ATTACHMENT A

A RESOLUTION RECEIVING A PRESENTATION ON A TRANSPORTATION STUDY OF THE OAK-POPLAR NEIGHBORHOOD AND WEST MAIN STREET AND SETTING A PUBLIC HEARING
Draft Resolution No. 91/2011-12

WHEREAS, *Carrboro Vision 2020* states that the "safe and adequate flow of bus, auto, bicycle and pedestrian traffic within and around Carrboro is essential"; and,

WHEREAS, the Carrboro Downtown Traffic Circulation Study (2005) and Carrboro Comprehensive Bicycle Transportation Plan (2009) recommend road diet concepts for the four-lane section of West Main Street; and,

WHEREAS, on February 8, 2011, the Board of Aldermen adopted a resolution directing Town staff to draft a letter to NCDOT conveying interest in the road diet concept and directing that an associated traffic and safety analysis be completed; and,

WHEREAS, on September 16, 2008, the Board of Aldermen adopted a resolution directing staff to organize a neighborhood meeting to discuss traffic management in the Oak-Poplar neighborhood, bounded by N. Greensboro St., W. Main St., Weaver St., and Carrboro Elementary; and,

WHEREAS, through the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization, the consulting firm Martin/Alexiou/Bryson was procured to conduct the road diet analysis and neighborhood traffic study; and,

WHEREAS, a draft report has been prepared that includes both studies;

NOW, THEREFORE BE IT RESOLVED by the Carrboro Board of Aldermen that:

1. The Board of Aldermen receives the presentation of the draft West Main Street Road Diet and Pavement Marking Study and the Oak-Poplar Neighborhood Traffic Circulation Study (the "draft report").
2. A public hearing on the draft report is set for Tuesday, March 27, 2012.
3. The draft report is referred to the Transportation Advisory Board for review.

WEST MAIN STREET ROAD DIET AND PAVEMENT MARKING STUDY
and
OAK-POPLAR NEIGHBORHOOD TRAFFIC CIRCULATION STUDY

Town staff note (3/1/2012): Appendix 3 omitted in this version. See note on last page of Appendix 2.

Prepared For:

Town of Carrboro

Durham-Chapel Hill-Carrboro Metropolitan Planning Organization

February 2012




DRAFT

Prepared By:

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1 INTRODUCTION AND BACKGROUND

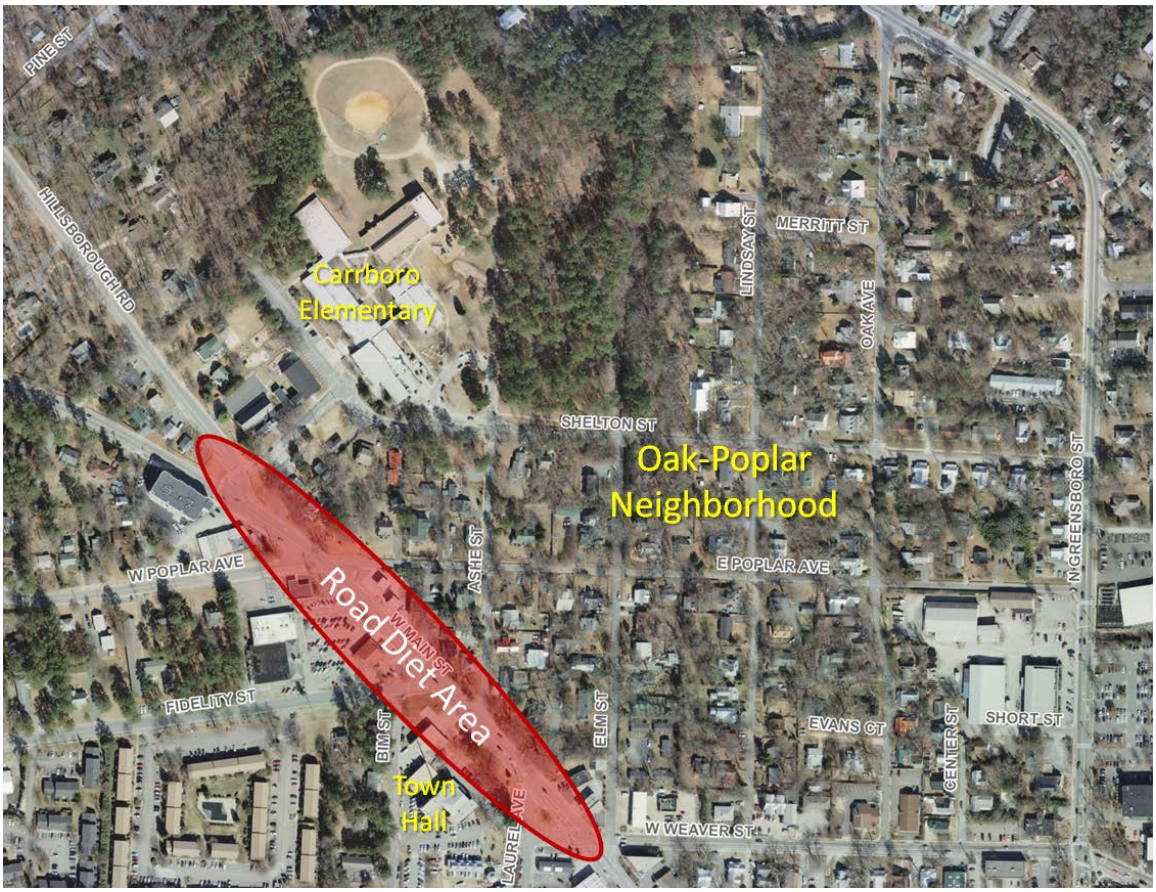
1.1 Purpose of the Study

This study was developed to provide recommendations to address existing and projected multimodal deficiencies for West Main Street between Weaver Street and Hillsborough Road in Carrboro, NC and address traffic concerns in the Oak-Poplar neighborhood. This study has two main parts. The first part is a set of road design recommendations, including a pavement marking and signage plan, for West Main Street. The second part of the study identifies existing and projected traffic and circulation concerns in the adjacent Oak-Poplar neighborhood and provides recommendations for the Town of Carrboro to explore to mitigate traffic issues.

1.2 Project Background and Context

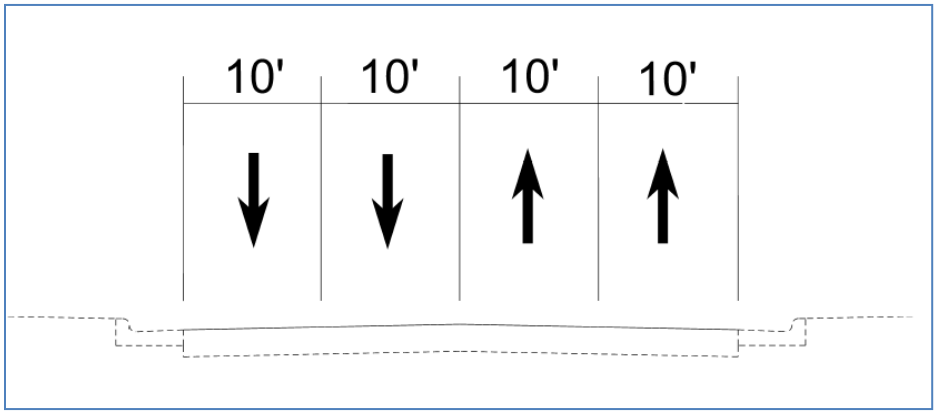
West Main Street is an important street for Carrboro residents, connecting neighborhoods on the west side of town with downtown and providing access to Town Hall and the popular Farmer's Market. West Main Street is listed as State Route 1010. The Study Area for the first part of the project covers the section of West Main Street between Hillsborough Road to the north and Weaver Street to the south. The Study Area for the second portion of this project is the adjacent Oak-Poplar neighborhood which is roughly bounded by West Main Street to the west, Carrboro Elementary and North Greensboro Street to the north, North Greensboro Street to the east, and Weaver Street to the south (see Figure 1).

Figure 1: Study Area



The typical cross-section for the portion of West Main Street in the Study Area is two travel lanes in each direction (see Figure 2). Immediately to the north and south of the Study Area, West Main Street has only one travel lane in each direction. This section of West Main Street does not contain any facilities dedicated to bicyclists. Immediately to the north of the study area, there are bicycle lanes on both sides of West Main Street and Hillsborough Road. There are also bicycle lanes on both sides of Weaver Street east of the Study Area, Poplar Avenue to the west, and a section of West Main Street further south outside of the study area (after the intersection with Jones Ferry Road). Thus, the section of West Main Street in the Study Area represents a gap in the existing bicycle lane network.

Figure 2: Typical West Main Street Cross-Section - Existing



The pavement marking portion of the study analyzed possible "road diet" alignments for West Main Street that would reduce the travel lanes to one in each direction plus provide a continuous, two-way turn lane. This alignment allows room for bike lanes in each direction. The road diet cross-section would also be consistent with immediately adjacent sections of West Main Street. It is anticipatd that changes to the pavement markings associated with a road diet will be implemented after a scheduled resurfacing of West Main Street; therefore no additional costs are associated with the removal of the existing pavement markings in the study area.

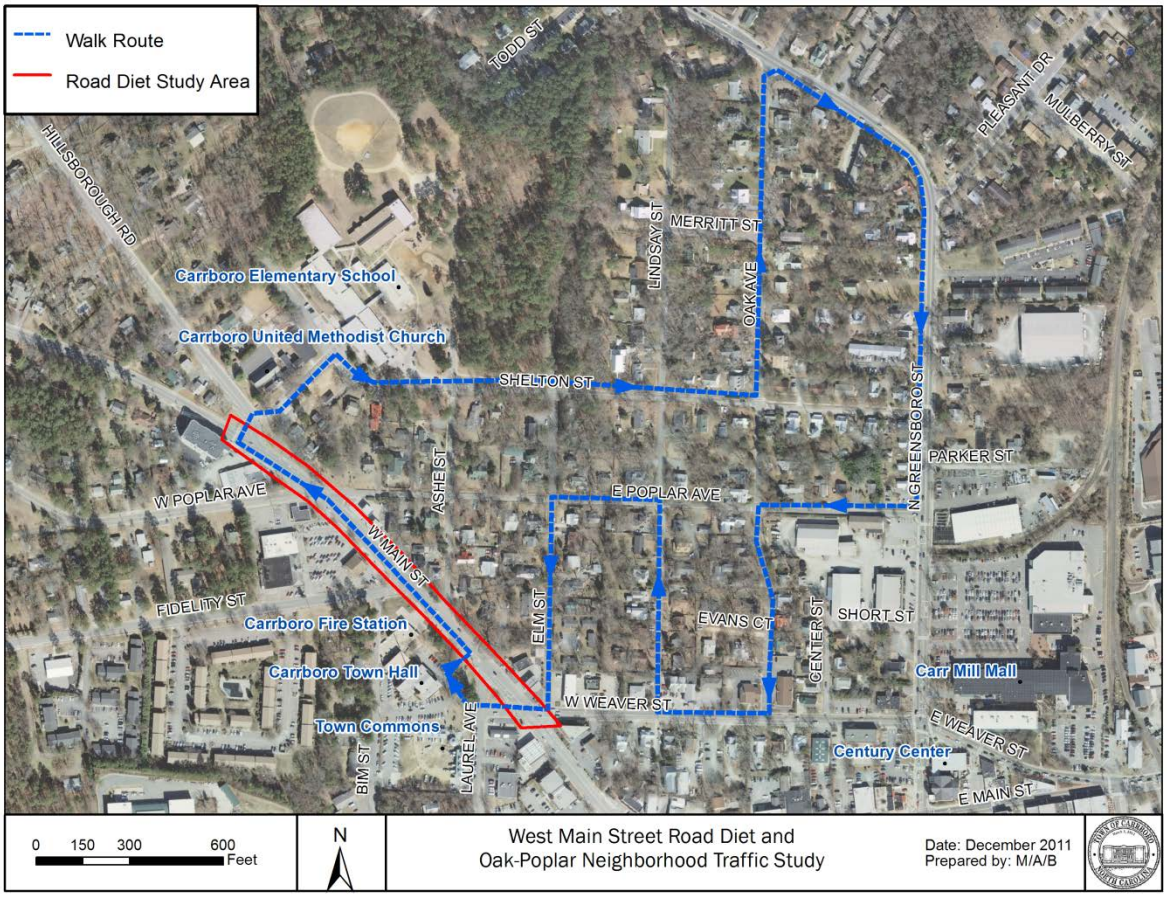
The second portion of the study concerns the 15-block Oak-Poplar neighborhood immediately adjacent to the section of West Main Street in the first part of the study. This neighborhood is residential in character and contains Carrboro Elementary School. The main roads within the neighborhood include Shelton Street (which has a one block, one-way section, westbound between Ashe Street and Hillsborough Road), Poplar Avenue (one-way eastbound), Ashe Street (which has a one block, one-way section, northbound between Poplar Avenue and Shelton Street), Elm Street, Lindsay Street, and Oak Avenue.

The Oak-Poplar Neighborhood Traffic and Circulation Study identified concerns and issues relating to transportation within the neighborhood and any possible impacts that might result from a road diet on West Main Street. This portion of the study includes preliminary recommendations for low-cost, high-yield changes to transportation infrastructure in the neighborhood to improve traffic and circulation issues. Like the road diet portion of the study, this neighborhood traffic study will be focused on multimodal solutions.

1.3 Community Involvement

A critical component of this study is involvement from the community to ensure the issues and concerns that are most important to the neighborhood residents are addressed and that potential solutions will comport with the expectations and desires of the community. In order to foster strong public participation, the project team held a neighborhood walk on November 3, 2011, and a public meeting on December 5, 2011. The neighborhood walk took place at 5:30 pm on a Thursday evening and had ten participants from the neighborhood (see Figure 4). The walk started and ended at Town Hall and took the route shown in Figure 3 through the Oak-Poplar neighborhood. The walk took about an hour and provided detailed feedback from community members on trouble spots, traffic concerns, and neighborhood transportation issues. Project team members also had a chance to ask questions of community members to gauge the importance of different circulation issues in the community.

Figure 3: Neighborhood Walk Route



The public meeting was held on a Monday night at 5:30 pm, at Carrboro Elementary School. Eleven members of the public were present. The meeting lasted about two and a half hours, including time at the beginning and end of the meeting where project team members were available for more informal, one-on-one discussions with community members. The presentation from the project team, which included ample opportunities for comments and feedback from members of the public, took about an hour and a half. The presentation contained a draft pavement marking plan for a road diet on West Main Street and a summary of

feedback and neighborhood traffic concerns heard to date. Figure 5 shows a neighborhood map with participant comments that was part of the public meeting process.

Figure 4: Neighborhood Walk

The neighborhood walk and public meeting generated a number of comments from members of the public about various neighborhood transportation concerns. In addition to input at the walk and the public meeting, a number of comments were received, via email, by project staff. A summary of the comments received regarding the road diet plan and traffic concerns in the Oak-Poplar neighborhood is contained in Appendix 2.

Figure 5: Public Meeting Map Exercise

1.4 Background Resources

In addition to feedback from the public, the project team utilized a number of other resources in this study. Town of Carrboro staff members provided input and their professional judgment of various options. M/A/B staff collected traffic count data, including for pedestrians and bicyclists, along the West Main Street Study Area section. M/A/B staff also made neighborhood traffic observations independent of the neighborhood walk in order to better understand transportation issues in the Oak-Poplar neighborhood (see Figure 6).

Figure 6: Roadway Data Gathering

In addition to community engagement, independent observation, and Town input, M/A/B staff examined existing Town of Carrboro plans and policies to ensure that recommendations are in accordance with other plans and goals. Plans and policies that have been reviewed include:

- Draft Safe Routes to School Strategic Action Plan (December, 2010)
- Town of Carrboro Comprehensive Bicycle Transportation Plan (March, 2009)
- Town of Carrboro Sidewalk Bond Referendum Project List

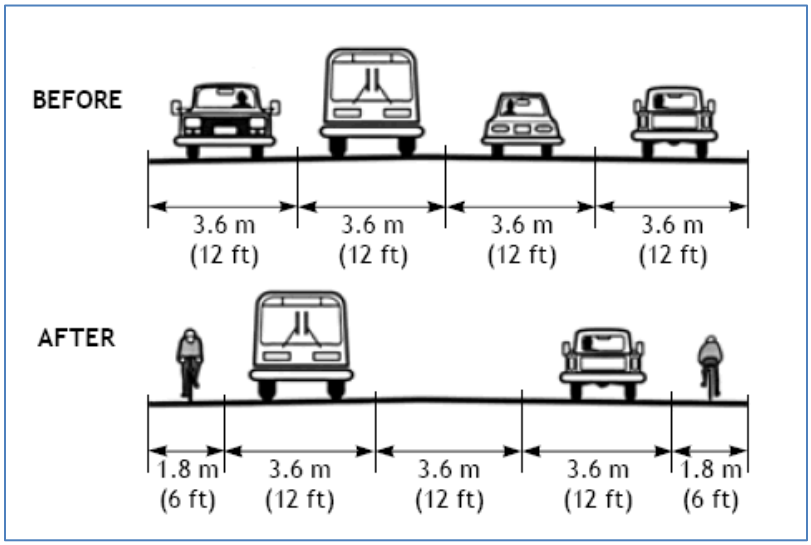
2 WEST MAIN STREET ROAD DIET AND PAVEMENT MARKING STUDY

2.1 Introduction

A road diet is a form of road engineering wherein travel lanes (and sometimes lane width) are reduced in order to improve traffic flow, road safety, and to better accommodate pedestrians and bicyclists. A common road diet is to replace a four lane cross-section (two travel lanes in each direction) with a cross-section featuring two travel lanes (one in each direction), a two-way, center turn lane, and the either bike lanes or on-street parking. The concept can have safety benefits for drivers, pedestrians, and bicyclists. By reducing lanes, drivers no longer can switch lanes and weave around traffic. Average travel speed is often reduced as traffic flows at the speed of the slowest driver. Pedestrians benefit from fewer lanes to cross when crossing the street. If bike lanes are added as part of the road diet, then bicyclists benefit from the additional

infrastructure, reduced vehicle speeds, and the elimination of lane changing. Road diets are also a cost-effective traffic control measure because they do not involve moving curbs and gutters, merely restriping a road section. Typically, the restriping is scheduled to be done after the road is resurfaced, which makes the marginal cost of the road diet essentially zero because the pavement markings would have to be repainted anyway and the only change is the pavement marking design. This is what is proposed on West Main Street. Average daily traffic typically should be less than 20,000 cars per day for a road diet to work. Figure 7 shows typical before and after cross-sections. Figure 8 shows the existing conditions on West Main Street.

Figure 7: Typical Road Diet Before and After Cross-Sections



Source: FHWA

Analyses were performed to assess the feasibility and traffic impacts of a road diet on West Main Street between Weaver Street and Hillsborough Road. Traffic analyses were performed to assess the existing traffic conditions on West Main Street and the conditions anticipated to result should the proposed road diet be implemented. Peak period intersection level of service analyses were performed using traffic data collected in the fall of 2011. To illustrate the potential layout of West Main Street, a concept pavement marking plan was prepared. The findings of the analyses indicate that the pavement markings on West Main Street could be modified to provide a travel lane each direction, a center two-way left-turn lane, and bike lanes on each side of the street and still provide acceptable levels of service at the intersections in the study area. The Town is considering possibly extending the road diet beyond the study area extent south of Weaver Street between Weaver Street and Jones Ferry Road. Based on our assessment, this would likely be feasible.

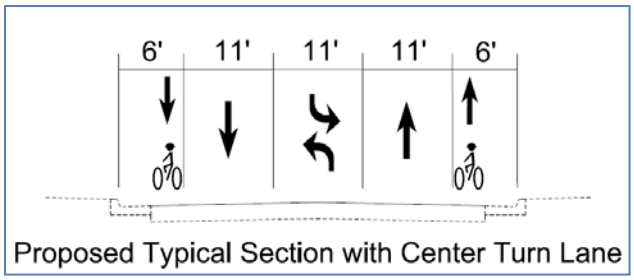
Chapel Hill Transit currently provides transit service on West Main Street on the CW Route. The headways are approximately 30 minutes during peak hours, 60 minutes during off-peak hours, and 90 minutes on Saturdays. It is not anticipated that a road diet on West Main Street would have any impact on transit service or operations nor are any modification to the transit service proposed as part of the road diet.

Figure 8: West Main Street - Existing

2.2 Road Diet Feasibility and Concept Plan

The goal of the road diet for West Main Street is to provide two travel lanes in each direction, a center two-way left-turn lane, and a bike lane in each direction between Weaver Street and Hillsborough Road without widening the existing road. The existing typical section of West Main Street includes two travel lanes in each direction between Weaver Street and Hillsborough Road. North of Hillsborough Road the typical section includes one travel lane in each direction with marked bike lanes in each direction. Field measurements indicate that the desired typical section can be accommodated within the existing curb to curb width of West Main Street. A concept plan for the road diet pavement markings is included in Appendix 1. The typical section that could potentially result from the road diet is illustrated below in Figure 9. It is anticipated that any new pavement markings associated with a road diet will be implemented after a scheduled resurfacing of West Main Street and would therefore not require any additional cost to remove the existing marking or to install the new markings. It is also anticipated that the speed limit on West Main Street will not be reduced as part of the road diet.

Figure 9: Proposed West Main Street Typical Section



It is anticipated that the adjustments in the lane markings on West Main Street due to a road diet may require that the existing traffic signal heads be adjusted to properly align with the approaching vehicles on southbound West Main Street at the intersection with West Weaver Street. The existing traffic signal at the intersection is pre-timed (does not include any vehicle detector loops); therefore no adjustments for vehicle detection will be required.

The draft pavement markings plan also shows a bike box on West Main Street at the intersection with Weaver Street. A bike box can be installed at intersections to allow bicyclists to move to the front of the queue, which improves the visibility of bicyclists to motorists and improves the safety of left and right bicycle turning movements (see Figure 10). Bicyclists can position themselves to more easily make left turns without having to merge into traffic, and the bike box would be painted a solid color to increase visibility. The safety of right turning movements is also improved as motorists are prohibited from turning right on red and are less likely to conflict with bicycle through traffic when turning right on green. Bicycle boxes are relatively new and not yet included within the MUTCD or AASHTO guidelines. Cities such as Portland, Minneapolis, and New York City have successfully implemented bike boxes. Because of the geometry of the intersection at West Main Street and Weaver Street and the relatively low volume of traffic, a bike box is not recommended at this location, although it was examined as an option. If a bike box were to be provided, then it would be painted a solid color to contrast with the asphalt, and consideration could also be given to painting the entire bike lane a solid color to improve visibility (as shown in the bike box example in Figure 10); this would entail higher maintenance costs and require approval from NCDOT.

Figure 10: Bike Box Example

Source: stelsewhere.blogspot.com

2.3 Traffic Data Collection

In order to assess the traffic impacts of a road diet, peak period intersection turning volumes were collected at the following intersections:

- West Main Street at Weaver Street
- West Main Street at Ashe Street
- West Main Street at Fidelity Street
- West Main Street at Poplar Avenue
- West Main Street at Hillsborough Road

West Weaver Street was closed to traffic at the time the traffic data was collected; therefore the data was adjusted based on historical traffic data to reflect conditions that would have been typical with Weaver Street open to traffic.

Daily traffic volume data were also provided by the Town of Carrboro. The daily traffic volumes range from approximately 6,300 vehicles per day between Weaver Street and Ashe Street to approximately 6,000 vehicles per day between Poplar Avenue and Hillsborough Road. Daily traffic volumes are illustrated below in Figure 11.

Figure 11: Average Daily Traffic Volume

*Note that traffic volume data was collected when East Weaver Street was closed. Traffic volumes on West Main Street north of Weaver Street may exceed the volumes indicated in the figure above after Weaver Street is opened to traffic.

2.4 Level of Service Analyses

Peak period intersection level of service analyses were performed for existing conditions on West Main Street and for the conditions anticipated to result should a road diet be implemented. Analyses were also performed to assess the impact of converting the signalized intersection of West Main Street at West Weaver Street to roundabout in addition to implementing a road diet. The results of the level of service (LOS) analyses are illustrated below in Figure 12 and detailed in Table 1.

The analyses indicated that all of the intersections in the study area are currently operating at acceptable (LOS A and B) levels of service during the A.M. peak hour and during the P.M. peak hour of traffic and would be expected to continue to operate at acceptable LOS should the road diet be implemented. The analyses also indicate that the approaches of West Main Street, West Weaver Street, and Elm Street would operate at acceptable LOS if the existing intersections of those streets were to be converted to a roundabout. While the analyses indicated that traffic operations should be acceptable with a roundabout, impacts on adjacent properties and driveways should be more fully assessed before making a recommendation to construct a roundabout at this location. The peak period intersection turning volumes and detailed traffic analysis reports from *Synchro* (intersection analyses) and *Sidra* (roundabout analyses) are provided in Appendix 3.

Implementation of the road diet concept will require that detailed pavement marking plans and traffic signal modification plans (if necessary) be submitted to NCDOT for approval. The necessary design documents will be prepared following the selection of the preferred road diet options by the Town.

Figure 12: Level of Service Analysis

Table 1: Peak Period Intersection Level of Service Results

West Main Street Intersection	Traffic Control	Existing (2011)		Road Diet (2011)	
		AM	PM	AM	PM
Hillsborough Road	Unsignalized	(WB-B)	(WB-B)	(WB-B)	(WB-B)
Poplar Avenue	Unsignalized	(EB-B)	(EB-B)	(EB-B)	(EB-B)
Fidelity Street	Unsignalized	(EB-B)	(EB-B)	(EB-B)	(EB-B)
Ashe Street	Unsignalized	(SB-A)	(WB-A)	(WB-A)	(WB-B)
Weaver Street	Signalized	B (SB-B)	B (NB-B)	B (SB-B)	B (NB-B)
Elm Street	Unsignalized	(SB-A)	(SB-B)	(SB-A)	(SB-B)
Weaver Street/Elm Street Roundabout	Roundabout	-	-	A (SB-A)	A (SB-A)

Legend: X (X-X) = overall intersection LOS for signalized intersection (worst approach – worst approach LOS)
X = Worst LOS for uncontrolled approach at unsignalized intersection

3 OAK-POPLAR NEIGHBORHOOD TRAFFIC AND CIRCULATION STUDY

3.1 Introduction

The Oak-Poplar neighborhood is roughly bounded by West Main Street to the west, Carrboro Elementary and North Greensboro Street to the north, North Greensboro Street to the east, and Weaver Street to the south. It is a mostly residential neighborhood that also includes Carrboro Elementary School, located on Shelton Street. The main roads within the neighborhood include Shelton Street (which has a one block, one-way section, westbound between Ashe Street and Hillsborough Road), Poplar Avenue (one-way eastbound), Ashe Street (which has a one block, one-way section, northbound between Poplar Avenue and Shelton Street), Elm Street, Lindsay Street, and Oak Avenue. The neighborhood streets are primarily arranged in a grid pattern with some variation, particularly at edges to the neighborhood.

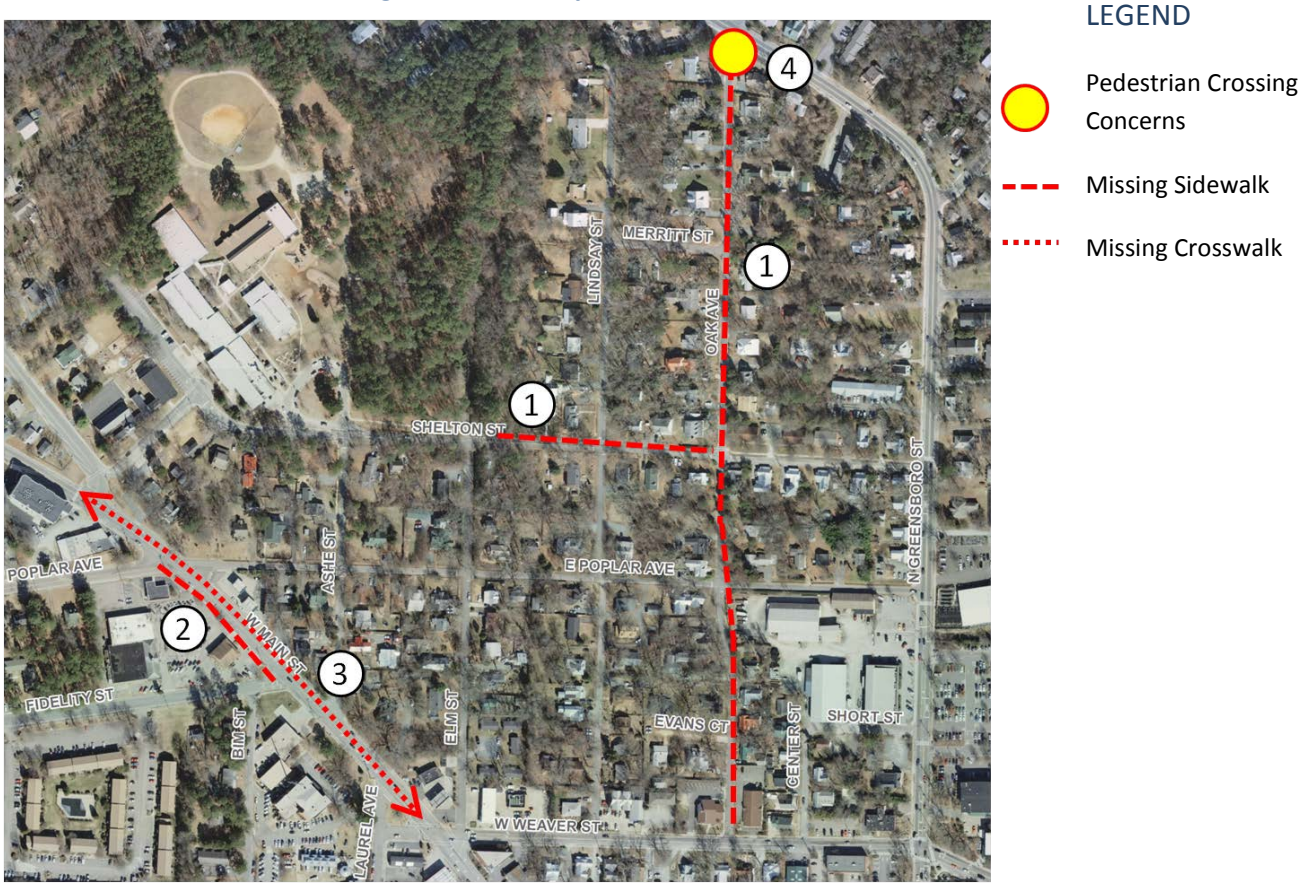
Because the Oak-Poplar neighborhood is older, many of its roads were designed and constructed prior to current engineering standards. Therefore, many of the roads in the neighborhood are narrower than typical roads, and most road segments do not have sidewalks. Additionally, the right-of-way is sometimes narrow on neighborhood streets with houses, trees, and utility poles occasionally close to the roadway. All of this complicates possible multimodal transportation facility improvements, and currently bicyclists, pedestrians, and vehicles often share the same space (see Figure 13). Residents of the neighborhood have voiced a number of concerns about traffic and transportation issues in the neighborhood, which are discussed below grouped by type of concern.

Figure 13: Multimodalism on Oak Avenue

3.2 Pedestrian Issues

Figure 14 shows pedestrian issues identified in the Oak-Poplar neighborhood. Most of the roads within the Oak-Poplar community do not have sidewalks. Ashe Street has a sidewalk on the block between Poplar Avenue and Shelton Street. Shelton Street has sidewalks, except for the portion between the greenway and Oak Avenue. Major roads in the area (North Greensboro Street, Weaver Street, and West Main Street) all have sidewalks on both sides, except for missing segments on the west side of West Main Street between Fidelity Street and Poplar Avenue. Many of the neighborhood streets in this segment are narrow and most lack curbs, meaning pedestrians and vehicles are not separated and travel close to each other.

Figure 14: Oak-Poplar Pedestrian Issues



Based on comments from the public and observations, the lack of sidewalks on key neighborhood roads, Shelton Street and Oak Avenue, was the biggest complaint (Number 1 in Figure 14 and Figure 15). According to members of the neighborhood, these two roads are frequently used by pedestrians both in the neighborhood and by residents outside the neighborhood to cross through the Oak-Poplar neighborhood. Additionally, Carrboro Elementary School is located at the western end of Shelton Street.

On West Main Street, there is a gap in the sidewalk on the western side between Fidelity Street and Poplar Avenue (Number 2 in Figure 14). There is some space to walk in the fitness center parking lot and the chiropractor's office driveway to avoid walking in the street; even so, this section is not very accommodating to pedestrians, particularly those with disabilities or pedestrians with strollers. Additionally, there are no crosswalks on West Main Street between Hillsborough Road and Weaver Street (Number 3 in Figure 14 and Figure 16). This was the top issue cited in public comments concerning West Main Street. Several commenters requested well-marked crosswalks like those on North Greensboro Street at Shelton Street. A road diet would reduce the number of vehicle travel lanes to cross at a mid-block crossing, but would also mean crossing bike lanes and in this case does not reduce the overall width of the crossing. A refuge island in the center or a raised median could potentially be added which could make it more feasible to provide a mid-block crosswalk.

Figure 15: Missing Sidewalks on Shelton Street

Figure 16: Pedestrian Crossing West Main Street

In addition to the pedestrian crossing issues along West Main Street, there were concerns raised about the intersection of Oak Avenue and North Greensboro Street. There is no marked pedestrian crossing here, either for pedestrians trying to cross Oak Avenue while traveling along North Greensboro Street or for pedestrians seeking to cross North Greensboro Street; the closest crossings of North Greensboro Street are Estes Drive to

the west and Shelton Street to the south. There is a striped yellow triangle which attempts to demarcate a traffic island, but this is faded (see Number 4 in Figure 14 and Figure 17). Cars can turn from North Greensboro Street into Oak Avenue at a high speed and pedestrians walking along North Greensboro Street do not have a raised pedestrian refuge while crossing Oak Avenue.

Figure 17: Oak Ave. and N. Greensboro St. Intersection

3.3 School Circulation Concerns

There are a number of circulation issues that are specific to the blocks adjacent to Carrboro Elementary School, and the concerns are largely as a result of trips generated going to and from the school (see Figure 18). Perhaps the primary issue cited here is the lack of traffic control for cars leaving the drop-off circle at Ashe Street and Shelton Street (Number 5 in Figure 18 and Figure 19). The other two streets at the intersection, northbound Ashe Street (one-way) and westbound Shelton Street (one-way west of the intersection), have stops signs. When school is starting or letting out, there is a traffic guard here who helps direct traffic. However, at other times of day, there is no clear indication of how a car leaving the traffic circle should proceed. The lack of appropriate controls may leave drivers unclear whether to stop, yield, or do neither.

Figure 18: School Circulation Concerns

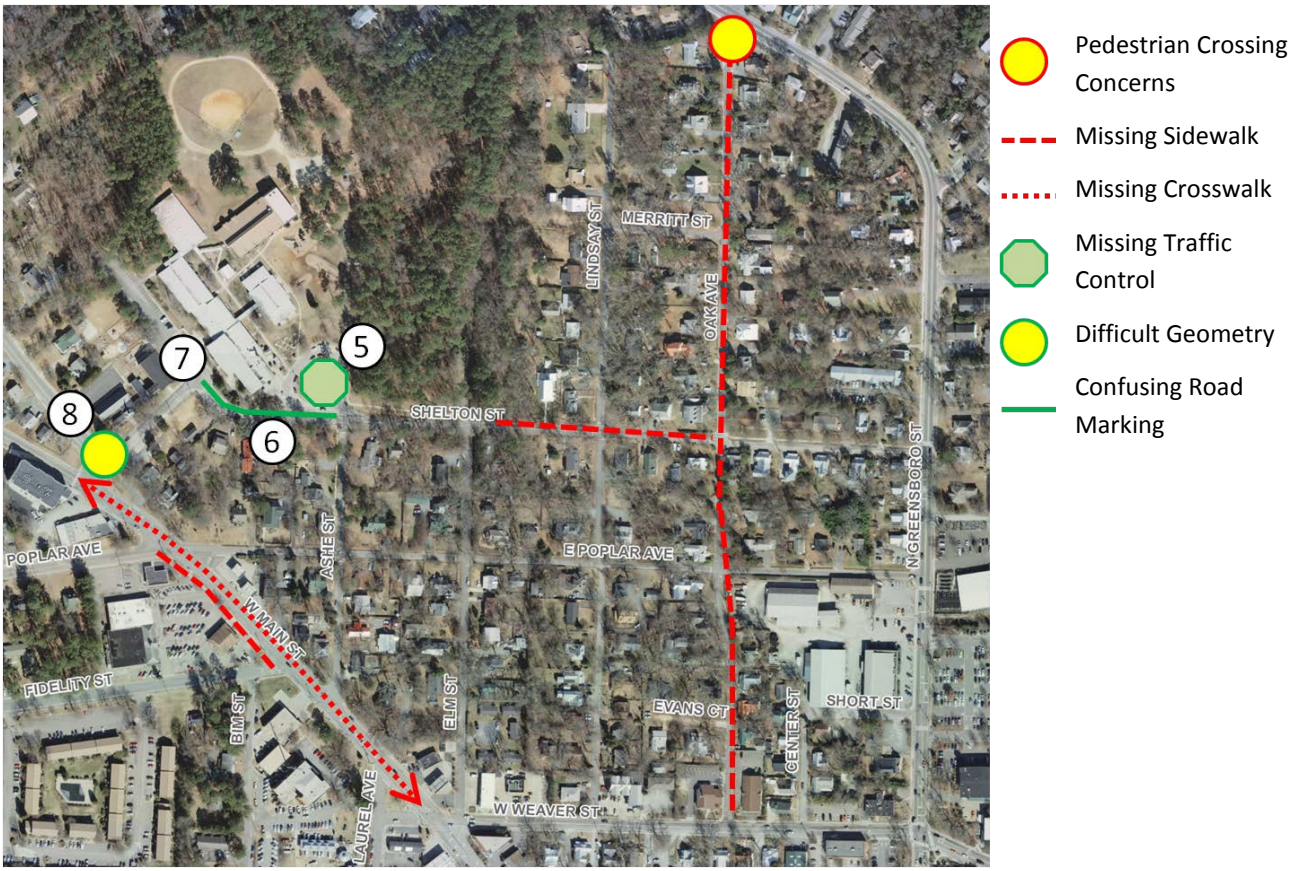


Figure 19: Carrboro Elementary Drop-Off Circle

Shelton Street in front of the school also can be confusing for drivers (Number 6 in Figure 18 and Figure 20). Approaching the school (i.e., east of Ashe Street), Shelton Street is two-way. However, it is one-way in front of

the school with a solid white line separating two lanes. First, it is unclear, initially, that there are two available travel lanes. Second, it is implied from the solid line that it is improper to change lanes. Third, when the two lanes reach a stop sign at the turn in the road on Shelton Street, both lanes are allowed to turn left, yet only one lane exists into which to turn left (Number 7 in Figure 18). This set-up is most likely to aid in pick-up and drop-off during school times when traffic flow is assisted by guards, but it leads to a confusing couple blocks at other times.

Figure 20: Pavement Markings on Shelton Street

The third primary issue around Carrboro Elementary is the road geometry at the intersection of Shelton Street, Hillsborough Road, and West Main Street (Number 8 in Figure 18 and Figure 21). Shelton Street intersects with Hillsborough Road only a few feet from where Hillsborough Road intersects with West Main Street. This leads to a situation where traffic during school drop-off and pick-up times is not permitted to take a left-turn from Shelton Street onto Hillsborough Road because there is not enough queuing space. Some of these cars that are forced to take a right-turn cut through a private driveway on Hillsborough Road to reach West Main Street, despite posted signs directing drivers that the driveway is private and should not be entered. The traffic flow is better here at non-school peak times because there is space for cars to queue up on Shelton Street if needed. Additionally, residents noted some accidents at this intersection because they believe drivers traveling south on Hillsborough Road failed to notice the curve in the road just before the stop sign at Main Street.

Figure 21: Intersection of West Main Street, Hillsborough Road, and Shelton Street

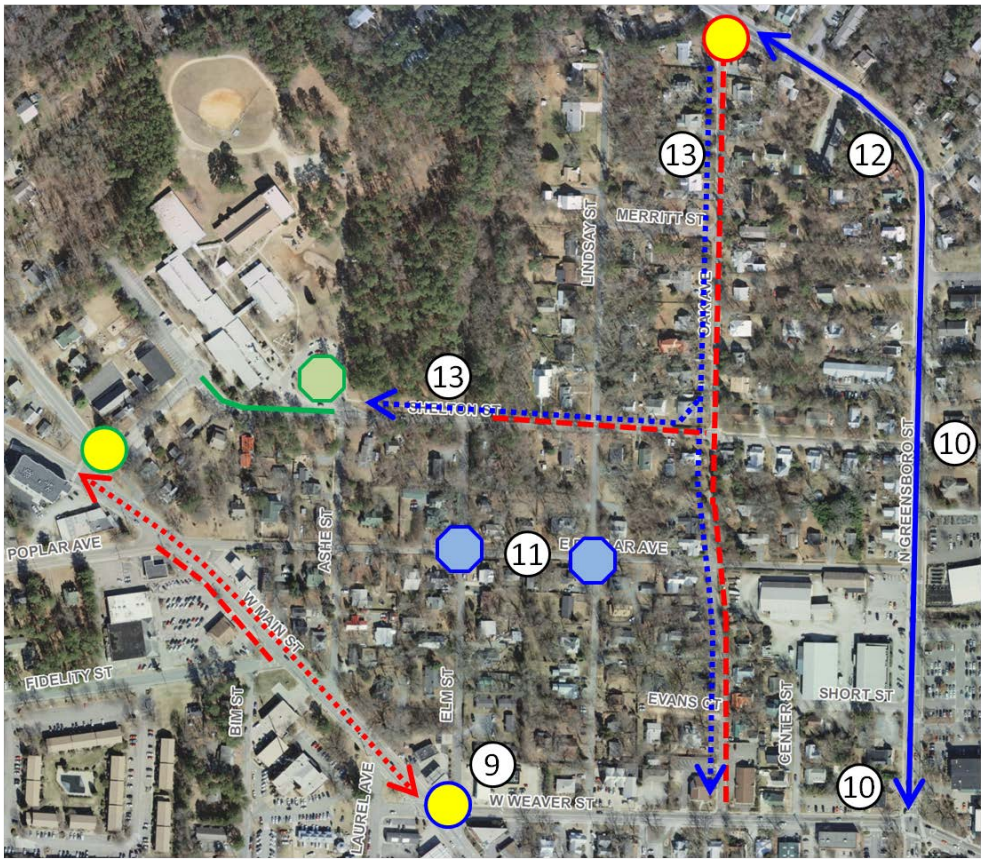
3.4 General Circulation Issues

There are some additional neighborhood traffic and circulation issues which have been highlighted by the public and the project team for additional attention (see Figure 23). A number of public comments cited cut-through traffic as an issue affecting the Oak-Poplar neighborhood. The primary roads that were mentioned as having cut-through traffic were Shelton Street and Oak Avenue, which makes sense based on the road characteristics. These two roads allow drivers to avoid downtown Carrboro when traveling from the north to the west or vice versa (Number 13 in Figure 23 and Figure 22).

Figure 22: Traffic on Poplar Avenue

A number of comments concerned failure to comply with stop signs throughout the Oak-Poplar neighborhood (Number 11 in Figure 23). There are no traffic signals within the neighborhood and all intersections are controlled with stop signs. Many of the public comments received noted that a number of drivers in the neighborhood fail to stop at stop signs and many fail to slow down much at all.

Figure 23: General Circulation Issues



LEGEND

- Pedestrian Crossing Concerns
- Missing Sidewalk
- Missing Crosswalk
- Missing Traffic Control
- Difficult Geometry
- Confusing Road Marking
- Stop Compliance
- Difficult Intersection
- Traffic Congestion
- Cut-through traffic

The intersection at Elm Street, West Main Street, and Weaver Street is another intersection with odd geometry (Number 9 in Figure 23). Elm Street intersects with Weaver Street within a few feet of the signalized Weaver Street and West Main Street intersection. There is confusing signage on Weaver Street regarding whether right turns onto West Main Street are permitted during red light cycles. The sign, placed before Elm Street, states, “Stop Here on Red,” in order to prevent queued vehicles from blocking Elm Street. However, it is not clear whether drivers can proceed forward to the Main Street intersection to take a right turn if that action would not block Elm Street. All turning movements into and out of Elm Street at this location were noted by some members of the public as difficult.

Traffic on North Greensboro Street can be heavy at peak travel times and queues from the traffic signal at Weaver Street and North Greensboro Street can stretch back to Poplar Avenue (Number 12 in Figure 23). The congestion on this section of North Greensboro Street may be encouraging cut-through traffic into the Oak-Poplar neighborhood to avoid the North Greensboro Street and Weaver Street intersection. Exiting the Oak-Poplar neighborhood at peak travel times can be difficult using any of the eastern egress points – Poplar Avenue, Shelton Street, or Oak Avenue. In particular, left turns to travel northbound on North Greensboro Street were noted by members of the public as particularly hard.

Connected with concerns about traffic on North Greensboro Street, there were many comments received about possible new developments on North Greensboro Street and the potential traffic impacts for the neighborhood resulting from these new developments (Number 10 in Figure 23). The two development proposals currently being considered are for a mixed-use development featuring over 100 apartment units (proposed for North Greensboro Street across from Shelton Street) and a CVS drug store at the corner of Weaver Street and North Greensboro Street. As part of the development review process, the impacts to the surrounding transportation network will be identified and addressed.

3.5 Potential Solutions

There are a variety of possible traffic measures for the Oak-Poplar neighborhood to address the traffic and circulation concerns identified by this study. These possible measures are shown below in a matrix in Table 2, but many need more extensive investigation to determine their feasibility and the possible traffic effects. Note that measures which change traffic patterns on one street may increase traffic on adjacent neighborhood streets.

The matrix shows problems addressed by each potential treatment, expected outcomes, next steps needed to implement the treatment, and a qualitative assessment of affordability, feasibility, and effectiveness. It is important to stress that these qualitative assessments are a high-level expectation based on neighborhood observations and similar projects in other locations; the actual assessment of the project may change after more detailed study of the unique planning and engineering elements of each treatment.

Each qualitative assessment category contains one to three plus signs denoting whether the treatment scores lowly (one plus mark), highly (three plus marks), or somewhere in the middle (two plus marks) for that category. Affordability scores are classified as: + means greater than $50,000 expected cost, ++ means between $10,000 and $50,000 expected cost, and +++ means less than $10,000 expected cost (note: detailed cost estimates were not completed for this study). Feasibility is a low (+), medium (++), or high (+++) ranking of the engineering, technical, and approval challenges posed by the project. Effectiveness is a low (+), medium (++), or high (+++) assessment of the degree to which the potential treatment solves the particular problems it seeks to address.

For example, a chicane on Shelton Street (introducing a horizontal “jog” or shift into an otherwise straight section of roadway) scores “+” for affordability, “+” for feasibility, and “++” for effectiveness. This means that this type of treatment is expected to cost more than $50,000, have a high degree of engineering and/or regulatory approval concerns, and be moderately effective at accomplishing the stated goals, in this case reducing traffic speeds. For an example of a chicane, see Figure 24.

Figure 24: Chicane Example

Source: walkinginfo.org

Table 2: Potential Solutions Matrix

Potential Solution	Problem(s) Addressed	Expected Outcomes and Impacts	Affordability [1]	Feasibility [1]	Effectiveness [1]	Next Steps
Oak Avenue One-Way	▪ Cut through traffic ▪ Limited space for autos and pedestrians on Oak Avenue	▪ Less cut through traffic ▪ Increased travel distance for residents ▪ Possible level of service impacts at intersections	++	+	++	Detailed Traffic Impact Analysis report
Traffic calming: traffic humps or speed tables on Oak Avenue	▪ Speeding ▪ Cut through traffic	▪ Slower traffic	++	++	++	Detailed engineering study on possible locations
Traffic calming: chicanes or traffic circles on Shelton Street	▪ Speeding ▪ Cut through traffic	▪ Slower traffic	+	+	++	Detailed treatment location / traffic impact study
Raised Pedestrian Islands at the North Greensboro Street and Oak Avenue intersection and the West Main Street and Weaver Street intersection	▪ Pedestrian discomfort at crossings	▪ Slower traffic ▪ Safer pedestrian crossings	++	+++	++	Town and NCDOT approval
Close Elm Street and Weaver Street intersection to vehicle traffic	▪ Difficult turning movements into and out of Elm Street	▪ Better traffic operations at Weaver Street and West Main Street ▪ Increased travel distance for residents of Elm Street ▪ Possible increase in traffic on neighboring streets	++	+	++	Traffic Impact Analysis report

Potential Solution	Problem(s) Addressed	Expected Outcomes and Impacts	Affordability [1]	Feasibility [1]	Effectiveness [1]	Next Steps
Reconstruct Shelton Street / Hillsborough Road / West Main Street intersection	▪ Lack of queue space on Hillsborough Road between West Main Street and Shelton Street ▪ Difficult turning movements ▪ Right only from Shelton Street during school drop-off and pick-up	▪ Better traffic movements, particularly from Shelton Street ▪ Possible increase in traffic on neighboring streets	+	+	+++	Planning and engineering study of traffic impacts, capital costs, new road alignments, and new traffic patterns.
Construct sidewalks on Oak Avenue, Shelton Street, and/or Elm Street (Note: Construction of a sidewalk on Elm Street is anticipated to begin in April/May 2012 and be completed in September 2012.)	▪ Pedestrians and vehicles having to share the same space on neighborhood streets	▪ Increased pedestrian safety and comfort ▪ May require new right-of-way acquisition and/or relocating utilities	+	++	+++	Detailed sidewalk layout study to determine sidewalk alignments and impacts on properties, right-of-way, trees, and utilities.
Mid-block, marked , pedestrian crossings on West Main Street (possibly with raised, pedestrian refuge islands)	▪ Haphazard pedestrian crossings ▪ Lack of marked crossings on West Main Street	▪ Increased pedestrian safety and comfort	+++ (++ if raised refuge islands are used)	+++	+++	Location study and NCDOT approval

[1] Scoring:

Score	Affordability	Feasibility	Effectiveness
+	Cost > $50,000	Low	Low
++	Cost $10,000 - $50,000	Moderate	Moderate
+++	Cost < $10,000	High	High

APPENDIX 1: DRAFT PAVEMENT MARKING PLAN

Figure 27 shows a possible pavement marking plan for a road diet on Main St., and Figure 25 shows a close-up view of the typical section for the road diet pavement marking plan. The plan shows one travel lane in each direction with a shared center turn lane and bike lanes in each direction. There is some possibility for alternative plans as well. For example, parking could possibly be added in front of Town Hall, although that would possibly require eliminating one or more of the bike lanes in this portion. Also, Figure 26 shows a bike box concept which could be included in a restriping project, but is not recommended in this particular case because of the geometry of the intersection at West Main Street and Weaver Street. Bike lanes could be painted a solid color to increase visibility, but this involves higher maintenance costs and NCDOT approval. It is anticipated that any revisions to the existing pavement markings associated with the road diet will be implemented following the scheduled repaving of West Main Street which would reduce the costs.

Figure 25: Road Diet Typical Section

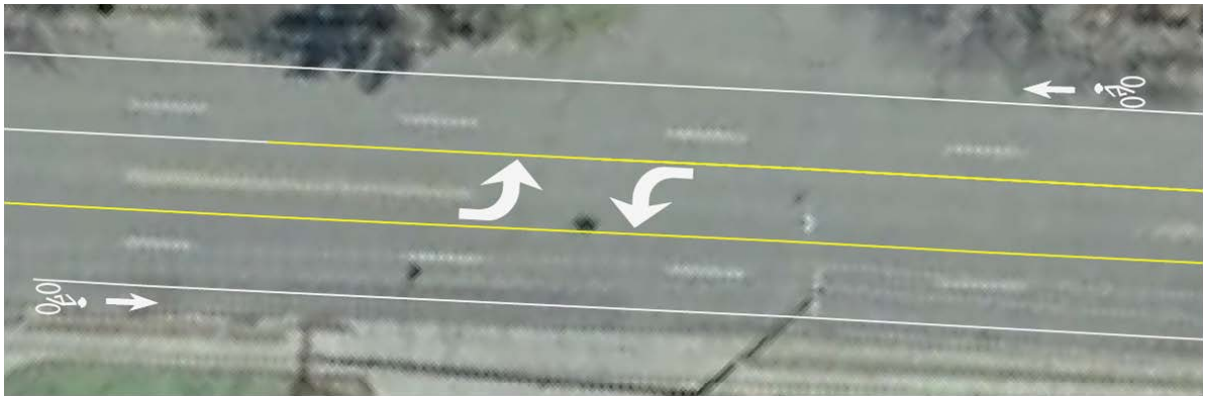


Figure 26: Bike Box Concept

Figure 27: Road Diet Pavement Marking Plan

APPENDIX 2: COMMENTS FROM THE PUBLIC

The following comments were received from the public during this process.

On the Neighborhood Walk:

- Crossing West Main Street as a pedestrian is difficult without any marked crossings, but many people make this crossing.
- The drop-off circle at Carrboro Elementary School is dangerous and several members of the walk commented on nearly having accidents with cars exiting the circle.
- The solid white line on Shelton Street in front of Carrboro Elementary School was noted as being confusing.
- Cut-through traffic is a problem, particularly on Oak Avenue and Shelton Street.
- Drivers sometimes fail to properly observe stop signs in the neighborhood by coming to a complete stop; some drivers barely slow down.
- A couple participants on the walk expressed a desire for Oak Avenue to be one-way.
- Several participants expressed a desire for speed humps on Oak Avenue, and speed humps larger than the one currently on Oak Avenue between Poplar Avenue and Weaver Street.
- The Oak Avenue and North Greensboro Street intersection was described by a couple of participants as difficult both for drivers and pedestrians.
- Many participants in the walk expressed concern over the possible traffic effects of proposed new development at North Greensboro Street across from Shelton Street.
- Turning movements from Elm Street onto Weaver Street or into Elm Street were described as difficult.
- A number of participants expressed a desire for sidewalks along Oak Avenue, or at least space demarcated for pedestrians to provide some separation from vehicles traveling in the road.
- Several comments expressed concern over the speed of traffic traveling through the neighborhood.

At the Public Meeting:

- Several members of the public expressed a desire to have some sort of “gateway” treatment at the north end of North Greensboro Street to signal to drivers that they are entering the downtown area and should proceed slowly and with caution.
- Several attendees expressed a desire to have crosswalks installed on West Main Street in the Road Diet Study Area section.
- Concerns were raised about the possible traffic and transportation impacts of new developments on North Greensboro Street across from Shelton Street and the proposed new CVS at North Greensboro Street and Weaver Street.
- Stop sign compliance was noted as a problem for neighborhood streets.
- Cut-through traffic was cited by a couple participants as a problem, particularly on Oak Avenue and Shelton Street.
- Town staff noted that bus headways are 30-minute peak and 60-minute off-peak for service along West Main Street in the Study Area.
- A couple participants noted that the intersection of Shelton Street, Hillsborough Road, and West Main Street is dangerous and they have observed accidents here when drivers were unaware of the turn in Hillsborough road before West Main Street.

- Several participants commented that drivers sometimes speed through the neighborhood and the existing stop signs do not appear to be effective devices for reducing vehicle speeds.

Town staff note (3/1/2012): Appendix 3 (50 pages) -- including Synchro and Sidra traffic analysis report tables and maps -- has been omitted to save paper in the agenda packet. For a copy of the full report, including Appendix 3, please contact Jeff Brubaker, Transportation Planner, at jbrubaker@townofcarrboro.org, or 919-918-7329.

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

Beverly Eaves Perdue
GOVERNOR

Eugene A. Conti, Jr.
SECRETARY

June 17, 2011

Mr. Steven Stewart
Town Manager
Town of Carrboro
301 West Main Street
Carrboro, NC 27510

Subject: Road Diet Study on West Main Street in Carrboro

Dear Steve:

Thank you for your letter, and Resolution of Support from the Carrboro Board of Alderman, relating to a concept for modifying the lane configuration on West Main Street (SR 1010), from Hillsborough Road (SR 1009) to Weaver Street, within the Town of Carrboro.

I certainly support the concept of this "road diet" along this section of West Main Street, and performing this modification of the travel lanes is something that can be accomplished with the resurfacing of the road, however, before we do so, I have two areas of concerns that we need to address.

The first concern is the need to have a public meeting, or workshop, scheduled in order to provide the citizens of this area an opportunity to review, and provide comments, on this proposal of the modification of the travel lanes.

Secondly, due to the amount of time that has elapsed, is to review the Carrboro Downtown Traffic Circulation Study that was performed in 2005, to ensure that the recommendations made from that study are still applicable with the current traffic conditions that exist on West Main Street.

I look forward to working with you on the "road diet" concept, and please do not hesitate to contact Pat Wilson, Division Operations Engineer, or myself, as we move forward to address the above concerns and implement this modification to the travel lanes.

Sincerely,

J. M. Mills, P.E.
Division Engineer

JMM/jm

Cc: Pat Wilson
Dawn McPherson
Brad Wall
Chuck Edwards
Matt Efird
Patricia McGuire
Jeff Brubaker
Roger Henderson

P. O. Box 14996 Greensboro, NC 27415-4996 Telephone No. (336) 334-3192 Fax No. (336) 334-3637

TOWN OF CARRBORO
NORTH CAROLINA
WWW.TOWNOFCARRBORO.ORG

RECEIVED
JUN 08 2011
NC Dept. of Transportation
Division of Highways-7th Div.

June 6, 2011

Mr. Mike Mills, PE
Division Engineer, NCDOT Highway Division 7
1584 Yanceyville Street
P.O. Box 14996
Greensboro, N.C. 27415-4996

RE: Road diet study on W. Main St. in Carrboro

Dear Mike,

This is to inform you that the Town of Carrboro is interested in a "road diet" concept for the segment of W. Main St. (SR 1010) from Hillsborough Rd. (SR 1009) to Weaver St. (locally maintained).

On February 8, 2011, the Carrboro Board of Aldermen adopted a resolution supporting the road diet concept and directing staff to conduct an analysis of traffic and safety impacts of implementation. As part of a study jointly funded by the Town and DCHC-MPO, the engineering and planning firm Martin/Alexiou/Bryson (M/A/B) is being contracted to conduct the analysis. If the analysis shows no substantial impacts to traffic operations or public safety, a preliminary pavement marking plan in accordance with the road diet concept will be submitted to the Division office. The Board requests that this lane configuration change be considered at the time the road is resurfaced.

A copy of the February 8, 2011, Board resolution is attached. If you have any further questions, please contact Jeff Brubaker, Transportation Planner, at 919-918-7329 or jbrubaker@townofcarrboro.org.

Thank you for your consideration.

Sincerely,

Steven Stewart
Town Manager
Town of Carrboro

Cc: Chuck Edwards, PE, District Engineer, NCDOT Division 7
Matt Efird, Assistant to the Town Manager, Town of Carrboro
Patricia McGuire, AICP, CZO, Planning Director, Town of Carrboro
Jeff Brubaker, Transportation Planner, Town of Carrboro
Roger Henderson, AICP, PE, Senior Project Manager, Martin/Alexiou/Bryson

The following resolution was introduced by Alderman Coleman and duly seconded by Alderman Lavelle.

A RESOLUTION RELATING TO A CONCEPT FOR MODIFYING THE LANE CONFIGURATION ON WEST MAIN STREET FROM WEAVER STREET TO HILLSBOROUGH ROAD
Resolution No. 56/2010-11

WHEREAS, *Carrboro Vision 2020* states that the "safe and adequate flow of bus, auto, bicycle and pedestrian traffic within and around Carrboro is essential"; and,

WHEREAS, the segment of West Main Street between West Weaver Street and Hillsborough Road is four lanes; and,

WHEREAS, the Carrboro Downtown Traffic Circulation Study (2005) recommends modifying this segment to one through lane in each direction with on-street parking on one side and bike lanes on both sides (assuming intersection capacity increasing with a modern roundabout at Weaver Street); and,

WHEREAS, the Carrboro Comprehensive Bicycle Transportation Plan (2009) recommends the following: "Stripe bicycle lanes along this stretch of Main St. with the implementation of a road diet, converting existing four lanes to two travel lanes, a central turn lane, and striped bicycle lanes on both sides of the roadway"; and,

WHEREAS, properly implemented "classic road diets" – converting roads from four lanes to three (including a center turn lane) – have been found to reduce crash frequency and motor vehicle speeds, as well as invite greater bicycle and pedestrian use while having insubstantial effects on traffic operations for streets with average daily traffic under 15,000 to 20,000; and,

WHEREAS, road diets reduce the number of lanes pedestrians and left-turning vehicles must cross; and,

WHEREAS, this segment of West Main Street is the site of a substantial number of bicyclists, pedestrians, and transit users; and,

WHEREAS, West Main Street is maintained by the North Carolina Department of Transportation (NCDOT);

NOW, THEREFORE BE IT RESOLVED by the Carrboro Board of Aldermen that:

1. The Board of Aldermen receives the staff report and presentation;

2. Town staff are directed to prepare a letter to NCDOT conveying the Board's interest in the road diet concept and requesting that it be considered at the time of resurfacing.
3. Town staff are directed to conduct an analysis of traffic and safety impacts of road diet implementation and present the analysis to the Board of Aldermen by May 1, 2011, and work with NCDOT on other necessary implementation steps.
4. The Board of Aldermen would like to explore possible ways to increase the safety of the crosswalk for walkers and bikers at Main and Poplar;
5. If the traffic and safety analysis shows no substantial traffic operations or public safety impacts, a pavement marking plan in accordance with the road diet concept described above shall be prepared and submitted to NCDOT by June 30, 2011.

The foregoing resolution having been submitted to a vote received the following vote and was duly adopted this 8th day of February 2011;

Ayes: Dan Coleman, Sammy Slade, Lydia Lavelle, Mark Chilton, Joal Hall Broun, Jacquelyn Gist, Randee Haven-O'Donnell

Noes: None

Absent or Excused: None

I, Catherine C. Wilson, Town Clerk for the Town of Carrboro do hereby certify that the foregoing is a true and accurate copy of a resolution duly adopted by the Board of Aldermen of the Town of Carrboro, NC.

Town Clerk

TOWN OF CARRBORO INCORPORATED 1911 NORTH CAROLINA