



# BEYOND THE BYPASS:

## Addressing Rural North Carolina's Most Important Transportation Needs



The Southern Environmental Law Center is a nonprofit organization dedicated to protecting natural resources and public health in the South. SELC works with more than 100 local, state and national groups, providing legal and policy expertise on issues related to transportation, land use, air quality, water quality, forests and wetlands. This report is part of SELC's Land and Community Project, which promotes smart growth, transportation choice, community revitalization, open space conservation and reduction of motor vehicle pollution, including greenhouse gas emissions.

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# INTRODUCTION

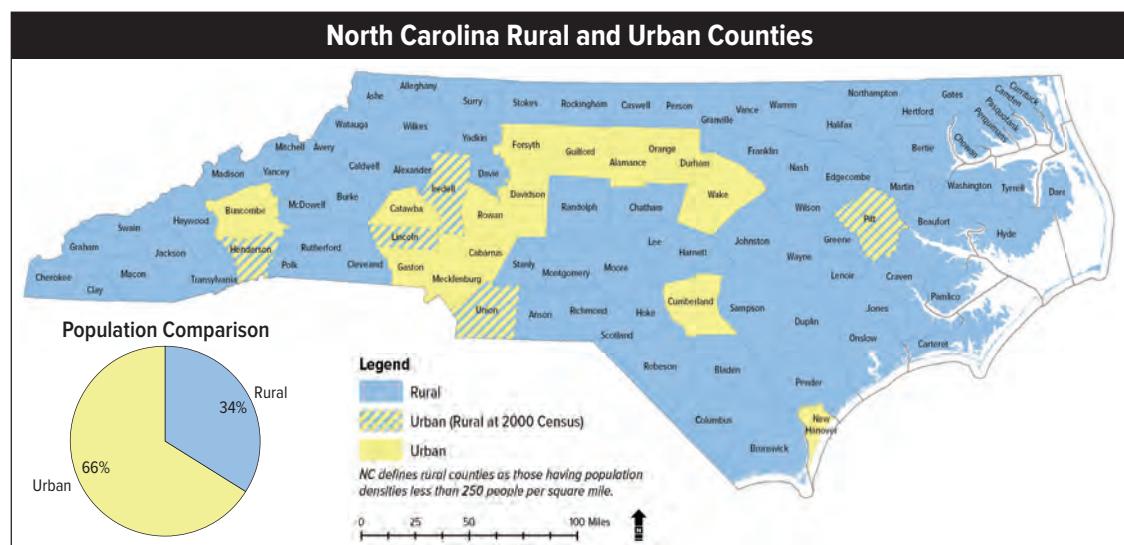
Rural North Carolina is home to more than a third of the State's population<sup>1</sup> and is vital to our overall economy and quality of life.<sup>2</sup> Unfortunately, decades of transportation spending priorities have failed to meet the needs of our rural areas, or North Carolina as a whole.

Rural communities have not been well served by the traditional emphasis on building new road capacity, including four-lane highways and bypasses, often where there is almost no demonstrated transportation need or economic payoff from those investments.

## An Opportunity to Refocus

Now is a particularly good time to revisit rural transportation policy in North Carolina. The latest draft of North Carolina's Long Range Transportation Plan—the first update since 2004<sup>3</sup>—has just been released for public review. The draft plan suggests spending in the range of \$94 billion to \$160 billion over the next 30 years,<sup>4</sup> but anticipated revenue is significantly less, only \$54 billion in available funds.<sup>5</sup> It is no secret that rural North Carolina has struggled in recent years to develop new economic opportunity, and transportation investments have been a major part of that discussion. But with only a small fraction of the dollars needed to build all the proposed projects across the State, how do we make the best use of available funding?

According to recent NCDOT transportation performance measures, our existing roads are not safe enough or in good enough condition.<sup>6</sup> Still, the State continues to spend more on new capacity than keeping our existing infrastructure safe and in good repair.<sup>7</sup> New road capacity is not needed for most of our rural areas and small towns. Bypasses, in particular, do not meet the needs of these areas and are often harmful. Rather, North Carolina should make rural safety a priority, focus highway spending on maintenance and repair, move beyond building new highways and bypasses, and provide

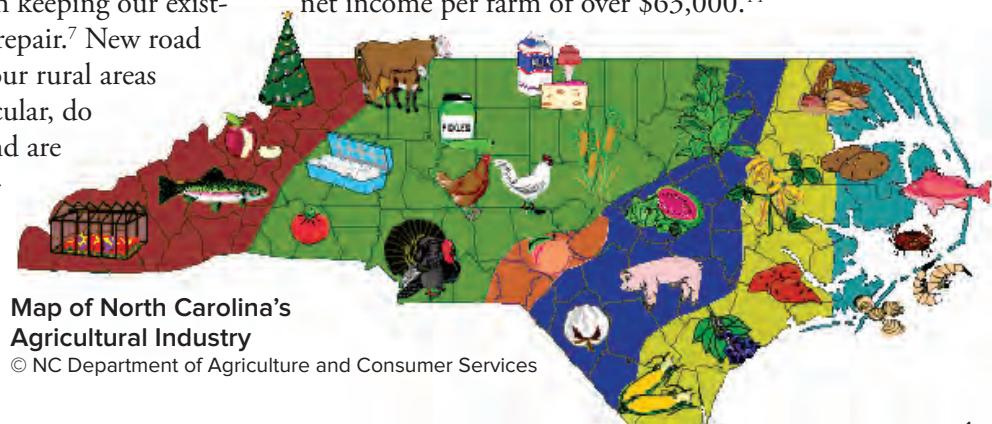


enhanced local and long-distance mobility. Each of the topics outlined above are discussed in the following four sections of this report.

## Profile of Rural North Carolina

To put the report in context, a brief overview of rural North Carolina is in order. The one-third of North Carolinians who continue to reside in rural areas<sup>8</sup> is two times the average for the United States as a whole.<sup>9, 10</sup> And, while five of our counties lost their “rural” status in the last census, the vast majority of our counties remain rural.<sup>11</sup>

Rural North Carolina is well known for the number of important commodities it produces. The State's farms are a significant source of the food, energy and fiber that help drive the North Carolina economy.<sup>12</sup> According to the North Carolina Department of Agriculture and Consumer Services, “North Carolina's agricultural industry, including food, fiber and forestry, contributes \$70 billion annually to the State's economy, and accounts for 18% of the State's income, and employs over 17% of the work force.”<sup>13</sup> The State ranks high in the nation for farm profits, with a net farm income of \$3.3 billion and a net income per farm of over \$63,000.<sup>14</sup>



# MAKING SAFETY THE TOP PRIORITY

## Dangerous Rural Roads Necessitate a Pragmatic Safety Agenda

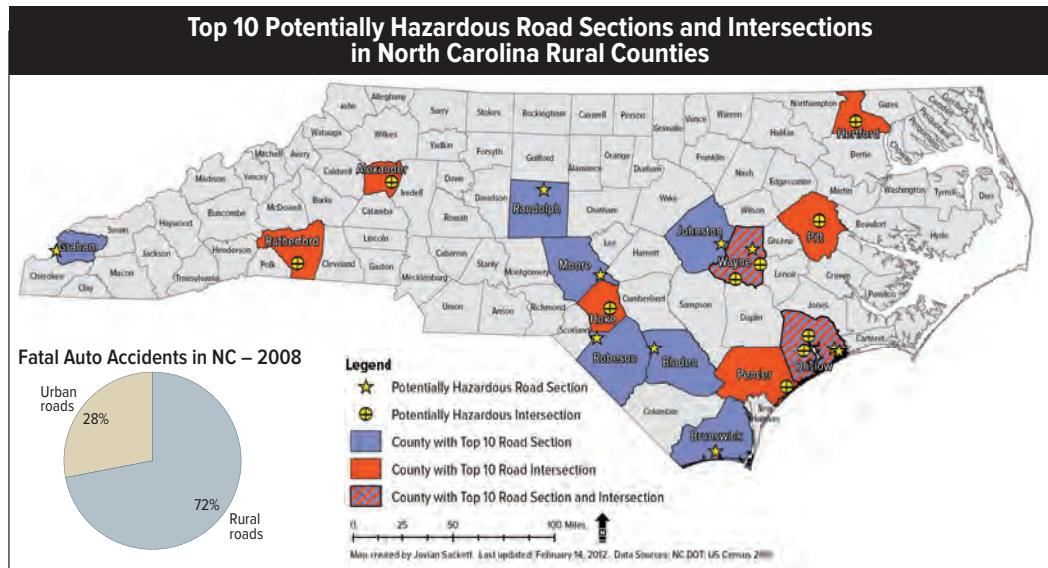
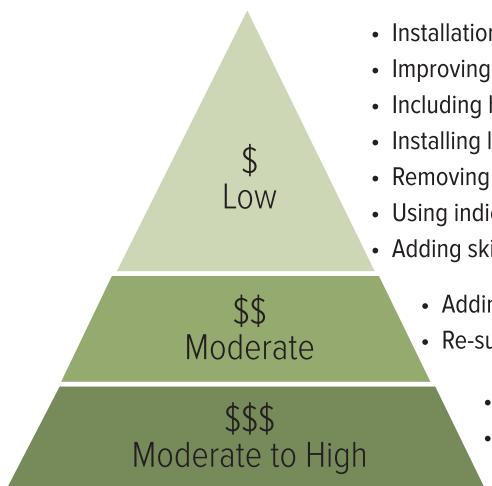
In its 2009 report to the General Assembly, the 21st Century Transportation Committee recommended coordinated efforts to reduce the frequency and severity of accidents and injury on North Carolina's secondary rural roads.<sup>15</sup> At the time, accidents on these roads accounted for 34% of all fatal accidents in the State.<sup>16</sup> The number is even more alarming if all rural roads are included. While rural residents account for only a third of our population, almost three quarters of fatal accidents in North Carolina occur on rural roads.<sup>17</sup>

More recently, as a part of the Highway Safety Improvement Program, NCDOT ranked the 200 most hazardous road sections and intersections in North Carolina based on a variety of factors.<sup>18</sup> More than half were rural.<sup>19</sup> The map above shows where the top ten most hazardous rural road sections and intersections are located.<sup>20</sup>

## Rural Accidents Causes and Solutions

A recent AAA study reported that motor vehicle crashes remain the single largest cause of death of people between the ages of 5-34.<sup>21</sup> Each year, law enforcement reports that motor vehicle crashes result in thousands of deaths and millions of injuries.<sup>22</sup> In addition to human lives lost, the cost of crashes per person is even larger for smaller populations.<sup>23</sup>

- Installation of rumble strips
  - Improving signage and pavement/lane markings
  - Including higher levels of retro-reflectivity
  - Installing lighting
  - Removing or shielding roadside obstacles
  - Using indicators to show roadway alignment along curves
  - Adding skid resistant surfaces at curves and adding guardrails
- 
- Adding turn lanes at intersections
  - Re-surfacing pavements and adding median barriers
- 
- Improving roadway alignment
  - Reducing the angle of curves and adding or paving shoulders



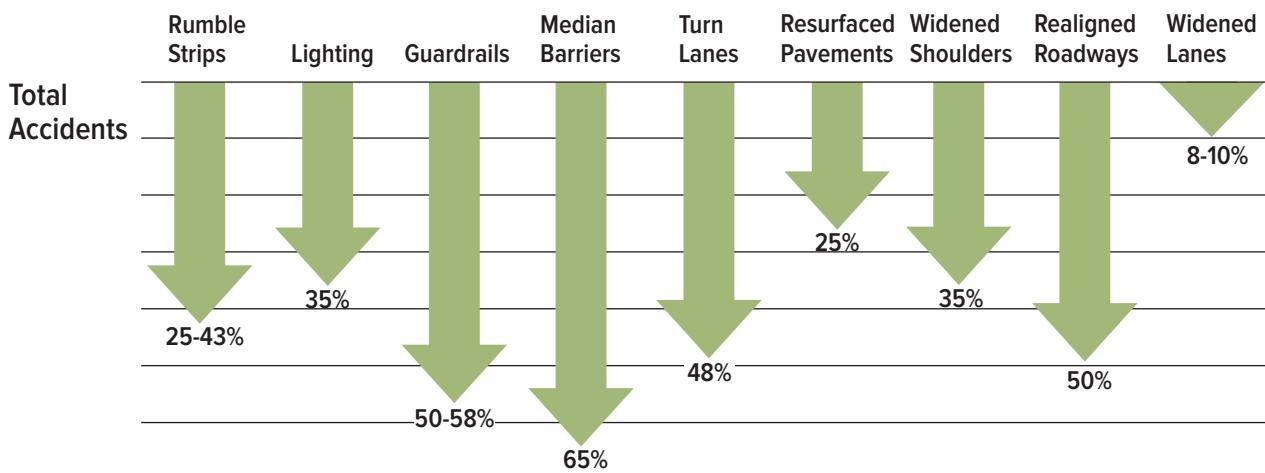
The reasons for higher fatalities on rural roads are varied.<sup>24</sup> Regardless of cause, simply building a bypass in the vicinity of a hazardous rural road does not result in an increase in safety on the existing route, which will remain in use by the local population.<sup>25</sup> And while fatality rates from accidents are declining across the country, they are not declining as quickly for rural areas.<sup>26</sup>

Many rural roads still lack appropriate safety features and experience crash rates far higher than all other roads and highways.<sup>27</sup> Rural roads' higher traffic fatality rates are due to inadequate roadway safety design, including narrow lanes, limited shoulders, sharp curves, exposed hazards, pavement drop-offs, steep slopes and limited clear zones along roadsides.<sup>28</sup> Additional factors include longer emergency response times and higher rates of speeds traveled on rural roads.<sup>29</sup>

## Cost of Safety Improvements

Many safety improvements are inexpensive, especially relative to new highways, but save a great deal in costs to society. In a recent study of improving signage for curves on local roads, one rural county spent \$79,260 to upgrade signs and estimated a savings of \$12 million to \$23 million in avoided accidents.<sup>30</sup> In a cost-benefit

## Reduction in Rural Crash Rates/Fatalities Due to Road Safety Improvements



analysis of adding median barriers to reduce crossover crashes, the net societal benefit of adding the barrier was determined to be \$420,000 annually.<sup>31</sup> Fortunately, design improvements like these come at several price points.

Relatively inexpensive improvements run in the hundreds to thousands of dollars range per location. They include installation of rumble strips along the centerline and sides of roads, improving signage, improving pavement/lane markings,<sup>32</sup> increasing levels of retro-reflectivity,<sup>33</sup> installing lighting, removing or shielding roadside obstacles, using indicators to show roadway alignment along curves,<sup>34</sup> adding skid resistant surfaces at curves and adding guardrails.<sup>35, 36</sup>

Moderate to high cost improvements run in the thousands to hundreds of thousands dollars range at each site. They include adding turn lanes at intersections, resurfacing pavements<sup>37</sup> and adding median barriers.<sup>38, 39</sup> Other somewhat more expensive improvements include improving roadway alignment,<sup>40</sup> reducing the angle of curves and adding or paving shoulders.<sup>41</sup>

All these upgrades can significantly lower crash and fatality rates.<sup>42</sup>

### The State Should Prioritize Safety Improvements over Costly New Construction

In addition to saving lives, safety improvements are great investments because they are far less costly than new construction projects. To make all identified highway safety improvements for the next 30 years,

N.C. would only need to spend \$2.5 billion,<sup>43</sup> which is less than the current operating budget of the DOT for a single year. In contrast, the current plan is to spend three to four times as much on costly expansions of uncongested roads in our rural areas.<sup>44</sup>

# FOCUSING HIGHWAY SPENDING ON MAINTENANCE AND REPAIR

## Prioritize Infrastructure Health Through Maintenance of Existing Roads

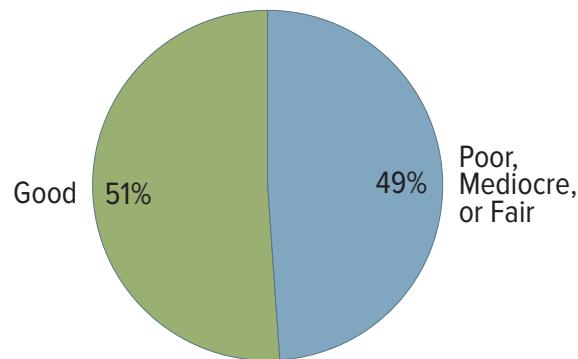
There are many more rural road miles to maintain than urban road miles in North Carolina.<sup>45</sup> In fact, North Carolina has the second largest state road network in the country,<sup>46, 47</sup> just smaller than Texas. Unfortunately, rural roads in North Carolina are not in the best condition, with 49% rating as fair, mediocre or poor.<sup>48</sup> There are two major cost savings that can be achieved by placing a greater emphasis on maintenance: first, we avoid the much higher long-term cost to the DOT of deferring maintenance, and second, we avoid the costs to consumers from wear and tear on vehicles.

Reconstructing roads is far more expensive than maintaining the ones we have.<sup>49</sup> In fact, one study suggests that rebuilding a road is four to ten times the cost of keeping the road in good repair.<sup>50</sup> With limited funding, it is particularly unwise to let our current roads and bridges fall into disrepair. We should not use scarce resources on unneeded new capacity when the existing infrastructure can be maintained at far less cost.

Also, poorly maintained roads cost North Carolina drivers an estimated \$1.7 billion each year in extra vehicle repairs and operating costs. This is about two times the current NCDOT annual maintenance budget.<sup>51</sup> The annual spending necessary to bring all roads up to par over the next 30 years would pay for itself in deferred vehicle maintenance alone.<sup>52</sup>

To see the enormity of the funding distribution issue, we can look to North Carolina's modal needs assessment for the 30-year planning period. Transportation modes are evaluated for how well they are doing in terms of mobility, safety and health across modes, on statewide and regional tiers. The chart on the top of the next page shows that the only areas currently performing at a high level of service<sup>53</sup> are highway expansions for some catego-

### Condition of Rural Roads



ries. New highway capacity is already performing more than adequately, but safety and infrastructure health are suffering.<sup>54</sup> While the entire State would benefit from a shift in spending away from highway expansion and toward safety and maintenance of our infrastructure, this is particularly true for rural areas.

## Prioritize Infrastructure Health Through Bridge Maintenance and Repair

Even if the useful life of bridges can be extended by performing routine maintenance, more costly repairs will be needed later for bridges to remain operable.<sup>55</sup> North Carolina already ranks high in the nation for deficient rural bridges<sup>56</sup> and, as the "Deficient Bridges in North Carolina" map illustrates, many of North Carolina's rural counties have a significant number of bridges that are in very poor condition.<sup>57</sup> As the State maintains almost all of our bridges, the majority of which are rural, increased focus on maintenance and repair can result in safer bridges in rural areas in particular.<sup>58</sup>

Keeping bridges in good repair in rural areas will promote both safety and getting crops to market. Deficient bridges reduce agricultural efficiencies, as heavy equip-

### Comparison of NC Rural Road Mileage to Urban Road Mileage

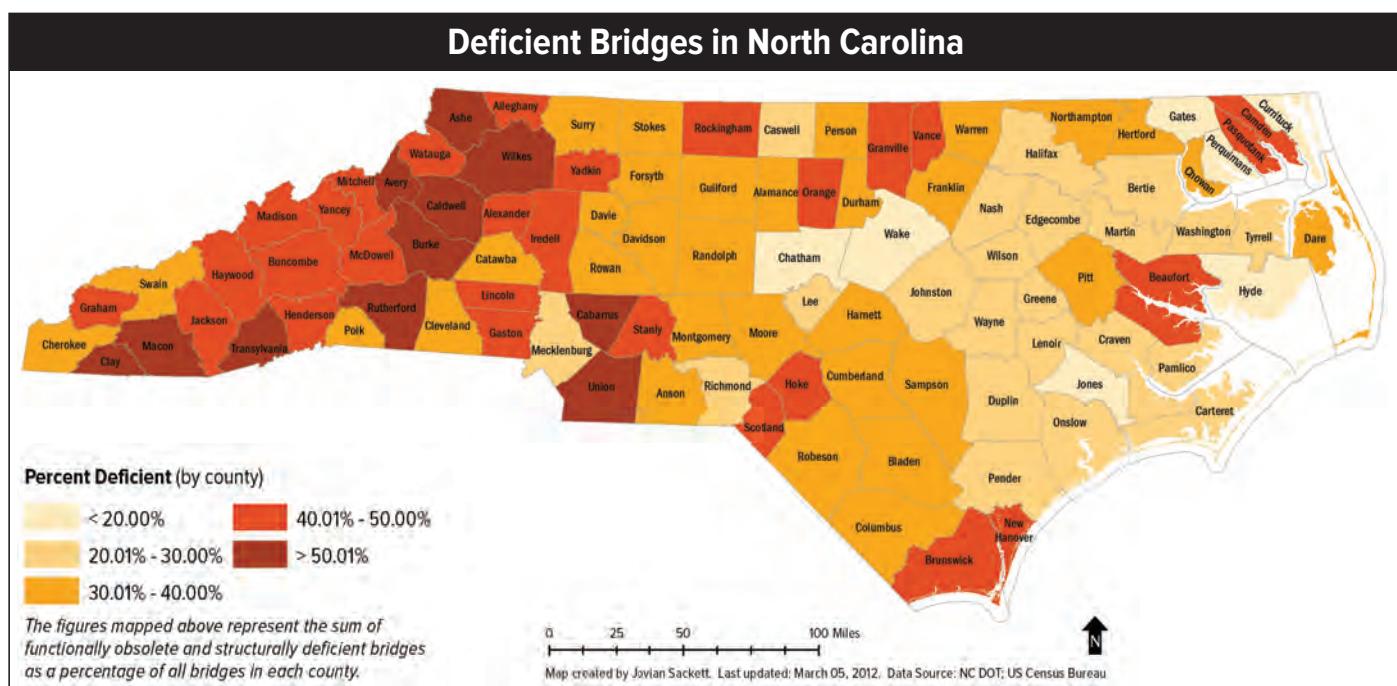
Rural mileage	75,561.15
Urban mileage	33,412.48

## 2011 North Carolina Highway Performance Rating

	Highway operating at Level of Service A
	Highway operating at Level of Service B
	Highway operating at Level of Service C
	Highway operating at Level of Service D

Mode/Sub-Mode	Investment Goal	NCMIN Tier	LOS A	LOS B	LOS C	LOS D
Highways – Bridges	Health	Statewide				
		Regional				
		Subregional				
Highways – Pavement	Health	Statewide				
		Regional				
		Subregional				
Highways – Roadway Maintenance	Health	Statewide				
		Regional				
		Subregional				
Highways – Safety	Safety	Statewide				
		Regional				
		Subregional				
Highways – Modernization	Health	Statewide				
		Regional				
		Subregional				
Highways – Expansion (Nonmetro)	Mobility	Statewide				
		Regional				
		Subregional				
Highways – Expansion (Metro)	Mobility	Statewide				
		Regional				
		Subregional				
Highways – ITS	Mobility	Statewide				
		Regional				
	Health	Statewide				
		Regional				

ment may need to be rerouted to avoid bridges with weight restrictions. A recent report by the USDA found that an effective transportation system supports rural economies, reducing the price farmers pay for seeds and fertilizers, and raising the value of crops.<sup>59</sup>



# MOVING BEYOND THE BYPASS

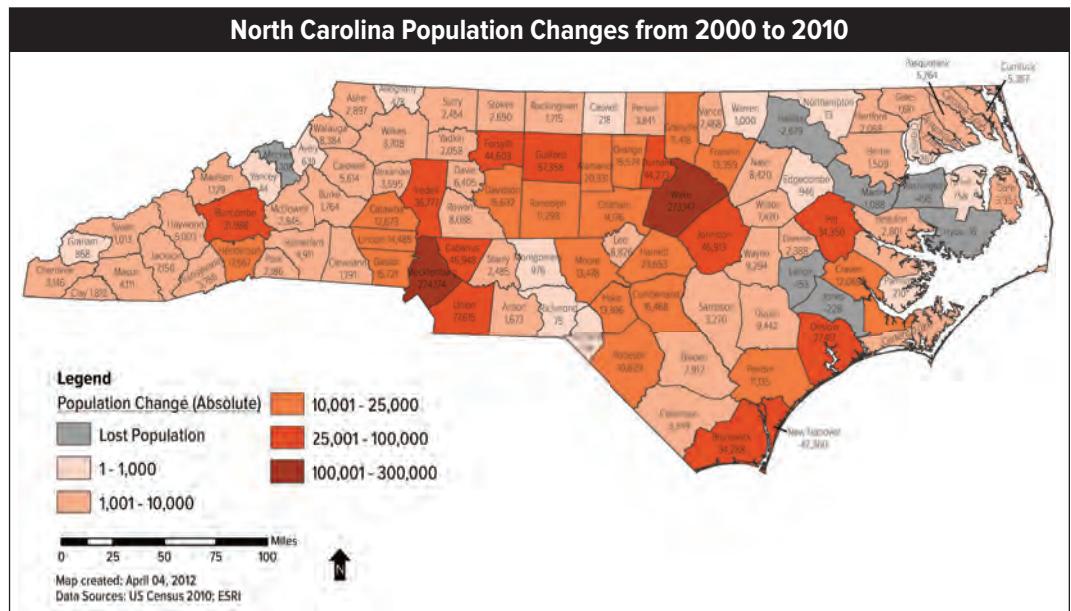
In shifting spending toward safety, maintenance and repair, North Carolina must reconsider how much it can afford to spend on four-lane highways and bypasses in rural areas. Bypasses have been promoted for rural areas as infrastructure projects that can enhance mobility,<sup>60</sup> improve economic growth<sup>61</sup> and increase safety.<sup>62</sup> But transportation studies that analyze the effects on communities being bypassed<sup>63</sup> show that, for rural areas, bypass construction more often impedes each of these desired goals or is usually neutral, at best. Influenced by the Highway Trust Fund project list,<sup>64</sup> North Carolina is poised to spend \$8.4 billion on bypasses and other four-lane highways in rural North Carolina over the next 30 years.<sup>65</sup> These projects should be reconsidered on a case-by-case basis.

## Congestion Levels Do Not Justify the Expense of Bypasses

Bypasses are often recommended for the stated purpose of enhancing mobility through congestion reduction. But congestion is not a significant issue for most of North Carolina. Already, 88% of roads in North Carolina's strategic corridor system have little or no recurring congestion.<sup>66</sup> Also, the rate of population growth in rural North Carolina is far less than that of urban areas, with several rural counties even losing population.<sup>67</sup> Expensive new-capacity bypasses are not needed to provide congestion relief in the vast majority of our rural areas.

## Negative or Neutral Economic Impact of Bypasses

The often-stated expectation of economic benefit is not borne out by studies on bypasses. In a national survey of businesses that rely on drive-by customers, 49 percent of

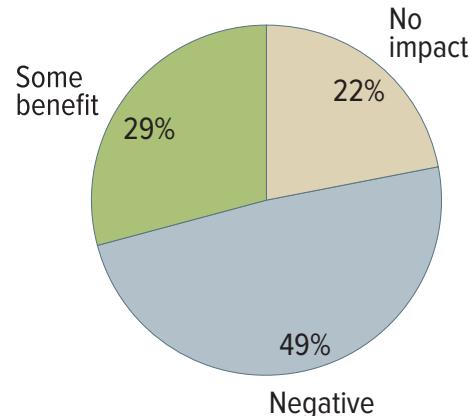


the firms reported negative impacts from bypass construction and 22 percent reported neither positive nor negative net benefits.<sup>68</sup> On average, retail sales decrease when a bypass is built around a community.<sup>69</sup> A National Cooperative Highway Research Program (NCHRP) study of DOTs in 47 states amplifies the potential for economic harm to rural areas, showing traffic-serving businesses along the bypassed route were most likely to be hurt by a bypass.<sup>70</sup> Retail businesses that cater to pass-through traffic, such as gas stations and fast food restaurants, are the most likely to be affected by reduced traffic.<sup>71</sup>

The distance from the bypass to the downtown of the bypassed community is an important factor in measuring negative implications of these projects. Generally, studies show that bypasses farther away from existing downtowns make it hard for travelers to see and access existing businesses.<sup>72</sup> Understandably, public opposition to bypasses correspondingly increases the greater the distance the bypass is from downtown.<sup>73</sup>

Whether or not the bypass is part of a high-speed freeway is also a factor in the economic harm associated with these roads. A recent study has shown that it

## Survey of Bypass Impacts on Traffic-Serving Business



is especially difficult to divert traffic from a bypass to a downtown area from high-speed routes.<sup>74</sup>

Smaller towns are far more likely to be hurt by bypasses<sup>75</sup> and find it harder to jump through the extensive hoops necessary to protect existing businesses, which are unlikely to relocate along the new route.<sup>76</sup> To address this issue, many communities are encouraged to extend their political boundaries to include the land near a new bypass. This may necessitate providing adequate water, sewer and additional roadway structure for development near the bypass.<sup>77</sup> If they fail to do this, they will be forced to restrict development along the bypass while their downtown businesses suffer from the loss of pass-through traffic, resulting in reduced income. Moving away from bypass construction in rural and small-town North Carolina will avoid this economic Catch-22.

### **Minimal Safety Improvements from Bypasses**

The safety justification of bypasses is also often unwarranted. Researchers found that accidents on bypassed routes, after going down for a short time, actually increased, and did not decrease to pre-existing levels or below until four or five years had passed.<sup>78</sup> In that same study, residents surveyed believed that local pedestrian safety was improved by bypass construction, but the data did not show an actual improvement in pedestrian safety due to the bypass construction.<sup>79</sup>

#### **Expecting big safety improvements from a bypass? Not likely.**

Rather than concentrate on a bypass for safety outcomes, a much more cost-efficient and results oriented approach is providing spot safety improvements in the most dangerous areas of the corridor. In the 2011 NCDOT study of the US 70, Havelock Bypass in eastern North Carolina, S.T.I.P. ID No. R-1015, one of the proposed goals of the project is to improve safety. The bypass, however, has not been shown to significantly advance that purpose relative to other potential investments. It would only remedy one of the four most dangerous intersections along US 70 in the county. The other three intersections would remain unaddressed.

Already, the DOT plans to create a flyover at the Slocum Road intersection of US 70. This area tops the list of dangerous intersections in the county. The problems there can be mitigated by the proposed flyover at a cost of \$15.6 million, far less than the \$157 million Havelock Bypass.

# ENVISIONING ENHANCED MOBILITY IN RURAL AREAS

Rural North Carolina continues to struggle with unmet mobility and economic development needs. Some have suggested commuting across multiple counties by car, for rural residents to access jobs. Studies show, however, that roads alone do not result in greater economic opportunity for those residents.<sup>80</sup> Since providing additional road capacity for rural areas is not necessary for congestion or useful as a driver of economic development, limited transportation resources should be spent on other needs.

## Unmet Mobility and Access to Economic Opportunity Needs in Rural Areas

Expanding affordable mobility options in rural North Carolina can make a difference for these citizens in getting, and keeping, employment.<sup>81</sup> Rural residents are more likely to face longer commutes to work.<sup>82</sup> Rural residents also make less money<sup>83</sup> than urban dwellers and thus have less money to spend on gas.<sup>84</sup> Lack of affordable transportation, then, becomes a barrier to work access<sup>85</sup> and prosperity.

In addition, rural areas have large elderly and minority populations, who are most likely to be negatively impacted by lack of mobility options.<sup>86</sup> Elderly residents, in particular, are less likely to spend time with others or to get the medical and social services they need without alternatives to solo driving.<sup>87</sup>

Also, walking and biking infrastructure is less prevalent in rural communities compared to the urban centers, despite a strong local demand for these facilities.<sup>88</sup> In addition to enhancing mobility, biking, walking and trail infrastructure projects create more jobs per dollar than highway projects.<sup>89</sup>

Increasing affordable transportation choices in our rural communities can give residents better access to jobs, health care and provide incentives for economic development.<sup>90</sup> Expanded mobility options, such as commuter bus, local transit, para-transit,<sup>91</sup> small scale transportation enhancement projects and broadband can all help to create greater prosperity and an improved quality of life for rural residents.

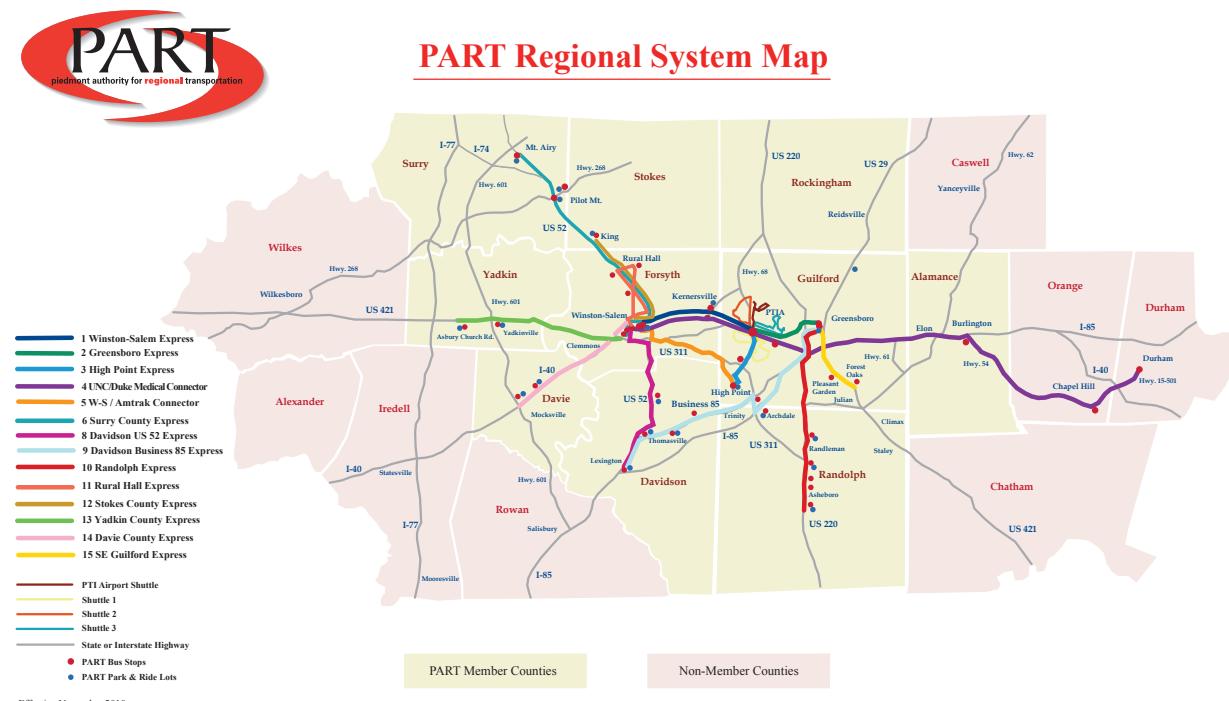
## Meeting Rural Mobility Needs

Regional Planning Organizations<sup>92</sup> (RPOs) and the DOT can place increased emphasis on meeting unmet transit needs rather than continued highway expansion.<sup>93</sup> In 2007, NCDOT itself recommended a 124% increase in its rural public transportation system service.<sup>94</sup> Instead of building costly bypasses, North Carolina should make it a higher priority to provide additional funding for rural transit which can match available federal and local funds. Localities can also choose to raise revenue specifically for transit through use of the transit tax measure that was codified as a part of the State's 2009 Intermodal bill.

## Commuter Bus Service

Transit funding can support expanding commuter bus service from rural areas to urban area employment

## PART Regional System Map



centers. Commuter bus service provides much needed, less costly transportation to employment for workers who do not have access to a personal vehicle or who live too far from industry centers to make traveling alone cost-effective. Successful services such as those provided by the Piedmont Authority for Regional Transportation (PART) offer valuable transportation options to the residents of the Piedmont Triad area. In 2009, the PART Express bus system supplied 544,061 passenger trips<sup>95</sup> to workers, including those in rural areas, and has been growing in use since its establishment in 1997.<sup>96</sup> PART has a broad reach throughout central North Carolina, serving 18 counties spanning a distance of 85 miles north to south and almost 170 miles west to east.

### Para-transit

Transit expansion also should include para-transit, in particular because the growth of the elderly population is pronounced in rural North Carolina.<sup>97</sup> Used for social services access and daily living needs, para-transit is primarily intended to serve the disabled and older adults. It provides the affordability of transit, the convenience of a taxi and specialized accessibility features to accommodate wheelchairs and physical disabilities. Advancements in technology have made scheduling trips more efficient and have improved driver knowledge of passenger needs.<sup>98</sup>

**Rural Broadband Service.** Broadband service for rural North Carolina can enhance the use of para-transit and transit, as well as provide additional benefits of supporting e-commerce and telecommuting. To realize the benefits of broadband in rural areas, the NCDOT should support changes to state and federal laws to allow transportation spending flexibility to include broadband as part of the mix. NCDOT can also encourage rural and small towns to seek grant funding toward acquiring broadband service.

**Community Transportation Enhancements.** Transportation enhancements are transportation projects including, but not limited to, biking and walking facilities, acquiring scenic or historic sites, historic preservation and rehabilitation or operation of historic transportation buildings, structures or facilities.<sup>99</sup> These projects, designed to maximize the potential of transportation to enhance communities,<sup>100</sup> efficiently move

people, improve local economies and tourism, enhance the environment and create community gathering places.<sup>101</sup>

Already, rural communities receive twice the amount of federal funds as urban areas receive for these types of transportation enhancements.<sup>102</sup> North Carolina can capitalize on the demand for more walkable, bikeable rural communities by providing enhancements to support those activities. To continue meeting that demand, North Carolina should specifically set out to plan for more sidewalks, bike lanes and trails in rural areas to support locals and tourists alike.



# SUMMARY

New highway capacity in our rural areas is seldom a formula to attract new industry in a 21st century global economy, and 20th century funding priorities must be revisited. North Carolina cannot afford to spend billions on unneeded new highways and bypasses with so many unmet, more pressing rural needs for mobility and access to opportunity. By coordination on both the regional and statewide levels, we can better satisfy the interests of both urban and rural residents.<sup>103</sup>

Rather than spending hundreds of millions on projects like widening US 64 in rural Dare County (see text box), a new vision is called for to meet the unique transportation needs of rural North Carolina. Safety improvements, highway maintenance and bridge repair should be the primary transportation priorities for rural areas. The needs of rural residents, including a disproportionate portion of our elderly, less affluent, and minority populations also would be better served by expanding commuter bus, para-transit, broadband to support these services and investing in community transportation enhancements.

## Small Communities Threatened By Expensive, Unnecessary Highway Projects

A proposed highway widening in rural eastern North Carolina (US 64 Improvement Project, Dare County, NC, TIP Project No. R-2544 and R-2545), illustrates the distorted funding priorities that result from North Carolina's Highway Trust Fund project list. NCDOT intends to spend over \$350 million on a project that serves no demonstrated purpose other than completing a plan conceived in 1989 to construct a massive network of four-lane highways and bypasses throughout the State. Understandably, the small community of East Lake is alarmed at "being wiped off the map" by the project.

"Widening US 64 threatens the East Lake community" by Catherine Kozak, Island Free Press, March 28,2012. <http://islandfreepress.org/2012Archives/03.28.2012-WideningUS64ThreatensTheEastLakeCommunity>

## Summary of recommendations:

- As the highest priority, North Carolina should address the compelling safety needs on our rural roads by devoting \$2.5 billion to complete a range of relatively low-cost safety improvements over the next decade.
- The second highest priority is to ensure adequate funding—doubling current spending—to maintain our rural roads and bridges, which will save money for both the DOT and consumers in the long run.
- We must reconsider proposals from a generation ago to spend over \$8 billion on expensive rural and small town four-lane highways and bypasses, which often lack a demonstrated transportation need and hurt local businesses.
- We can improve local mobility and long distance access to economic opportunity for rural areas by investing in commuter bus, para-transit, broadband and community transportation enhancements to meet the unique transportation needs of rural North Carolina.

# ENDNOTES

- <sup>1</sup> American Association of State Highway and Transportation Officials (AASHTO). *Transportation Reboot: Connecting Rural and Urban America*. Aug. 2010. p. 4. [http://expandingcapacity.transportation.org/connecting\\_communities/images/Connecting\\_Communities\\_0810.pdf](http://expandingcapacity.transportation.org/connecting_communities/images/Connecting_Communities_0810.pdf).
- <sup>2</sup> Vanderberry, Herb. *North Carolina Agriculture Overview*. NC Dept. of Agriculture & Consumer Services, Agricultural Statistics Division, 13 Sept. 2011. <http://www.ncagr.gov/stats/general/overview.htm>.
- <sup>3</sup> Atkins. *North Carolina Statewide Transportation Plan: 2040 Plan Report*. Draft Version 2. NCDOT, Mar. 2012. pp. 1, 30, 34. [http://www.ncdot.gov/download/performance/2040\\_DRAFTPlan.pdf](http://www.ncdot.gov/download/performance/2040_DRAFTPlan.pdf).
- <sup>4</sup> *Ibid.* (\$94.13 billion is required to maintain the system at current level of service (LOS) C, \$130.39 billion is required to reach LOS B, and 159.53 billion is required to reach LOS A.)
- <sup>5</sup> *Ibid.*, p. 23.
- <sup>6</sup> Atkins. *North Carolina Statewide Transportation Plan: System Inventory and Modal Needs*. Draft Report. NCDOT, Dec. 2011. Executive Summary, Table ES-2, p. x. Print.
- <sup>7</sup> NCDOT, Finance and Budget page, accessed April 23, 2012. <http://www.ncdot.gov/about/finance/>.
- <sup>8</sup> AASHTO, p. 4. (In fact, as many as 3.2 million people, or up to 34% of the population, are rural.)
- <sup>9</sup> TRIP: A National Transportation Research Group. *Rural Connections: Challenges and Opportunities in America's Heartland*. National Information and Reports. Sept. 2011. Executive Summary, p. 1.
- <sup>10</sup> AASHTO, p. i. (Approximately 50 to 60 million Americans living in small communities and rural areas account for 17% to 20% of the United States population.)
- <sup>11</sup> Gray, Jason. "North Carolina Rural Data Bank: Custom Data Search." *NC Rural Economic Development Center, Inc.* Select: Rural/Urban; Rural; Add; All; Land Area; Add; Submit Data Search. (Most of the state's 100 counties, 85 at the time of the 2000 census, 80 at the time of the 2010 census, are rural, and at least 41,485 of North Carolina's 48,711 square miles of total land area are considered rural.)
- <sup>12</sup> *North Carolina Agriculture Overview*.
- <sup>13</sup> *Ibid.*
- <sup>14</sup> *Ibid.*
- <sup>15</sup> 21st Century Transportation Committee (21CTC). *Final Report to the 2009 General Assembly of North Carolina. 21st Century Transportation Committee – 2007*. North Carolina General Assembly, 10 Dec. 2008. p. 10. Print.
- <sup>16</sup> *Ibid.*
- <sup>17</sup> TRIP, p. 5. (North Carolina ranks third in nation in the total number of rural non-Interstate traffic deaths in 2009.)
- <sup>18</sup> Lowry, Stephen, et al. *2011 North Carolina Highway Safety Improvement Program*. HSIP Detailed Reports. NCDOT, June 2011. Print.
- <sup>19</sup> NCDOT, DMV, and Traffic Records Branch. *North Carolina 2008 Traffic Crash Facts*. 2010. p. 195. [http://www.ncdot.gov/download/dmv/2008\\_Crash-facts.pdf](http://www.ncdot.gov/download/dmv/2008_Crash-facts.pdf). (Roads are classified as rural if they are located in an unincorporated area or a municipality with a population of less than 5,000.)
- <sup>20</sup> Table with map data on file at Southern Environmental Law Center (SELCA).
- <sup>21</sup> Cambridge Systematics, Inc. *Crashes vs. Congestion—What's the Cost to Society*. AAA, Nov. 2011. Executive Summary, p. ES-1. [www.camsys.com/pubs/2011\\_AAA\\_CrashvCongUpd.pdf](http://www.camsys.com/pubs/2011_AAA_CrashvCongUpd.pdf).
- <sup>22</sup> *Ibid.*, p. 1. (Each year, traffic motor vehicle crashes result in over 30,000 deaths and two million injuries in the United States.)
- <sup>23</sup> *Ibid.*, p. 10.
- <sup>24</sup> Center for Excellence in Rural Safety. Mid-Term Report. Hubert H. Humphrey Institute of Public Affairs at the University of Minnesota, July 2008. p. 1. <http://www.ruralsafety.umn.edu/publications/documents/CERSmidtermreport.pdf>. (A number of factors contribute to rural road fatalities, including inexperience, driver behavior, failure to use seat belts, alcohol use and importantly, road condition and design. While alcohol maybe involved in some accidents, it's not the leading cause.)
- <sup>25</sup> System Metrics Group Inc., Cambridge Systematics, Inc., Economic Development Research Group, Inc., HLB Decision Economics, Inc., and Judd Associates. *California Bypass Study: The Economic Impacts of Bypasses*. Final Report, Vol.1. CA Dept. of Transportation, Transportation Economics, May 2006. p. 48. Print.
- <sup>26</sup> TRIP, p. 4. (The fatality rate on all roads declined from 2000 – 2009 by 28%, while the rate on non-Interstate rural roads declined by only 13%).
- <sup>27</sup> *Ibid.*, p. 1.
- <sup>28</sup> *Ibid.*, p. 6.
- <sup>29</sup> *Ibid.*, p. 23.
- <sup>30</sup> The American Traffic Safety Services Association (ATSSA). *Low Cost Local Road Safety Solutions*. March 2006. p. 2. Print.
- <sup>31</sup> ATSSA, p. 31.
- <sup>32</sup> *Ibid.*, pp. 5, 15, 18, 20. (Installation of rumble strips along the centerline and sides of roads costs \$0.25 - \$1.50 per linear foot, improving signage costs \$200-\$300 per sign, and improving pavement/lane markings cost \$2- \$9 for each raised pavement marker.)
- <sup>33</sup> USDOT, FHWA, and FHWA Office of Safety. "Nighttime Visibility." Accessed April 25, 2012. [http://safety.fhwa.dot.gov/roadway\\_dept/night\\_visib/](http://safety.fhwa.dot.gov/roadway_dept/night_visib/). ("Adequately maintained retroreflective signs and pavement markings improve highway safety and prevent roadway departure crashes by bouncing light from vehicle headlights back toward the vehicle and the driver's eyes, making the signs and markings appear brighter and easier to see and read.")
- <sup>34</sup> ATSSA, p. 5. (Using indicators to show roadway alignment along curves costs \$200-\$300 per sign.)
- <sup>35</sup> TRIP, p. 8.
- <sup>36</sup> ATSSA, p. 29. (Adding guardrails costs \$8/ft - \$35/ft.)
- <sup>37</sup> United States Dept. of Transportation, Federal Highway Administration, the Office of Research, Development, and Technology, Office of Safety, and RDT. Summary Report. *Safety Evaluation of the Safety Edge Treatment*. Jan. 2011. <http://www.fhwa.dot.gov/publications/research/safety/hsis/11025/>. (Resurfacing pavements costs \$96,000 per sq. mile.)
- <sup>38</sup> TRIP, p. 8.
- <sup>39</sup> ATSSA, p. 31. (Adding median barriers costs \$44,000 per mile.)
- <sup>40</sup> USDOT, FHWA, and the FHWA Office of Safety. *North Carolina's 2009 Highway Safety Improvement Report & Five Percent Report*. Highway Safety Improvement Program (HSIP). 26 Aug. 2009. <http://safety.fhwa.dot.gov/hsip/five-percent/2009/index.cfm?state=nc> (Improving roadway alignment costs \$30,000-\$200,000+.)
- <sup>41</sup> TRIP, p. 8.
- <sup>42</sup> See graph: Reduction in Rural Crash Rates/Fatalities due to Road Safety Improvements.
- <sup>43</sup> Atkins. *North Carolina Statewide Transportation Plan: System Inventory and Modal Needs*. Draft Technical Report: Version 2. NCDOT, March 2012. Executive Summary, Table ES-3, p. ES-11. Print.
- <sup>44</sup> See note 65.
- <sup>45</sup> NC Dept. of Transportation, NCDOT State Road Maintenance Unit, Road Inventory Information Section, and et al. *2008 Highway and Road Mileage*. State Mapping Resources: Inventory and Assessment Reports. Sept. 2009. p. 12. [http://www.ncdot.gov/travel/statemapping/\\_download/highwayroadmileage\\_2008.pdf](http://www.ncdot.gov/travel/statemapping/_download/highwayroadmileage_2008.pdf).
- <sup>46</sup> USDOT, FHWA. *Transportation Asset Management: Beyond the Short Term*. Beyond the Short Term: Transportation Asset Management for Long-Term Sustainability, Accountability and Performance. *FOCUS: Accelerating Infrastructure Innovations*. July 2010. <http://www.fhwa.dot.gov/publications/focus/10jul/01.cfm>.
- <sup>47</sup> Patel, Alpesh G., NCDOT Board of Transportation, et al. *Charting a New Direction for NCDOT: North Carolina's Long-Range Statewide Multimodal Transportation Plan*. Sept. 2004. p. 7. Print.
- <sup>48</sup> Frankel, Jake. *New Report Finds North Carolina Rural Roads Among Nation's Deadliest*. Mountain Xpress, 9 Feb. 2011. Print.
- <sup>49</sup> TRIP, p. 30.
- <sup>50</sup> Marshall, Alex. *Why Does U.S. Build Roads If It Can't Pay to Fix Them?* Bloomberg. 5 April 2012. <http://www.bloomberg.com/news/2012-04-05/why-does-u-s-build-roads-if-it-can-t-pay-to-fix-them-.html>. ("Every dollar spent in keeping a good road good precludes spending \$6 to \$14 to rebuild one that has deteriorated.")
- <sup>51</sup> NCDOT. Uses of Funding. "Finance and Budget." <http://www.ncdot.gov/about/finance/>. (Current DOT annual maintenance budget is \$957 million.)
- <sup>52</sup> Atkins. *North Carolina Statewide Transportation Plan: System Inventory and Modal Needs*. Draft Technical Report: Version 2. NCDOT, Mar. 2012. Executive Summary, Table ES-3, p. ES-11. Print. (Currently, projected maintenance needs for highways through 2040 are almost \$58 billion.)

- <sup>53</sup> Atkins. *North Carolina Statewide Transportation Plan: 2040 Plan Report*. Draft Version 2. NCDOT, Mar. 2012. p. 14. [http://www.ncdot.gov/download/performance/2040\\_DRAFTPlan.pdf](http://www.ncdot.gov/download/performance/2040_DRAFTPlan.pdf). (Level of Service is a term used in the grading system that NCDOT developed for each transportation mode that defines how well that mode meets public needs. The level of performance for each mode is ranked similar to a school report card, LOS A, B, C, D, and F); Atkins. Dec. 2011. p. x.
- <sup>54</sup> Atkins. *North Carolina Statewide Transportation Plan: System Inventory and Modal Needs*. Draft Report. NCDOT, Dec. 2011. Executive Summary, Table ES-2. p. x. Print.
- <sup>55</sup> TRIP, p. 32.
- <sup>56</sup> *Ibid.*, p. 31. (NC is number 14 in the nation on the list of deficient bridges.)
- <sup>57</sup> NCDOT. *Bridge & Culvert Stats, Download. NCDOT: Bridge Stats & Structure Maps*. pp.1-2. <http://www.ncdot.gov/projects/ncbridges/maps.html>. (31 rural counties have over 40% of their bridges that meet the criteria for being structurally deficient or functionally obsolete.)
- <sup>58</sup> TRIP, p. 31. (North Carolina has 18,007 bridges, 13,982 which are rural.)
- <sup>59</sup> *Ibid.*, p. 2.
- <sup>60</sup> System Metrics Group Inc., p. 11.
- <sup>61</sup> Atkins. *North Carolina Statewide Transportation Plan: Challenges and Opportunities. NCDOT 2040 Plan*. NCDOT, Sept. 2011. p. 33. [http://www.ncdot.gov/download/performance/2040\\_ChallengeOpp.pdf](http://www.ncdot.gov/download/performance/2040_ChallengeOpp.pdf).
- <sup>62</sup> System Metrics Group Inc., p. 11.
- <sup>63</sup> *Ibid.*, p. 12.
- <sup>64</sup> N.C.G.S. § 136-179.
- <sup>65</sup> NCDOT Cost to Complete Intrastate System Calculation and System Map on file at SELC.
- <sup>66</sup> Atkins. *North Carolina Statewide Transportation Plan: Challenges and Opportunities. NCDOT 2040 Plan*. NC Dept. of Transportation, Sept. 2011. p. 26. [http://www.ncdot.gov/download/performance/2040\\_ChallengeOpp.pdf](http://www.ncdot.gov/download/performance/2040_ChallengeOpp.pdf).
- <sup>67</sup> United States Census Bureau.
- <sup>68</sup> System Metrics Group Inc., p. 25.
- <sup>69</sup> Thompson, Eric, et al. *The Impact of a New Bypass Route on the Local Economy and Quality of Life*. Kentucky Transportation Center, University of Kentucky: Coll. of Engineering, June 2011. p. ii. Print.
- <sup>70</sup> System Metrics Group Inc., p. 15.
- <sup>71</sup> *Ibid.*
- <sup>72</sup> Otto, Daniel and Connie Anderson. *The Economic Impact of Rural Highway Bypasses: Iowa and Minnesota Case Studies Final Report*. Midwest Transportation Center, Iowa State University, Jan. 1995. p. 16. [http://www.intrans.iastate.edu/reports/rural\\_bypasses.pdf](http://www.intrans.iastate.edu/reports/rural_bypasses.pdf).
- <sup>73</sup> *Ibid.*, p. 17.
- <sup>74</sup> System Metrics Group Inc., p. 21.
- <sup>75</sup> *Ibid.*, p. 15. (Where negative impacts of ten bypassed communities were found, seven of those ten communities were small towns.)
- <sup>76</sup> *Ibid.*, p. 9.
- <sup>77</sup> *Ibid.*, p. 23.
- <sup>78</sup> *Ibid.*, p. 48. (For the bypasses studied, “the number of collisions increased on the routes that were bypassed after an initial, marginal decline. After about four or five years, the number of collisions fell to or below pre-existing levels.” The authors theorize that new traffic patterns confused drivers and resulted in more collisions.)
- <sup>79</sup> *Ibid.*, p. 37.
- <sup>80</sup> Partridge, Mark D. et al., *Rural-to-Urban Commuting: Three Degrees of Integration*. Steven Deller and Tom Leinbach, eds. Ohio State University, Dept. of Agricultural Environmental and Development Economics, 17 Feb. 2010. p. 5. [http://aede.osu.edu/sites/drupal-aede.web/files/Partridge\\_et\\_al\\_Out-commuting2\\_paper-feb18.pdf](http://aede.osu.edu/sites/drupal-aede.web/files/Partridge_et_al_Out-commuting2_paper-feb18.pdf).
- <sup>81</sup> Hall, Billy Ray. *Poverty's Enduring Tradition in Rural North Carolina: How Do We Respond?* Popular Government, Spring/Summer 2003. p. 29. Print.
- <sup>82</sup> *Profiles of Innovative Rural Vanpool Programs*, June 2009, Introduction. Print. (Rural residents have faced disproportionate job loss in the current economic downturn, and some are facing longer commutes when they return to work.)
- <sup>83</sup> <http://www.raconline.org/states/northcarolina.php> (Estimates from 2010 indicate a poverty rate of 20.3% exists in rural North Carolina, compared to 16.2% in urban areas of the state.)
- <sup>84</sup> Hall, Billy Ray. p. 25.
- <sup>85</sup> *Ibid.*, p. 25.
- <sup>86</sup> Atkins. Sept. 2011. p. A-19.
- <sup>87</sup> Rutkowski, Charles A. and Pamela Friedman. *Transportation*. Rural Assistance Center: Rural Transportation Resources. <http://www.raconline.org/topics/transportation/>.
- <sup>88</sup> Rails-To-Trails Conservancy, *Active Transportation Beyond Urban Centers; Walking and Bicycling in Small Towns and Rural America*. <http://www.railstotrails.org/ourWork/reports/beyondurbancenters.html>.
- <sup>89</sup> *Ibid.*, p. 3.
- <sup>90</sup> TRIP, p. 2. (Citing Ray LaHood blog post.)
- <sup>91</sup> Para-transit is an alternative flexible public transportation mode that does not follow fixed routes or schedules, and often has features to make travel easier for disabled people.
- <sup>92</sup> N.C.G.S. § 136-210-213
- <sup>93</sup> Draft report on file with Tri-State Transportation Campaign. (In a 2012 study of state-by-state new capacity spending, North Carolina ranked number one in spending for the 2008-2018 planning period.)
- <sup>94</sup> AASHTO, p. 10.
- <sup>95</sup> Kochanski, Brooke. *What is PART? Provision of Part Programs*. Piedmont Authority for Regional Transportation: The Transportation Solution. PART, <http://www.partnc.org/whatisPART.html>.
- <sup>96</sup> Piedmont Authority for Regional Transportation. *The History of PART*. Piedmont Authority for Regional Transportation: The Transportation Solution. PART, <http://www.partnc.org/history.html>.
- <sup>97</sup> Atkins. Sept. 2011. p. A-19. (In a survey of where elderly North Carolinians reside, the highest percentages after the urban retirement destinations of Wilmington and Asheville are in rural North Carolina.)
- <sup>98</sup> Sulek, Joanne. *Fail-Safe Methods for Para-Transit Safety*, p. 67. Print.
- <sup>99</sup> FHWA Guidance: Transportation Enhancement Activities. US Department of Transportation, Federal Highway Administration. March 2010. p. 4. Print.
- <sup>100</sup> Fields, Billy. *Enhancing America's Communities: A Guide To Transportation Enhancements*. 3rd Ed. National Transportation Enhancements Clearinghouse. March 2007. p. 1, Print.
- <sup>101</sup> *Ibid.*, p. 1.
- <sup>102</sup> Rails-To-Trails Conservancy, p. 3.
- <sup>103</sup> Partridge, Mark D., p. 5.



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