne Walters.

of this unique partnership began with a \$60,000 Fit Community grant provided to Wilmington by the N.C. Health and Wellness Trust Fund in 2009. With this funding, the City constructed North Carolina's first bicycle boulevard along the Ann Street corridor that connects historic neighborhoods to two schools, two fitness centers, Robert Strange Park, Martin Luther King Jr. Recreation Center, downtown Wilmington, and the Riverfront Farmers' Market. The Ann Street corridor completes the River to the Sea Bikeway within historic Wilmington.

The bicycle boulevard concept, which originated in Berkeley, California, is a strategy whereby bicycles are given priority over motor vehicles on an existing roadway corridor. The bicycle boulevard strategy involves improved infrastructure such as curb extensions, alley resurfacing, high-visibility crosswalks, pavement markings, and wayfinding signage. Internal policy changes are also required and include changes to City's Traffic Engineering and Streets Division's protocols to give priority to bicycles along the selected corridor.

The Ann Street corridor was originally identified during public meetings conducted by the City's Neighborhood Traffic Management Program in late 2008 as part of an area traffic-calming study. During these meetings, residents expressed desires for a safer bicycle route between their neighborhoods and downtown, especially to attend regular events including the Riverfront Farmers' Market and the Downtown at Sundown Concert Series. Following the residents' survey responses from 2009, the Ann Street corridor was chosen as the most viable location for the downtown portion of the River to the Sea Bikeway.

The Fit Community Task Force included many of the City's new partners and successfully promoted to raise awareness of Wilmington's new and existing bicycle and pedestrian facilities. Following construction of the Ann Street bicycle boulevard, the partnership held four events that included free bicycle safety instruction to children and adults, free health screenings, and substantial programming efforts. The partnership also hosted six group rides along the Ann Street Bicycle Boulevard. Overall, the partnership was able to provide bicycle safety instruction to approximately 150 people and about 100 people joined the group rides.

The partnership has helped leverage additional funding sources in order to improve and expand the River to the Sea Bikeway. For example, the New Hanover County Health Department, working with the UNCW Obesity Prevention Initiative and the City's Transportation Division, applied for and received funding from the N.C. Department of Health and Human Services (NCDHHS) through the Eat Smart, Move More N.C. Community Grant Program. Along with establishing community gardens and providing bicycle safety training, this \$20,000 grant will help fund a multi-use path that extends the Ann Street Bicycle Boulevard east towards Wrightsville Beach.



Local Resident Participates in Youth Bike Program. Image courtesy of Adrienne Walters.

Additional Work of the Bike-Ped Partnerships

In addition to the Bikeway funding, four additional partnerships promote improved bicycle and pedestrian facilities in Wilmington: FedEx Safe Kids Walk This Way, Physical Activity in the Built Environment, Bicycle Friendly Community from the League of American Bicyclists, and Fit Community Designation for New Hanover County.

The Eat Smart, Move More N.C. Task Force partnered with the Safe Kids Cape Fear Coordinator and applied for and received the FedEx Safe Kids Walk This Way grant. This \$25,000 grant will fund intersection improvements along a highly-traveled pedestrian corridor that connects several community centers, schools, parks and transit stops with large low-income housing communities. The goal of this partnership is to improve pedestrian connections to the Bikeway through enhanced crossings and innovative signal timing.

The partnership also collaborated to apply for the Physical Activity in the Built Environment Policy Initiative grant. NCDHHS awarded the City of Wilmington \$24,999 in grant funding from the American Recovery and Reinvestment Act (ARRA) to reconcile policy conflicts between state and local levels of government.

The majority of this funding is designated for salary for the project coordinator who will be identifying barriers to the implementation of built environment policy, attending Health Impact Assessment and advocacy training sessions, and advocating for state policy change to promote healthy environments and active lifestyles in North Carolina communities. This task force consists of transportation planners, the Obesity Prevention Initiative coordinator, the Health Promotion Supervisor, and a health economist. The award was made by the Centers for Disease Control and Prevention as part of the “State Supplemental Funding for Healthy Communities, Tobacco Control, Diabetes Prevention and Control, and Behavioral Risk Factor Surveillance System.”

We hope that Wilmington’s unique partnerships will serve as models to other municipalities across North Carolina. The transportation division has found it very beneficial to partner with local public health officials because we share common goals and objectives. Having the right people at the table facilitates communication and is key to any successful initiative. The people involved are motivated to think outside of the box and seek innovative funding opportunities. Staying focused on shared interests helps Wilmington provide safe and accessible bicycle and pedestrian facilities to the public health benefit of all residents.

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Linking Mobility and Context in North Carolina

Ann Hartell, N.C. State University

Context Sensitive Solutions (CSS) is a principle-driven, consensus-based approach to planning, designing, building, maintaining and operating transportation facilities and programs. CSS promotes interdisciplinary collaboration, meaningful engagement of stakeholders and communities, and transportation solutions that balance vehicle mobility within a community and environmental context. CSS encourages the careful, deliberate consideration of community values and goals, the various functions and activities of residents, and sensitive ecosystems and habitats.

CSS is rooted in the National Environmental Policy Act (NEPA), which passed in 1969. NEPA requires that the planning processes for federally funded projects incorporate documentation and evaluation of anticipated impacts to communities and the natural environment. CSS was formally articulated in 1998 at the “Thinking Beyond the Pavement” workshop convened by the Maryland Department of Transportation (then the Maryland State Highway Administration). The participants established a set of principles to guide transportation decision makers

towards a more inclusive and flexible approach to roadway design and highway project development.

In the intervening years, these principles were refined to a set of ‘core principles’ (see text box to the right). Recognizing the value of CSS, the Federal Highway Administration (FHWA) currently promotes the application of these principles and supports CSS as a national policy initiative. The principles address transportation outcomes (project design, facility operations, etc.) and processes (stakeholder engagement, design development, etc.) – both *what* transportation agencies do and *how* they do it.

CSS originally focused on roadway design (thus Context Sensitive Design is the name some state DOTs use for the approach), but now transportation agencies increasingly recognize that the principles are relevant for long-range planning activities and internal institutional processes. With this expansion, CSS offers a critical role in transportation decisionmaking for planners, who are uniquely qualified to understand contexts, apply ‘soft skills’ for facilitation and communication to build consensus among stakeholders, work towards internal process improvement, and critically evaluate the implications, intended or not, of a range of alternatives.

The CSS core principles represent a fundamentally different approach from the ‘interstate era’ of state DOTs, where the goal was to build hundreds of miles of high-capacity roadways. Effectively accomplishing this goal meant a factory-style approach organized around the tasks and functional areas within a DOT. Planning staff generate the conceptual description and the general location, whereby design staff then define roadway dimensions, right-of-way requirements, and pavement and landscaping specifications. Concurrently, the project undergoes the applicable environmental reviews (e.g. water quality, environmental justice, endangered species impacts), which may or may not result in legal action to halt or alter the project. Then, if funding is secured, right-of-way is acquired, construction commences, and eventually the facility is handed over to Operations and Maintenance.

Highway design is generally expected to adhere to established guidelines provided in the authoritative “Green Book” released by the American Association of State Highway and Transportation Officials (AASHTO). While the Green Book does offer specific dimensions for hundreds of potential project alternatives, these dimensions do not represent a design ‘standard’ but rather offer ranges to guide the final design. Still, many designers select the highest (or lowest) value in a range, sometimes believing that this will assure maximized safety, optimized operations, and the elimination of any professional liability related to safety problems. Experience and research, however, caution that applying AASHTO guidelines in isolation does not guarantee safety and may not improve long-term traffic conditions. Strictly adhering to the Green Book is not a viable shortcut and cannot substitute for good judgment. Expanding the perspective of the highway designer is a central element underpinning CSS principles.

Core Principles for “Context Sensitive Solutions”

1. Strive towards a shared stakeholder vision to provide a basis for decisions.
2. Demonstrate a comprehensive understanding of contexts.
3. Foster continuing communication and collaboration to achieve consensus.
4. Exercise flexibility and creativity to shape effective transportation solutions, while preserving and enhancing community and natural environments.

Over time, practitioners have pinpointed several weaknesses to this traditional process. One significant drawback is that external contacts, critical for securing permits and approvals, may not be apparent until designs are 60% to 80% complete. Similarly, the process offers little opportunity to build public input (other than a few perfunctory, legally mandated public meetings) and develop consensus, especially early on when the purpose and need for projects are established and fundamental design choices are made. The result is a process sometimes referred to as “Decide, Announce, Defend.” Internal to the DOT, this process creates and sustains ‘silos’ that lessen the opportunity for the various planning, engineering, and construction disciplines to interact. The consequences for a state DOT include increased costs from design changes, delayed or halted projects, and frustrated stakeholders and DOT staff.

In contrast to these traditional approaches, applying the CSS principles leads to a decision-making process organized around the logical progression of the decisions that need to be made, rather than the technical functions of a state DOT. As a result, CSS emphasizes careful attention to up-front problem definition and stakeholder identification. This establishes a decision-making process that addresses environmental and community issues, and the lifecycle of infrastructure. Problem definition should engage many functional units and disciplines from within a state DOT, including long-range planners, right-of-way agents, construction managers, and maintenance units, as well as stakeholders from the community. This iterative process avoids the unpleasant discovery of ‘fatal flaws’ that require unanticipated, costly mitigation.

Following problem definition, planning agencies must develop evaluation criteria and identify potential solutions. This opens the discussion to a broader range of problems and alternatives, eliminating the tendency in many agencies to “default” to building more roadway capacity. Consensus building at these steps helps to effectively avoid conflicts and re-do loops later in the process. Early collaboration also helps stakeholders understand the constraints that transportation agencies may face in funding, right-of-way, or choice of mode technology so that stakeholders recognize that some of their wants are genuinely outside

the control of the agency.

Successfully applying this decision model requires communication and collaboration at each step. It also highlights the importance of using interdisciplinary teams throughout; no one discipline can move a project through any single step. A third critical piece is careful documentation of each step. This serves to support continuity over the long project development process, and gives those with direct professional responsibility for decisions protection should a decision be challenged later. Good documentation also contributes to improved project evaluation that enables the sharing of experiences across states and disciplines.

Recalibrating the transportation decision-making process from the traditional model to a CSS-driven model requires institutional change. Project managers must seek out the input of stakeholders and incorporate it into alternative solutions rather than relying solely on technical transportation analyses to generate alternatives. Also, agency management may need to reallocate resources to ensure that stakeholder engagement is meaningfully incorporated throughout the life of a project. Various functional units within the agency must have the opportunity to work across traditional boundaries. Processes should be evaluated to determine if they are transparent and intelligible to stakeholders.

Some DOTs have undertaken a wholesale rework of their project development process. Leaders in this regard are Massachusetts, Pennsylvania, and New Jersey. First issued in 2006, the MassDOT Project Development and Design Guide¹ incorporates CSS in three major ways:

- The project development process emphasizes better problem definition, more public outreach, and more early internal and external coordination
- Revised design controls, such as design speed and roadway type, toward controls that better reflect local context and project users, as well as respond to the unique character of Massachusetts communities and roadways
- Expanded flexibility in design, including a broader range of values, greater numbers of intersection, and spot treatments

A similar policy and guidebook was developed jointly by the New Jersey (NJDOT) and Pennsylvania DOTs (PennDOT). The Smart Transportation Guidebook² focuses strongly on the linkage between transportation and land use. The Guidebook also provides DOT staff with tools, including how to measure the success of a project using metrics that capture not only vehicular mobility and roadway safety elements, but also community character, environmental factors, cost effectiveness, and measures for alternative modes of travel.

While NCDOT has not to date developed a formal revision to its project development process to be more closely aligned with CSS principles, the Department's overall environmental stewardship policy adopted in 2002 incorporates CSS. That policy emphasizes balancing transportation needs with environmental needs, and ties that balance to supporting quality of life in our state. One environmental stewardship initiative is the Merger 01 process, a collaboration between NCDOT and natural resource agencies to streamline review and permitting actions.³ Merger 01 is an example of early and continuous collaboration designed to reduce delays and overall costs.

In December 2010, the NCDOT adopted a Public Art in the Right of Way Policy that seeks to integrate transportation into communities.⁴ This policy lays out a process for the Department to work with local communities and stakeholders to integrate public art installations on NCDOT rights of way. In the past, the Department was generally not receptive to such requests, but recently recognized that public art can be an important part of a community's overall economic development or tourism strategy, as well as contribute to positive community identity and cohesion. The public art policy is the first step towards developing a comprehensive landscape and aesthetics manual for NCDOT and offers new opportunities to enhance the aesthetics of a transportation facility by incorporating local values and meaning into the design.

The NCDOT Complete Streets policy is a further demonstration of the Department's efforts to understand and respond to community context and to strengthen their collaboration with local partners. Since July 2009 when the policy was formally adopted, NCDOT has been developing revised guidelines that will incorporate the needs of pedestrians, cyclists, and transit users. The guidelines are anticipated in 2011 and will represent a new state of practice in roadway design in North Carolina.

Endnotes

¹ Currently available at: <http://www.mhd.state.ma.us/default.asp?pgid=content/designguide&sid=about>

² <http://www.smart-transportation.com/guidebook.html>

³ "Planning and Environmental Linkages, Case Studies, North Carolina: Environmental Stewardship Policy." Currently available at: http://www.environment.fhwa.dot.gov/integ/case_ncarolina.asp

⁴ Currently available at: <http://www.ncdot.org/doh/preconstruct/altern/value/manuals/artpolicy.pdf>

A Commentary on the Effectiveness of Environmental Justice Efforts at the Federal Level and in North Carolina

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When environmental justice questions are asked of transportation infrastructure outcomes, the answers are usually given for individual projects. Responses rarely, if ever, highlight aggregate outcomes across wider geographies. The inclusion of environmental justice considerations into the planning of surface infrastructure projects is intended to ensure that the least powerful members of society do not bear a disproportionate burden of the endeavors. How well have communities around the nation and across North Carolina met this objective? Collectively, have project level outcomes supported this federal policy decision? Have legislative efforts benefitted the populations that they were intended to protect? These questions can neither be answered at the national level nor in North Carolina – but why?

It is widely held that environmental justice (EJ) emerged as a concept in the United States in the early 1980s growing out of the term "environmental racism." Coined by Dr. Benjamin Chavis, this phrase referenced the unjust siting of a hazardous materials waste site in a predominantly black and economically disadvantaged neighborhood in Warren County, N.C. Although this awakening occurred almost twenty years after the 1964 Civil Rights Act, it marked the birth of a new movement that focused attention on the inequitable distribution of environmental hazards across communities.

EJ is best defined as a question, rather than a statement – will racial minorities and/or the economically disadvantaged receive an equitable distribution of burdens

Historical Developments in Environmental Justice

1970: Passage of the National Environmental Protection Act (NEPA)

1971: Passage of the U.S. Code 109h of Title 23 (part of the Federal Aid Highway Act) that applies NEPA to highway planning

1994: President Bill Clinton signs his Executive Order 12898 for Federal Actions to address environmental justice in minority and low-income populations

1995: Implementation of the USDOT Environmental Justice Strategy

1997-1998: Initiation of USDOT Orders 5610.2 and 6640.23 to place President Clinton's executive order into operation

and benefits associated with projects compared to non-disadvantaged groups? In seeking to answer this question, President Bill Clinton laid out a directive in the 1994 Executive Order that serves as the measurement rubric:

“Each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.”

This mandate would be achieved by:

- Avoiding, minimizing, or mitigating high and adverse human health and environmental effects, including social and economic effects, on the aforementioned populations
- Ensuring the full and fair participation by all potentially affected communities in the transportation decision-making process
- Preventing the denial of, reduction in or significant delay in the receipt of benefits by minority and low-income populations

The Impacts on Transportation

One of the most important pillars of a modern economy is the ability to move goods and people as needed. When transportation systems are efficient, they provide economic and social benefits that result in positive multiplier effects such as better accessibility to markets, employment opportunities, and additional investments. When transport systems are deficient in terms of capacity or reliability, they pass along unnecessary economic costs to users.

Although transportation often yields several negative socioeconomic impacts, among the most noteworthy associated with EJ are mobility gaps and air and water quality degradation. Because of the expense associated with transportation facilities, they are often located on the cheapest lands, directly impacting minority and low-income families and communities in and near the right of way. Mobility gaps are likely to have substantial impacts on individuals' opportunities when the lack of income, time, means and access impair mobility choices. Furthermore, atmospheric emissions from pollutants and water contaminants produced by transportation modes can cause respiratory troubles and associated illnesses. This situation is particularly concerning given North Carolina's strained infrastructure, dramatic population growth, and racial as well as socioeconomic trajectories.

Demographic Trends

Like many southern states, North Carolina has experienced tremendous growth in recent years, including a 42% increase in population in the last decade. Despite

the current national economic downturn, the state has also experienced sustained growth in vehicle miles traveled and economic output since 1990. This growth is expected to continue: the state's population will likely increase to 12.2 million by 2030 from its current 9.4 million, putting strain on the existing transportation network and necessitating new capacity improvements. How will the burdens and benefits of these investments radiate across North Carolina's communities, particularly those that are socioeconomically constrained and racially diverse?

Poverty in North Carolina knows no racial boundaries although some groups are affected more starkly than others. Data from the Pew Hispanic Center and the UNC School of Law-based Center on Poverty, Work & Opportunity indicate that poverty affects 17% of all North Carolinians but 24%, 25%, and 27% of the state's Native American, African American, and Hispanic populations, respectively. Therefore, almost one fifth of our citizens, or about 1.6 million people, are particularly vulnerable to the disproportionate negative impacts of transportation plans. EJ policy could significantly alter transportation outcomes to avoid harm to these communities and even bestow benefits. Unfortunately, no individual or organization has seriously assessed the outcomes of EJ policies within our state since the concept entered the national consciousness in the mid-1990s.

Assessment of Environmental Justice Outcomes

Very little research exists that examines if EJ policy concerns are being adequately addressed. The Environmental Defense Fund's annotated bibliography of EJ publications, last updated in 2003, highlights the paucity of recent research. Most of the work was completed in the mid-1990s and had little focus on transportation outcomes. A search of the Michigan State University Extension program's Environmental Justice Web Database returned zero documents when the key term "transportation" was used to filter a 550 document database. In addition, the renowned Environmental Justice Resource Center at Clark Atlanta University has an annotated bibliography last updated in 1998 with only one document specifically addressing transportation as it relates to environmental justice.

The Federal Highway Administration (FHWA) provides no national comprehensive data on the effectiveness of programs aimed at stemming environmental injustice in transportation projects. FHWA only highlights project-level case studies; even then, no new case studies have been provided since 2000. Their annotated bibliography for community impacts and environmental justice does not indicate any comprehensive analysis by either FHWA or the academic community in the last decade. The most comprehensive case study is very outdated – the *Case Study of Socio-Economic and Environmental Justice Issues Associated with Off-site Wetland Mitigation* (completed 1997) – and is not even transportation related. Additionally, no readily available data can be found for transportation projects and EJ issues in North Carolina.

The Environmental Protection Agency (EPA), as a federal partner integral to the EJ policy determination process, has not produced a review of the effectiveness of their undertakings. As the arbiters of unacceptable human health impacts, the EPA is ready to mark 20 years since the passing of President Clinton's executive order even though their own 2006 Office of the Inspector General report noted that the EPA has not consistently performed EJ reviews of programs, policies, and activities and no agency-wide guidance exists for a program or policy review. Furthermore, an April 2009 Government Accountability Office (GAO) report regarding EJ across all federal agencies notes that concerns have not been prominently considered.

Conclusions and Suggestions

The year 2014 will mark 20 years since President Clinton's Executive Order and 50 years since the passage of the Title VI components of the Civil Rights Act. Ought we not to stop and analyze what has transpired across the nation and at the state level? According to Mervyn Tano, President of the International Institute for Indigenous Resource Management, environmental protection laws and policy are based largely on science. The scientific

issues related to the distributive aspects of environmental protection policy are extremely complex and require analytical and technical capabilities not typically found in environmental justice organizations. The organizations that do have the capacity to analyze EJ outcomes are also the entities that have promulgated the relevant laws and policies – the EPA and FHWA – and they should consider investigating their outcomes.

An emerging trend as we enter the second decade of the new millennium is the submergence of environmental justice under the equity components of sustainability discourses. This presents serious problems since we have failed first and foremost to understand environmental justice as a free standing issue. An opposing viewpoint suggests that there is no need to further investigate the outcomes of the environmental justice and transportation nexus and that transportation no longer negatively impacts disadvantaged groups. If that is the case, where is the data to support this viewpoint and what is the next step?

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