

Downtown Slow Zone Feasibility Report

Presented at the Carrboro Board of Aldermen meeting, May 27, 2014
Carrboro Planning Department – Jeff Brubaker, Transportation Planner

1 Background

1.1 Board of Aldermen direction

On February 18, 2014, the Board of Aldermen received a presentation from Seth LaJeunesse of the Transportation Advisory Board on creating a slow zone in downtown Carrboro. The Board subsequently adopted the following language in a resolution:

NOW, THEREFORE, BE IT RESOLVED by the Carrboro Board of Aldermen that the Board receives the presentation on a downtown slow zone by the Transportation Advisory Board.

BE IT FURTHER RESOLVED that the Board of Aldermen directs staff to report to the Board of Aldermen on the feasibility of a downtown slow zone including:

- 1) The Arts Commission being involved in the gateway portion
- 2) Researching signal timing with Chapel Hill
- 3) Reporting how downtown businesses will be involved
- 4) Including a traffic study
- 5) Reporting back to the Board no later than three months

This feasibility report responds to the resolution.

1.2 What is a slow zone?

A slow zone is an area in which traffic calming measures are implemented to discourage motor vehicle traffic from exceeding a certain speed, typically 20 mph. The measures are commonly physical traffic calming measures, such as curb extensions, speed humps or cushions, textured pavement, or gateways.¹ They may be supplemented with traffic operations measures (such as modifying traffic signal timing), installing signage, or education campaigns.

1.3 Traffic speed and pedestrian safety

One purpose of slow zones is to reduce crash risk and severity. There is a correlation between the speed at which a motor vehicle is traveling when a collision with a pedestrian occurs and the probability that the pedestrian will be killed by the collision.

¹ Grundy, C., R. Steinbach, P. Edwards, J. Green, B. Armstrong, P. Wilkinson. 2009. Effect of 20 mph traffic speed zones on road injuries in London, 1986-2006: controlled interrupted time series analysis. *British Medical Journal* 2009; 339:b4469 doi 10.1136/bmj.b4469.

A 2009 study using head-on, front-bumper, auto-pedestrian accident data from Germany from 1991-2003 examined the relationship between the speed of a motor vehicle upon impact during an auto-pedestrian collision and the likelihood of the pedestrian dying from the collision. For example, the study found a “strong dependence on impact speed...with the fatality risk at 50 km/h [31 mph] being more than twice as high as the risk at 40 km/h [25 mph] and more than five times higher than the risk at 30 km/h [19 mph]”.²

The study used logistical regression to “derive an analytical expression for the pedestrian fatality risk as a function of impact speed.” The function was then graphed. It is excerpted here below.

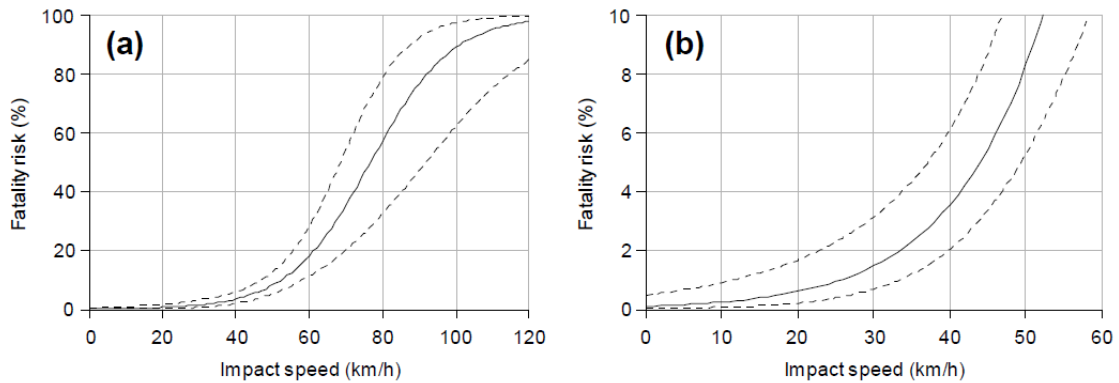


Figure 1: Pedestrian fatality risk

(a) The fatality risk as a function of impact speed for adult pedestrians hit by the front of a passenger car. The dotted curves show approximate 95% confidence limits. (b) Zoom in on the risk curve below 60 km/h.

As can be seen in the overall graph (a) and zoomed-in version (b) (note the different vertical axis scales), the fatality risk begins to increase rapidly at speeds higher than 50 km/h (31 mph). From 60 to 80 km/h (37 to 50 mph), the risk increases more than three times, from 18% to 57%. Even comparing fatality risk at lower speeds, there appears to be a non-negligible difference in fatality risk:

- At 20 mph, the function shows a fatality risk of 1.8%.
- Increasing to 25 mph, the fatality risk doubles but is still a relatively low 3.6%.
- Increasing to 30 mph, it doubles again to 7.2%.
- Increasing to 40 mph, it more than triples to 24.9%.

Some caveats and notes should be considered:

- The final sample size for the study consisted of 490 pedestrians and 36 fatalities.
- It is possible data in the U.S. could show a different risk curve.

² Rosen E. and U. Sander. 2009. Pedestrian fatality risk as a function of car impact speed. *Accident Analysis and Prevention*, 41 (2009), 536–542. Available at: http://nacto.org/docs/usdg/pedestrian_fatality_risk_function_car_impact_speed_rosen.pdf.

- Other factors may play a role, such as improvements in trauma care, emergency response time, and size of vehicle.

1.4 Slow zone implementation and effects

Analyses of the implementation of slow zones are summarized here.

- **New York City's** Neighborhood Slow Zones are roughly quarter-mile, primarily residential zones where the speed limit is reduced from 30 mph to 20 mph with traffic calming to encourage slower driving. As reported by NYCDOT, the “ultimate goal of the Neighborhood Slow Zone program is to lower the incidence and severity of crashes.” The identification of slow zones starts with applications from neighborhoods. They are selected based on factors such as crash history, support from the community, and proximity to schools, daycare centers, and senior centers. Slow zones feature gateway treatments and internal traffic calming. However (unlike the proposed Carrboro slow zone), they are implemented on neighborhood streets with relatively lower traffic volumes.³
- Since 2008, **New York City** has implemented pedestrian safety countermeasures in 37 Senior Pedestrian Focus Areas (SPFAs), identified in part by relatively higher senior pedestrian crash rates. The countermeasures include physical traffic calming, road diets, removing on-street parking spaces near crosswalks for increased visibility, signage, and signal enhancements (e.g. lengthening the walk phase). NYC DOT identified a modest decrease in senior pedestrian fatalities concurrent with the launch of the program.⁴
- A study of **London's** slow zones found that implementation of them “was associated with a reduction in casualties and collisions of around 40%”, with generally larger reductions of child casualties, injuries, and deaths. Reductions occurred at different magnitudes across all users studied: car occupants, motorcyclists, bicyclists, and pedestrians. The study reported somewhat ambivalent results for areas adjacent to slow zones.⁵
- Another **London** study showed an average reduction of 9 mph after slow zone implementation, resulting in an average speed of 17 mph.⁶
- Slow zones in **Barcelona** and the **Netherlands** have been reported to have lower crash rates after slow zone implementation.⁷
- **Paris** has established several specific area slow zones and is considering implementing a 30 km/h (19 mph) speed limit for the entire city.⁸

³ <http://www.nyc.gov/html/dot/html/motorist/slowzones.shtml>

⁴ <http://www.nyc.gov/html/dot/html/pedestrians/safeseniors.shtml> and <http://www.nyc.gov/html/dot/downloads/pdf/safestreetsforseniors.pdf>

⁵ Grundy et al 2009

⁶ Webster D., R. Layfield. 2003. Review of 20 mph zones in London boroughs. Transport for London (project report PPR243). Cited in: Grundy et al 2009.

⁷ http://nacto.org/wp-content/uploads/2012/10/ViolaRob_Neighborhood-Slow-Zones-NACTO-Conference-2012.pdf, see slide 3.

⁸ Britton, Eric. 2014. Paris to limit speeds to 30 km/hr over entire city. World Streets. <http://worldstreets.wordpress.com/2014/05/21/paris-to-limit-speeds-to-30-kmhr-over-entire-city/>

Slower vehicle speeds may increase travel times. However, speed along segments is not the only factor in travel time; another major factor is delay at signalized intersections.

2 Traffic speed and crashes in downtown Carrboro

2.1 Current speed limits and actual speeds

A substantial portion of motor vehicles has been found to travel faster than 20 mph at various downtown locations.

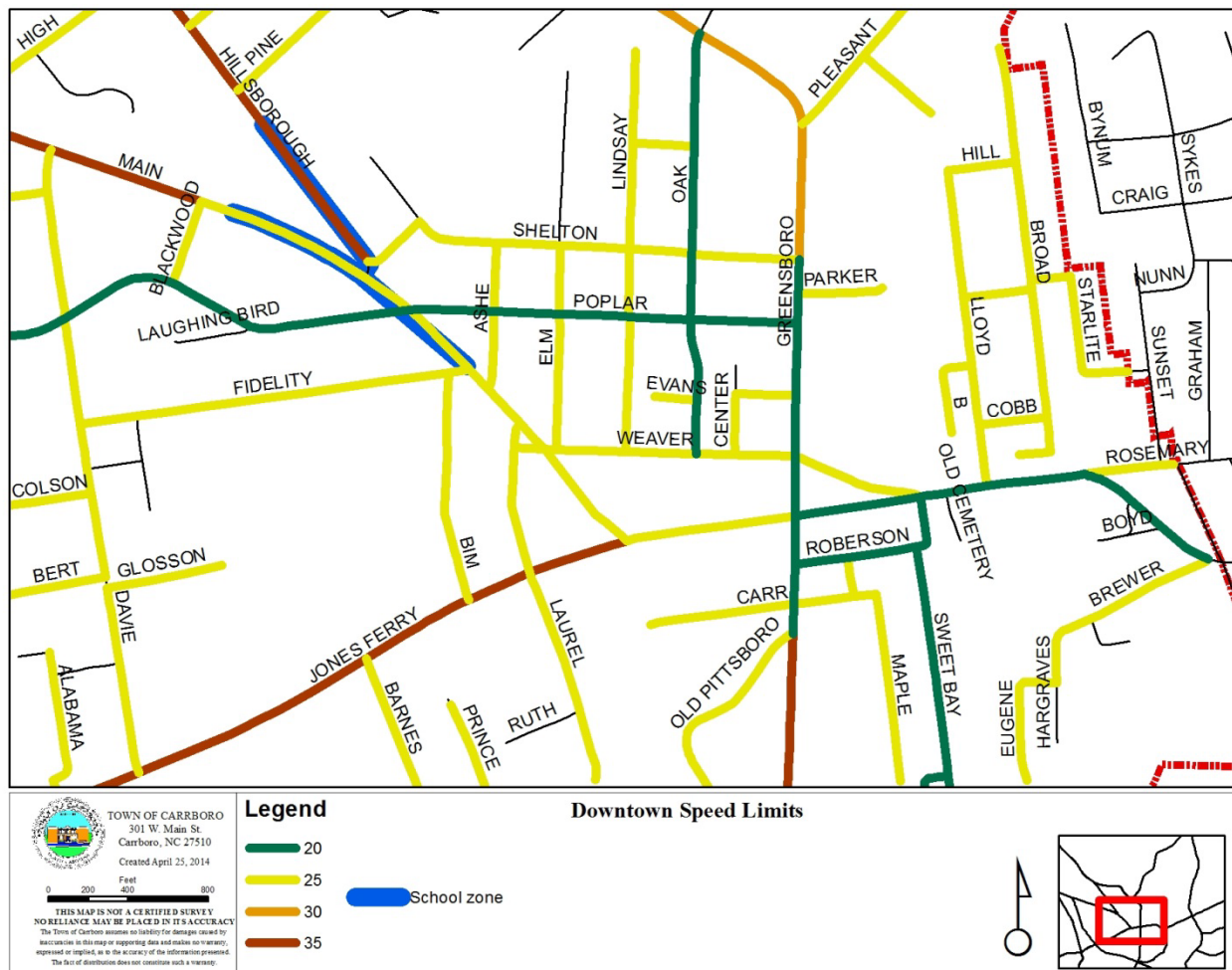


Figure 1. Downtown speed limits

Focusing on downtown commercial streets, Greensboro St., E. Main St., and Roberson St. already have a 20 mph speed limit, whereas Weaver St. and W. Main St. have a 25 mph speed limit. The gravel-paved Bike Alley (not symbolized on the map below) is the Town’s first public street with a speed limit of 10 mph. Several streets leading into the downtown area – including W. Main St., Hillsborough Rd., Jones Ferry Rd., S. Greensboro St. – have a 35 mph speed limit, while N. Greensboro St. is 30 mph.

Actual speeds have occasionally been measured at different downtown locations. At some locations, speeds are significantly higher than the speed limit. Average speeds, percent over the speed limit, and 85th-percentile speeds⁹ at various locations will be presented in more detail at the May 27 meeting. 85th-percentile speeds are important because they provide a reasonable indication of the top speed at which most drivers will feel comfortable driving given the design of the street and the nature of the corridor.

2.2 Crash statistics

2.2.1 Motor vehicles

From April 2009 through March 2014 (a five-year period), there were 140 reported crashes on the two major state-maintained streets in downtown: Main St. (between Hillsborough and Merritt Mill) and Greensboro St. (between Shelton and Carr). This averages to over 2 reported crashes per month.

Planning Level Crash Data				(04/01/2009 - 03/31/2014)
Location	Total Crashes	Fatal Crashes	Non-Fatal Injury Crashes	PDO Crashes
SR 1010 (Main) from SR 1009 (Hillsborough) to SR 1771 / SR 1927 (Merritt Mill)	86	1	25	60
SR 1919 / SR 1772 (Greensboro) from Carr to Shelton	54	0	18	36

Table 1. Five-year crashes on Main and Greensboro, downtown. PDO = property damage only.

The data summary in Table 1, provided by NCDOT, includes crashes involving all modes. A full crash report allowing filtering for motor-vehicle-only crashes could not be analyzed in time for this memo. Using town-wide data from the 2008-2012 five-year period, 8% of all reported crashes involved either a bicycle or pedestrian. Assuming a slightly higher proportion of bike-ped crashes on these downtown streets, one could estimate that there were between 100 and 130 motor-vehicle-only crashes on these streets.

Of all the 666 reported town-wide crashes between 2008-12, speeding was reported in 62 (9%) of them. The fatal crash occurred in July 2011, when the community mourned the loss of Mr. Robert Harman, who was riding his bicycle and swerved into traffic on W. Main St.

2.2.2 Motorcycles

Of the 2008-12 town-wide crashes, 10, or 1.5%, involved a motorcycle.

2.2.3 Bicyclists

Comprehensive bicyclist crash data from 1997 to 2012 is available from the UNC Highway Safety Research Center’s Pedestrian and Bicycle Information Center.¹⁰ In these 16 years, Carrboro had a total

⁹ 15 percent of all traffic travels faster than the 85th-percentile speed.

¹⁰ http://www.pedbikeinfo.org/pbcat_nc/_biketypefacts.cfm

of 87 reported bicycle crashes for an average of 5.5 per year. Of these, 1 resulted in a fatality (as mentioned above), 8 resulted in a disabling injury, and 35 resulted in a non-disabling injury.

In only one of these crashes, excessive speed of the auto was reported. This small percentage is also evident in statewide crashes. In 23% of crashes, the estimated auto speed exceeded 20 mph, and in 10% percent of crashes, the speed exceeded 30 mph. 3 of the 8 disabling injuries (38%) and 10 of 35 evident injuries (29%) occurred when the estimated auto speed exceeded 20 mph. However, this is a small sample size. Looking at the entire Piedmont region over the same period (n=8,404), 88% of bicyclist fatalities, 71% of disabling injuries, and 45% of evident injuries occurred when the estimated auto speed exceeded 20 mph. Therefore, although many factors potentially affect a crash, motorist speed appears to be an important one.

The Carrboro Bike Plan examined the location of bicycle crashes from 1990 to 2006. Over this 17-year period, there were 88 reported crashes, resulting in an average of just over 5 per year. Of the top 6 crash locations, five were in downtown:

- Main-Lloyd: 12
- Main-Rosemary: 6
- Main-Weaver-Roberson: 5
- Greensboro-Weaver: 5
- Main-Jones Ferry: 4

The only other location in the top six was NC-54-Jones Ferry.

2.2.4 Pedestrians

Nationally, the number of pedestrian fatalities per billion vehicle-miles traveled decreased from greater than 5 in the mid-1970s to below 2 by the 2000s. This mirrored a proportionate decrease in motor-vehicle crash fatalities, a downward trend that has continued into the 2010s. Over the last 10 years, however, the downward trend for pedestrians has not continued, as the pedestrian fatality rate has been essentially unchanged at about 1.5.¹¹

The National Highway Traffic Safety Administration (NHTSA) reports that the 4,743 pedestrian fatalities in 2012 were the most since 2006, and pedestrian fatalities' share of total traffic fatalities has increased slightly, from 11 to 14% over the last 10 years. Another 76,000 pedestrians were injured in 2012. The NHTSA data suggest several factors in pedestrian fatalities relevant to safety engineering:

- 3 out of every 4 fatalities occurred in an urban setting.
- 2/3 occurred at non-intersections
- 70% occurred at nighttime (6pm to 5:59am)
- Older pedestrians (age 65+) have the highest fatality rate

¹¹ Leonhardt, David. As Traffic Deaths Fall, Pedestrian Deaths Do Not. *New York Times*, May 4, 2014. http://www.nytimes.com/2014/05/05/upshot/as-traffic-deaths-fall-pedestrian-deaths-do-not.html?_r=2

- Of all child (aged 15 and younger) traffic fatalities, a greater proportion were pedestrians (21% to 22%) than for the population as a whole (14%)

NHTSA also reports: “Alcohol involvement — either for the driver or for the pedestrian — was reported in 48 percent of the traffic crashes that resulted in pedestrian fatalities” – with the alcohol level of pedestrians being more common in crashes.¹²

The PBIC provides an important caveat that “only a fraction of pedestrian crashes that cause injury are ever recorded by the police”.¹³

In Carrboro, in the 16 years from 1997-2012, there were 103 reported pedestrian crashes. Of these:

- 37% occurred at an intersection
- 33% occurred at a non-intersection street location
- Other crashes were classified as non-roadway (e.g. parking lot), intersection-related, or unknown
- Only 3 of the 103 crashes was reported as a non-injury. Excluding unknowns:
 - 2 crashes involved a fatality
 - 22 involved a disabling injury
 - 33 involved an evident injury
 - 40 involved a possible injury

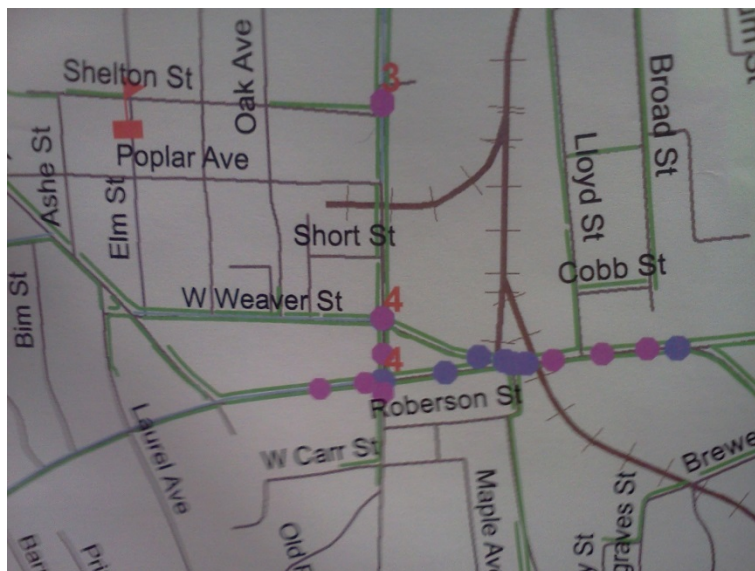


Figure 2. Pedestrian crash map, 2000-2011. Blue dots represent 2000-05 crashes; magenta dots represent 2006-11 crashes. Numbers indicate clusters of crashes.

¹² National Highway Traffic Safety Administration. Traffic Safety Facts: Pedestrians. April 2014. <http://www-nrd.nhtsa.dot.gov/Pubs/811888.pdf>.

¹³ http://www.pedbikeinfo.org/data/factsheet_crash.cfm

A crash map (Figure 2) prepared by the Highway Safety Research Center and NCDOT as part of the Watch for Me NC campaign showed that pedestrian crashes from 2000-11 were concentrated in the downtown area. This is not an unusual result, as downtown has the most pedestrians.

2.3 Yielding compliance at crosswalks

Since 2010, the Carrboro Police Department has conducted pedestrian safety operations to enforce yielding compliance at crosswalks. These operations were folded into the Watch for Me NC campaign after it commenced in 2012. A table that includes yielding violation rates is included in the Appendix. Although it includes somewhat small sample sizes, the table shows both positive and negative data for downtown Carrboro crosswalks:

- Generally, 90-95% of vehicles yielded at the W. Weaver / Oak crosswalk
- There is a wider range of violation rates for the N. Greensboro / E. Poplar crosswalk, from 15% to 40%
- The W. Main / Hillsborough crosswalk had violation rates which at their highest were generally between 45% and 55%

3 Considerations for a downtown slow zone in Carrboro

3.1 Business community feedback

A presentation on the slow zone concept was made at the Carrboro Business Community Meeting on April 25, 2014, and constructive comments were received from attendees. The following is a summary of those comments:

- Overall, there was general support for the idea
- More speed enforcement is needed downtown, and the Police Department should be involved in slow zone consideration
- Lower speed limits
- E. Main St. pedestrian crossings (300 block) are an issue
- Would like a slower, steadier traffic flow rather than stopping and accelerating
- Businesses had positive feedback for the idea of a gateway treatment, but had questions about the cost
- E. Weaver St. should not be a thoroughfare
- Pedestrians need to look both ways before crossing

3.2 Arts Committee feedback

A presentation was made at the May 12, 2014, Arts Committee meeting, and the committee provided helpful feedback. The following is a summary:

- Art along the street, but not in the street

- Public art that would not conflict with NCDOT standards
- Neighborhood lights spanning above the street
 - Creates festive atmosphere
 - “Canopy” feel
- Support for stamped asphalt
- Examples to consider
 - Rio de Janeiro mosaic
 - Sundance Square, Fort Worth, TX – stamped like cobblestone
 - Downtown Durham
- Roberson St. may be a better candidate for a woonerf than E. Weaver St.

3.3 State-maintained streets

NCDOT maintains Main St. and Greensboro St., key arterials within the proposed downtown slow zone. Physical traffic calming measures on these streets must be approved by NCDOT. This section includes some, but not necessarily all, approvable and not permissible design features.

3.3.1 Approvable options

The following design measures are permissible, but need to be approved by NCDOT.

- Stamped asphalt, via a third-party encroachment agreement.¹⁴ The Town would be required to maintain it. NCDOT will not approve actual brick paving on state-maintained roads.
- Curb extensions. Over the years, NCDOT has installed several curb extensions at intersections outside of the proposed slow zone, e.g. Main-Hillsborough, Greensboro-Pleasant, and Hillsborough-James. These have primarily served to slow turning movements by sharpening the turning angle.
- Crosswalk visibility or signalization. Features such as Rectangular Rapid Flashing Beacons (RRFBs), LED edge-lit crosswalk signs, or HAWK signals must be approved by NCDOT.
- Changes to traffic signal timing must be approved by the NCDOT Division Traffic Engineer. NCDOT’s ITS and Signals Unit may also be a part of the approval process. NCDOT owns all traffic signals, and the Town contracts with the Town of Chapel Hill to maintain Carrboro’s traffic signals. NCDOT then reimburses the Town of Chapel Hill for the maintenance work.

3.3.2 Options that are not permissible

The following measures are prohibited:

- Vertical traffic calming such as speed humps or cushions. Per 136-102.8, speed humps are permissible on NCDOT-maintained rural subdivision roads (e.g. Turkey Farm Rd. in rural Orange Co.), but not on urban arterials.
- Shared streets or woonerfs are not known to be approvable by NCDOT.

¹⁴ Previous communication with NCDOT district engineer.

3.4 What if the Town assumes maintenance of State-maintained streets?

If the Town wishes to install design features not permitted by NCDOT on state-maintained streets, one option is to assume maintenance of the streets.

The following are notes from a phone conversation with the NCDOT District Engineer's Office about the process for a municipality to assume maintenance of state-maintained streets.

- The NCDOT District Engineer sends a letter to town managers in February or March of each year. This affords the municipality time to plan for the change's effect on its upcoming budget and update its Powell Bill eligibility map for the upcoming fiscal year.
- The actual transfer of maintenance process could take place any time throughout the year.
- There is a precedent for Town assumption of state-maintained roads. One example is Tallyho Trail (albeit a rural subdivision road that serves as a collector, not an arterial). NCDOT improved the road prior to the Town taking over maintenance.
- A Board of Aldermen resolution would be needed to approve the maintenance transfer. Upon adoption, the resolution is forwarded to district engineer, who forwards it to the NC Board of Transportation. The BoT then considers approval of NCDOT abandoning maintenance.
- The Powell Bill formula determines how much additional revenues the Town would receive for the additional street mileage it is responsible for maintaining. See Section 3.4.1 for more information on the Powell Bill process.
- GS 136-41.3 provides guidance on the maintenance activities able to be funded by Powell Bill revenues"
 - "maintaining, repairing, constructing, reconstructing or widening of any street or public thoroughfare including bridges, drainage, curb and gutter, and other necessary appurtenances within the corporate limits of the municipality or for meeting the municipality's proportionate share of assessments levied for such purposes"
 - "planning, construction and maintenance of bikeways, greenways, or sidewalks"
- The District Engineer's office would prefer to maintain a level of connectivity of the state-maintained network after the transfer. As a hypothetical example, a transfer of the central portion of Greensboro St. would preferably span from at least Estes Dr. to NC-54. The remaining state-maintained portions of Greensboro St. could then be accessed via the state highway network from those two intersecting state-maintained facilities. However, the District Engineer stated that a smaller segment, such as Shelton St. to Carr St., may yet be possible.

North Carolina municipalities receive Powell Bill funding to help offset the cost of maintaining local streets. However, because of the question as to whether Powell Bill allocations adequately cover the cost of local street maintenance, municipalities may be concerned about the fiscal impacts of taking over state-maintained streets.

This report does not make any recommendations on assuming maintenance. If the Board is interested in pursuing this process further, a cost-benefit study is one possible way to inform decision-making on this topic. Input from Public Works and Management Services is also important here.

3.4.1 Powell Bill

The Powell Bill established the state statutes that govern allocation of State Street-Aid funds from the State Highway Fund to eligible, incorporated municipalities. The total amount that is allocated to these municipalities every fiscal year is equivalent to 10.4% of the state’s motor fuel tax for that fiscal year. Of the total amount, 75% is allocated based on population, so each municipality’s share of this 75% is based the ratio of its population to the sum total for all eligible municipalities. The remaining 25% is based on the ratio of its locally-maintained public street mileage to the sum total for all eligible municipalities. Municipalities are responsible for submitting a report providing the necessary information. The disbursement is then made twice each fiscal year: once by October 1 and once by January 1.

The Powell Bill distribution structure’s reliance on population for most of its allocation implies that if a municipality takes over maintenance of a state-maintained road, the increase in maintenance responsibility will be paralleled by a disproportionately smaller increase in Street-Aid revenues. Also, per a requirement of state legislation, NCDOT is studying changes to the Powell Bill formula that would shift the distribution of funding based on lane-mile, instead of street-mile data.

4 Feasibility of implementing a slow zone

4.1 General considerations

This report finds that creating a slow zone is feasible, with the specific features and implementation of the slow zone having varying levels of feasibility based on factors such as NCDOT approvability, engineering soundness, cost, space to put features, and so forth.

At the same time, a bigger-picture question emerges. As the downtown transportation system is one element of the downtown area, its feel and function is dependent on the overall vision of the community for the downtown area. This vision includes land use, urban design, and economic development. Integration of these elements was accomplished by the *New Vision* process in 2001; this plan has now passed its first decade.

Cities and towns large and small are engaging in deeper thinking about what, and whom, their streets are for. As the National Association of City Transportation Officials (NACTO) *Urban Street Design Guide* states:

Growing urban populations will demand that their streets serve not only as corridors for the conveyance of people, goods, and services, but as front yards, parks, playgrounds, and public spaces. Streets must accommodate an ever-expanding set of needs. They must be safe, sustainable, resilient, multi-modal, and economically beneficial, all while accommodating traffic.¹⁵

¹⁵ National Association of City Transportation Officials. “About the Guide”. *Urban Street Design Guide*. <http://nacto.org/usdg/about-the-guide/>

In the foreword to the guide, former New York City DOT Commissioner Jeanette Sadik-Khan refers to creating “a new DNA for city streets.”¹⁶

The system recommended by the 1985 *Carrboro Traffic Operation Study* conducted by NCDOT – including one-way, multi-lane pairs and widening E. Main St. and N. Greensboro St. to five lanes – was not preferred by the Town. The traffic projections (to 2000) cited to justify the recommended system were by and large substantially higher than the 2000 volumes turned out to be. The study cited increased speed and an increase in (auto) capacity as benefits of its proposed system. It also cited a reduction in auto accidents as a benefit, but paid little attention to alternative transportation modes apart from their effects on auto traffic operation. For example, the study reported: “Pedestrian [*sic*] activity that interferes with traffic operation have been [*sic*] observed at intersection [*sic*] of Weaver Street / Main Street / Roberson Street.”¹⁷

As has been reported to the Board previously, motor vehicle traffic volumes have for the most part either stayed flat or declined on downtown street segments over the last 15 years, arguably due to factors such as the widening of NC-54 bypass, the implementation of fare-free transit, and investment in bicycle and pedestrian infrastructure. Two decades after the NCDOT study, the 2005 *Downtown Traffic Circulation Study*, which used the *Downtown Design Guidelines* and *New Vision* as a philosophical framework, had a substantially more modally balanced set of recommendations that emphasized the “penultimate” importance of downtown access for pedestrians, motorists, bicyclists, transit users, and delivery trucks. This also accords with the overall goal (4.0) of *Vision 2020*: “The safe and adequate flow of bus, auto, bicycle and pedestrian traffic within and around Carrboro is essential.”

The balance sought by the Complete Streets movement and design guides such as the *Urban Street Design Guide* is between two fundamental, historical values of streets: the pre-1910s-era function of streets as meeting and mixing areas for people and commerce and the midcentury view of streets primarily as thoroughfares for automobiles. The implication is that it is possible to make streets inviting for all users – people on foot (*Vision 2020* 3.25 and 3.27), transit users (3.24), and cyclists (4.3) – while continuing to provide adequate automobile access. For example, the comment from the business community meeting about achieving a slower, steadier flow of traffic implies a reduction in maximum auto speeds but also a reduction in signal delay.

Downtown streets currently approach this balance, but some street segments are more imbalanced than others. The experience of travel in downtown by people using different modes is compromised, or potentially compromised, by traffic speed, traffic noise, yielding violation rates, red light running, lack of facilities and amenities, lack of buffers between pedestrians and the travelway, peak hour congestion, difficulty locating parking lots, and other factors.

With downtown Carrboro’s vibrancy and abundance of destinations where people want to be, there is a significant amount of all modes of traffic. The relatively lack of parallel street connectivity puts more pressure on downtown streets to adequately serve those modes. For example, E. Weaver St. is a central

¹⁶ <http://nacto.org/usdg/foreword/>

¹⁷ A copy of the study is available in the Carrboro Planning Department office. The quote is from p. 12.

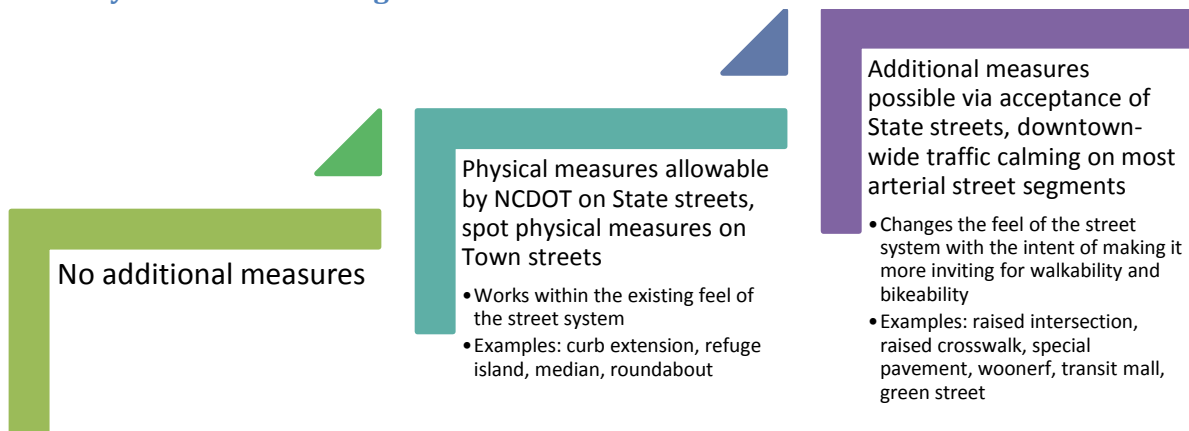
gathering place for people, but it also provides capacity for a significant amount of east-west through traffic (9,000 ADT and over 200 cyclists per day). Therefore, the balance between function and feel of downtown streets can be a delicate one, and it deserves careful consideration as the community reflects on our big-picture vision of downtown.

4.2 Implementation building blocks

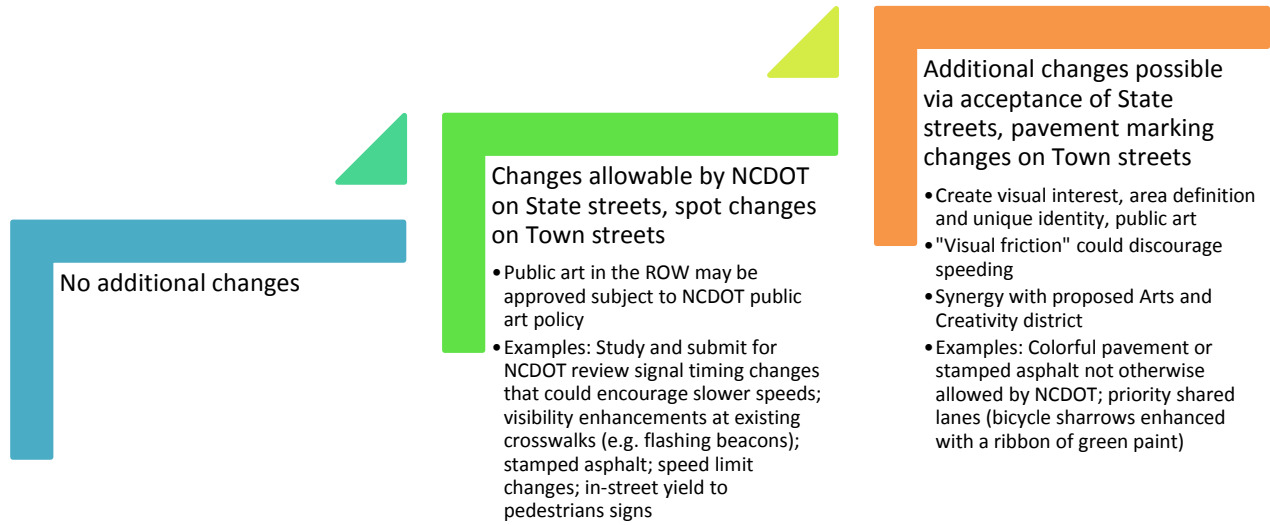
There is not much precedent for implementing a downtown slow zone in the U.S. However, it is clear that implementation is a function of how different “building blocks” are utilized within the feasibility parameters mentioned above.

Below is a framework for thinking about the various levels of implementation of the building blocks. The steps are meant to be cumulative. Implementation of specific examples in this section may require additional engineering study.

4.2.1 Physical traffic calming features



4.2.2 Pavement marking, signage, signal, and aesthetic changes



4.2.3 Education and enforcement

Working with NCDOT, the UNC Highway Safety Research Center, and other Triangle-area municipalities, the Town is already engaged in education and enforcement relating to transportation safety via the Watch for Me NC campaign (www.watchformenc.org). Education is an important supplemental strategy for raising awareness of the desired speed the slow zone attempts to encourage.



Figure 3. Watch for Me NC materials

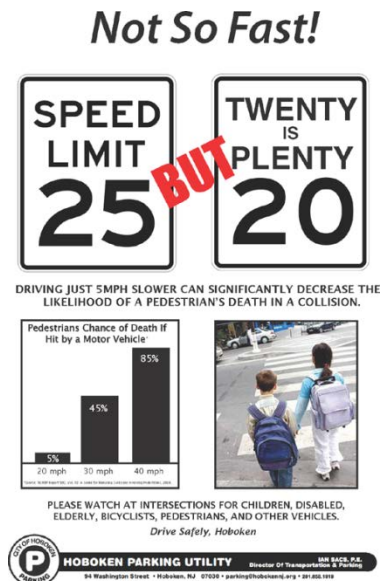


Figure 4. Educational flyer from Hoboken, NJ. Source: City of Hoboken.

Enforcement is not covered in detail in this report. Staff input on how enforcement could play a role in a downtown slow zone is deferred to the Police Department. If a slow zone is pursued, then consideration of speed limit changes would seem warranted assuming a desired maximum speed of 20 mph.

4.3 Slow zone designation and branding

The Town could strive to implement slow zone elements without actually designating a slow zone. However, the following potential benefits could be achieved by official designation:

- Basis for planning and policy within the slow zone
- Potential synergy with an arts and creativity district
- Greater recognition, marketing, and branding power
- A well-defined area that could serve as a unifying theme of grant applications

At the same time, the following potential challenges should be carefully considered:

- Impact on traffic speed on segments in the vicinity of the zone
- Potential confusion on boundaries and marketing if both arts and creativity district and slow zone are established
- In addition to consideration of traffic level of service, consider input from transit providers on potential impacts to bus service

5 Slow zone boundaries

As part of the February 18 meeting, Mr. Lajeunesse outlined potential slow zone boundaries as shown in Figure 5.



Figure 5. TAB-proposed slow zone boundaries

Another boundary reference is existing zoning. Properties zoned B-1 and B-2 may have destinations for which access is sought and will tend to attract higher traffic volumes for all modes.

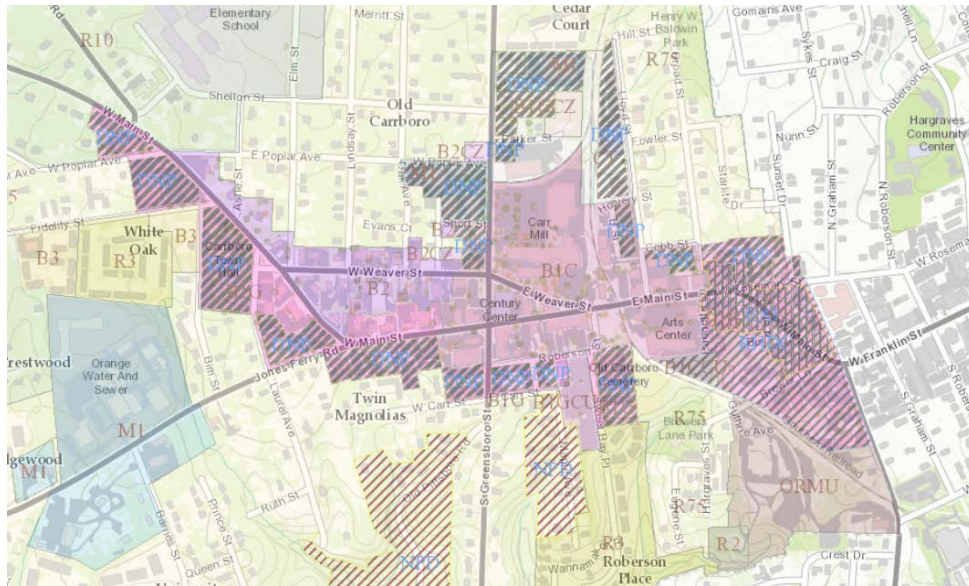


Figure 6. Downtown zoning

6 Next steps

There are a number of options for the Board to consider for proceeding with a slow zone:

- Continue individual efforts to make streets safer and more walkable in the downtown area, but do not specifically establish a slow zone
- Defer consideration of a slow zone to future planning processes that might incorporate the concept as a key element
- Direct staff to return to the Board with a Slow Zone Policy for the Board’s review and consideration of adoption. The purpose of this policy would be to formally establish the slow zone as a priority, define slow zone boundaries, and serve as a guide for future decision-making on projects within the slow zone area.
- Direct staff to report back with more information on slow zone implementation, including providing direction on additional elements to be incorporated into the slow zone

Appendix

Watch for Me NC yielding data

Statistics on pedestrian safety operations (crosswalk yielding compliance) maintained by the Carrboro Police Department, through mid-Oct. 2013

Date	Location	# Crossed	# Violators	% Violated	Citations	Warnings	All Citations	All Warnings	Directed Patrols	Sign present?
2/23/2010	W Main / Hillsborough	9	4	44%	4					
3/8/2010	W Main / Hillsborough	26	14	54%	14					
4/13/2010	S Greensboro / Carr	31	9	29%	9					
4/22/2010	S Greensboro / Carr	50	3	6%	3					
5/10/2010	S Greensboro / Carr	30	7	23%	8					
5/11/2010	W Main / Hillsborough	26	14	54%	14					
5/12/2010	Hillsborough / James	25	11	44%	11					
5/13/2010	N Greensboro / E Poplar	30	6	20%	6					
5/14/2010	S Greensboro / Carr	22	5	23%	5					
	totals for 2010	249	73	29%	74		1590	289	1282	
2/19/2011	Hillsborough / James	25	11	44%	11					
5/12/2011	N Greensboro / E Poplar	30	6	20%	6					
6/27/2011	Hillsborough / James	15	5	33%	4	1				
10/24/2011	S Greensboro / Carr	15	1	7%	1	0				
12/5/2011	S Greensboro / Carr	30	7	23%	7					
	totals for 2011	115	30	26%	29	1	1659	557	1182	
1/16/2012	S Greensboro / Carr	15	1	7%	1	0				No
3/16/2012	W Weaver / Oak		0	0%	0	0				Unk
4/10/2012	S Greensboro / Carr				3					No
7/10/2012	S Greensboro / Carr	18	0	0%	0	0				No
7/23/2012	W Weaver / Oak				5					Unk
7/24/2012	S Greensboro / Carr				2	1				No
8/21/2012	W Main / Hillsborough	13	5	38%	3	2				No
8/22/2012	N Greensboro / E Poplar	15	6	40%	3	1				No
9/20/2012	W Weaver / Oak	19	2	11%	2					Yes
10/14/2012	Hillsborough / James	23	7	30%	6	1				No
10/15/2012	Hillsborough / James	61	15	25%	11	4				No
10/16/2012	W Weaver / Oak	77	5	6%	5					No
10/17/2012	S Greensboro / Carr	124	7	6%	7					No

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10/18/2012	N Greensboro / E Poplar	75	11	15%	7	4			No
10/26/2012	W Main / Hillsborough	24	6	25%	5	1			No
10/27/2012	810 Old Fayetteville	9	3	33%	3				No
12/11/2012	306 Estes Dr Ext	19	5	26%	4	1			No
12/18/2012	306 Estes Dr Ext	26	4	15%	2	2			Yes
	totals for 2012	518	77	15%	69	17	1906	836	1791
1/9/2013	810 Old Fayetteville	32	4	13%	2	2			Yes
2/20/2013	W Weaver / Oak	20	2	10%	2	0			No
4/1/2013	Hillsborough / James	29	4	14%	2	2			Yes
4/2/2013	W Main / Hillsborough	28	3	11%	0	3			Yes
5/14/2013	W Weaver / Oak	42	4	10%	3	1			Yes
5/15/2013	Hillsborough / James	34	2	6%	1	1			Yes
7/16/2013	810 Old Fayetteville	16	4	25%	4	0			Yes
8/20/2013	W Weaver / Oak	24	2	8%	2	0			Yes
8/23/2013	W Main / Hillsborough	17	7	41%	6	1			Yes
9/9/2013	810 Old Fayetteville	33	2	6%	2	0			Yes
10/8/2013	W Main / Hillsborough	21	7	33%	7	0			Yes
10/9/2013	Hillsborough / James	49	5	10%	3	2			Yes
	totals for 2013 (to date)	345	46	13%	34	12	1533	837	1123

* Acknowledgement to Amanda Stipe in the Police Department for providing the data