Attachment "A"

A RESOLUTION RECEIVING THE UPDATE ON THE
DOWNTOWN CARRBORO TRANSPORTATION STUDY
Resolution No. 36/2004-05

WHEREAS, the Carrboro Board of Aldermen seeks ample opportunities to develop and implement initiatives which enhance the viability of downtown.

NOW, THEREFORE BE IT RESOLVED by the Carrboro Board of Aldermen that the Aldermen has received the update on the downtown transportation study.

Carrboro Downtown Transportation Study

I. INTRODUCTION

Smokestacks were a common sign of economic success during the industrial age in America. Later, the spotted owl and the return of other endangered species were an icon of success during environmental awareness periods in America. Today in twenty-first century America, the pedestrian and streetlife in general is a sure sign of success in urban life.

Some cities in Florida and California are identifying districts where pedestrians come first, with accommodation of all others! Conflict among different modes of transportation is not only inevitable; it is welcomed in a vibrant, prosperous downtown. The key to success is managing that conflict so that the appropriate balance is achieved and maintained in a safe and efficient manner.

Today, downtown Carrboro has achieved vibrancy and a degree of prosperity. There is a very successful music scene and emerging arts and food experience. No other town Carrboro's size can brag about having a popular food co-op next to a successful Harris Teeter grocery store, plus numerous excellent restaurants. Today, downtown Carrboro's streetlife is active, particularly near the Weaver Street green and most especially on Thursdays and weekends.

However, the pedestrian is not yet treated as a first priority in downtown Carrboro. That is because the street system is designed primarily to move traffic and all other modes secondarily. Proof of this situation is found on most street corners by pedestrians who are confused about where and when to cross, despite the presence of traffic signals.

The purpose of this plan is to describe various ideas about how the transportation system can be used and improved to expand and enhance the vibrancy of downtown Carrboro. Specifically, the ideas generated by Carrboro citizens during a three-day charrette held in 2001 are evaluated. A study area map is shown in ***Figure 1.***

For example, there are at least four oddly-shaped intersections that are confusing to pedestrians, bicyclists and some motorists. This plan includes new designs that would reduce confusion and clearly delineate safe places to cross these busy streets. Furthermore, Carrboro has achieved national recognition for the creation of bikeways, however, that success has had limited penetration into the downtown area. This plan considers facilities to close gaps in the bikeway network.

Through a rigorous process of data collection and analysis, a team of traffic engineers, urban planners and landscape architects offer concepts for a balanced plan for downtown Carrboro. The plan builds on previous work including the Downtown Design Guidelines adopted in 1992 and the New Vision for Downtown Carrboro formulated by hundreds of citizens in a three-day charrette held in 2001. These guidelines and vision establish the philosophical framework for this plan.

If the purpose of towns and cities is to maximize the exchange between people and organizations, then access is penultimate.

- Access by pedestrians to all buildings, streets and intersections.
- Access by motorists to conveniently distributed parking lots.
- Access by bicyclists to all streets and bicycle parking areas.
- Access by patrons of the bus system to safe and well-marked bus stops.
- Access by delivery trucks from preferred truck routes to markets.
- Access by citizens and visitors to meet and greet each other.

Access is an evolving factor as downtowns grow. Downtown Carrboro has evolved into a network of streets and paths that offer travelers real choices among fare-free buses, shared-use paths, pleasant sidewalks, well-distributed public and private parking lots and multilane streets with synchronized traffic signals. In sustainable cities and towns, growth is accommodated through increased use of walkways, bikeways and transit rather than wider roads.

Timeline of Pertinent Events

- The NC 54 bypass opened to traffic in 1952 and was widened to a multilane highway in 1992. This facility is designed to carry "through traffic" (motorists without a downtown origin or destination) around downtown. This is important if Carrboro implements strategies that increase travel time on downtown streets, leading to perhaps a distinct split between motorists who choose not to stop and shop that will travel via the bypass and those who have an origin or destination downtown who will travel downtown.
- Traffic studies were done in the mid-1970's and repeated in the mid-1980's that led to multilane streets and synchronized traffic signals. The system works reasonably well for traffic, despite obvious vehicle queues during weekday peak periods that extend a full block on Weaver Street, Greensboro Street and occasionally on Main Street.
- Carrboro Downtown Business District *Guidelines for Design*, prepared by Lucy Carol Davis Associates in 1990. This very readable document begins a new era for downtown Carrboro whereby pedestrians begin to take precedence over the automobile.
- *Guidelines for Design* adopted by Board of Aldermen March 10, 1992.
- Community Visioning Workshop, March 25, 2000 (100 participants)
- Carrboro Vision 2020: Policies through the year 2020, adopted December 5, 2000. Significant policies are established by the Board including a goal to "double commercial square footage in the downtown from that existing in the year 2000." Traffic demand management strategies are adopted that assume increases in traffic volume that are tempered through the use of parking lots at the downtown perimeter served by shuttles to bring people downtown.
- Downtown Visioning Charrette, September 13-15, 2001 (with hundreds of participants)
- Preliminary Vision, presented to Board of Aldermen by Walkable Communities on November 10, 2001.
- Charrette Report, Walkable Communities, Inc.; February 2002
- Downtown Traffic Circulation Study and Streetscape Plan initiated March 2004.

Community Vision

Carrboro citizens are widely recognized for their passionate involvement in community activities. Their collective vision for downtown is captured in two documents of which the guiding document is entitled *Carrboro Vision 2020*, adopted by the Board of Aldermen in December 2001. Further information is provided in a consultant's report entitled *Downtown Visioning Charrette Report* which was submitted in February 2002 based on extensive citizen involvement over a three-day period in September 2000. Overarching goals adopted by the Board of Aldermen that are central to this study are listed below in no particular order.

1. "Double commercial square footage in the downtown from that existing in the year 2000"
2. Downtown accessibility by all travel modes
3. "as a general policy, established roads should be widened to accommodate bike lanes and sidewalks, but not to provide additional lanes for automobiles"
4. Improve pedestrian comfort and safety
5. Improve downtown parking

Guidance provided by Town staff at this study's kickoff meeting in March 2004 included the following:

- keep traffic moving and maintain unique character of downtown Carrboro
- identify transportation infrastructure to accommodate downtown growth
- study recommendations of the New Vision report (February 2001)
- consider rail station at Main Street with connections to UNC and Carolina North
- Weaver Street improvements have been delayed three years waiting for this study so consider scheduling Weaver Street reconstruction before other streets
- Consider strategies to shift some travel from auto to other modes
- Maximize the supply of on-street parking spaces
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Additional guidance provided by Town staff in July and again in September 2004 included the following:

- strong support for improving pedestrian safety and convenience
- vehicle trips that stop to shop in downtown Carrboro are valuable and transportation strategies should not discourage such trips
- service vehicles and trucks need to be accommodated
- traffic signal at Main and Lloyd Streets took a lot of effort, with strong community support, and should be retained
- consider advantages and disadvantages of on-street parking in different configurations including parallel, diagonal, and diagonal back-in type
- consider different types of on-street bikeways
- consider improved connectivity of downtown streets and strategies to mitigate neighborhood concerns about connected streets

Problem Statement

Downtown Carrboro has one of the most vibrant small-town economies in North Carolina. The design of most buildings in relation to the street system supports a downtown feel where pedestrians enjoy the environment. However, pedestrian comfort and safety can be improved with investments of public and private funds as new buildings are constructed. Street design changes could reduce travel speeds, create a buffer space between moving vehicles and pedestrians, and break-up an existing bottleneck that now affects quality-of-life at the Weaver Street "Green" and nearby public spaces.

II. ALTERNATIVES CONSIDERED

Overall, the Town of Carrboro wishes to enhance the experience and expand the "downtown" character to the edges of the study area. Public investment in infrastructure is envisioned in order to support the enhancement and expansion goals. Various alternative public investments that were considered in this study are described. To serve as a baseline for comparison purposes, the so-called "Do Nothing" alternative is included. Following discussion, various elements of different alternatives may be combined to create a "preferred" alternative.

Alternative 0: Do Nothing – allowing downtown Carrboro to grow without major changes to the street system is always an option. In the future, any hope for significant state or federal funding for transportation projects downtown would require consideration of the "Do Nothing Alternative". As shown in Table 4, year 2030 growth will result in Level of Service F traffic conditions at 7 of the 10 downtown study intersections. Delay and queue lengths could be quite long, leading many regular commuters to choose alternate routes. It is unlikely Carrboro would realize their objective of doubling the amount of non-residential building space downtown because traffic congestion would keep prospective businesses and customers away.

Alternative 1: One-way Couplet – considered only for the 100 block of West Weaver Street and the 100 block of West Main Street whereby westbound traffic would be routed via Weaver Street and the return (eastbound) traffic flow would use Main Street. Greensboro Street and all other study area streets would remain two-way. A short one-way connector lane was also considered through the existing Christmas tree lot to link the one-way sections from Weaver to Main Street. Advantages and disadvantages of this alternative are listed below:

Alternative 1: One-Way Couplet	
Advantages	**Disadvantages**
Reduces traffic congestion on Weaver Street	Lacks public support
Improves public safety for all users (Goal 4)	Lacks merchant support
Simplifies pedestrian crossings (Goal 4)	Typically confuses drivers
Allows for added on-street parking (Goal 5)	Contributes to speeding
Simplifies traffic, pedestrian and bicycle movements at intersection of Main/Weaver/Roberson	Increases congestion on East Main Street approaching the railroad tracks
Allows for safer pedestrian crossings at intersection of Main/Weaver/Roberson Streets	
Creates a usable public open space by widening "The Point" adjacent to The Spotted Dog restaurant by narrowing Weaver and Main Streets. Can put umbrella tables out there.	

Alternative 2: Ease Level of Service Goal – an easing of the Town's level of service goal could maintain two-way streets with the addition of on-street parking on any street that is at least 38 feet wide (examples include sections of East and West Main Street). Parking maneuvers could increase traffic delays, prompting through traffic to use alternate routes such as the NC 54 Bypass. Customers of downtown businesses could face more congestion, but their overall travel time might not change if they snag a parking place in front of their destination. Advantages and disadvantages of this alternative are summarized below:

Alternative 2: Ease Level of Service Goal	
Advantages	**Disadvantages**
Increases parking supply and distributes spaces throughout downtown (Goal 5)	Increases traffic congestion
Buffers pedestrians from moving cars (Goal 4)	Lacks NCDOT support
Allows for shorter pedestrian crossings due to narrowing of streets (Goal 4)	May require Town ownership of streets if NCDOT support is not provided

Alternative 3: Interconnect streets – a city street system is analogous to a human skeleton wherein streets, like bones, are typically connected with one another. Specific street connections were not considered because it is outside the scope of this study. Interconnecting streets may encourage local traffic to avoid using downtown streets, thus providing some relief from traffic congestion, however it may lead to increased traffic volumes on streets with single-family homes. There are treatments (such as traffic calming) that can minimize and mitigate the impact of higher traffic volumes by maintaining reasonable speeds on residential streets, however, there would be no way to avoid the impact of more vehicles. The consultant believes that, over time, residential property values on these interconnected streets would increase due to demand for housing that is truly walking distance to a cultural center with a mix of uses, a plethora of activities, and opportunities to meet and greet friends from all over Carrboro. Winning approval on this point, however, is problematic.

Alternative 3: Interconnect Streets	
Advantages	**Disadvantages**
Relieves traffic congestion	Increases traffic volume on residential streets
Offers alternate routes	Outside the scope of this study
Avoids multilane additions to streets (Goal 3)	Politically unpopular

Alternative 4: Roberson Extension and Weaver Woonerf – the bend in Roberson Street north to intersect Main Street avoids another crossing of the railroad, however it complicates the signalized intersection at Main and Weaver Streets. The traffic signal provides for clear and safe turning movements for vehicular traffic, but it is confusing for pedestrians. Pedestrian movements across this intersection are important to the success of downtown as this could be considered the "100 percent" corner (defined as the best corner to locate a business because of the high level of activity) in Carrboro and it is on a main pedestrian route between the Weaver Street Green and the nearest municipal parking lot.

Alternative 4 considers changing this short block of Roberson Street to serve one lane of one-way southbound traffic leading away from Main Street. On-street parking opportunities could be added on one (diagonal) or both (parallel parking) sides of Roberson Street. A street extension could be built adjacent to the existing shared-use path across the railroad tracks into the site occupied by the Arts Center and Cats Cradle. This should only be considered in conjunction with agreements by the property owner and are dependent on successful integration with their plans to redevelop their property. Roberson Street could intersect with a southerly extension of Lloyd Street that would have an outlet to the existing signal at Main and Lloyd Streets.

This could be an "initial operating segment" that could ultimately be extended easterly to intersect Main Street near Brewer Lane and/or Merritt Mill Road / Franklin Street which would extend the urban grid street pattern in downtown Carrboro and support the Town's goal of doubling the amount of non-residential building space. There are several "hard to reach" lots behind the Arts Center that could be developed to highest and best use if fronting on a street like Roberson Street.

In February of 2003, the Board of Aldermen adopted a wider cross-section for Roberson Street that would eventually increase from the existing 40-foot wide right-of-way to 68 feet in width. The additional right-of-way is envisioned to add on-street parking, tree planting areas and wider sidewalks.

The Weaver Street woonerf is identified in the *New Vision* report as "a compromise between full closure" [as suggested by some Carrboro citizens] and the traffic-clogged street that now blows exhaust fumes into the Weaver Street Green. "The design philosophy of the woonerf is to create visual cues to motorists (through good design) that the street belongs to the people who are not in vehicles, but they are willing to share the space with those who need access. Motorists are treated as the intruder and usually feel uncomfortable driving at speeds in excess of 10 mph".

During most peak periods today, traffic in both directions is stopped and some motorists would appreciate the ability to speed-up to 10 mph. However, it is the close spacing (300 to 500 feet) between signalized intersections and the excess demand of vehicular traffic that causes the peak period queuing, delays, noise and emissions that detract from the area.

Alternative 4 considers changing the 100 block of Weaver Street into a one-lane one-way westbound woonerf. Intersections at either end of the woonerf would be simplified, thus leading to shorter queue lengths and diminished impacts on the Weaver Street Green. Another benefit includes the creation of "new" public space that could be converted from striped traffic lanes today into more on-street parking and/or bicycle lanes, wider sidewalks and/or landscape strips separating pedestrians on the sidewalk from moving cars. Furthermore, the elevation of Weaver Street itself could be lifted to match the sidewalks and thereby eliminate the need for curbs, as these form barriers to citizens in wheelchairs. Drainage of surface water could be accomplished through the introduction of "valley gutters" separating the travel lane and the on-street parking.

The benefits to pedestrians, bicyclists and citizens enjoying the Weaver Street Green are real, however deliberations must consider where the traffic will go if they won't use Weaver Street. One obvious and one not-so-obvious answer were considered in this analysis. First, maintaining two-way traffic flow on Main Street would accommodate some of the diverted traffic. Second, the extension of Roberson Street across the railroad tracks to Lloyd Street would add critical new capacity parallel to Weaver Street. Queues could be reduced by minor widening and restriping of Greensboro Street and eliminating the traffic signal at Main and Weaver Streets.

Alternative 4: Roberson Street Extension / Weaver Woonerf	
Advantages	**Disadvantages**
Relieves traffic congestion	Requires public awareness and outreach to convey project objectives
Offers alternate routes	Requires changes to established driving patterns
Simplifies intersections (Goal 4)	Minor widening to add right-turn lane southbound on Greensboro at Main Street (counter to Goal 3)
Enhances public space along Weaver	More traffic pressure on Greensboro Street and in the 100 blocks of East and West Main Street
Extends urban street grid thereby supporting downtown growth objectives (Goal 1)	
Increases supply of on-street parking (Goal 5)	
Vast improvement in walkability along Weaver Street and enjoyment of the Weaver Street green	

Alternative 4 could be implemented by a public-private partnership involving key property owners, the Town of Carrboro and the North Carolina Department of Transportation. Alternative 4 is summarized below.

- Extend Roberson Street to Lloyd Street on a 80-foot wide right-of-way
- Extend Lloyd Street south of East Main Street on at least a 40-foot right-of-way
- Modify traffic signals at East Main / Lloyd Streets to add fourth leg
- Restripe southbound Greensboro Street from Carr Mill to Carr Street
- Widen southbound Greensboro St. to add right-turn lane at Main Street
- Modify traffic signals at Greensboro/Weaver and Greensboro/Main
- Convert 100 block of Weaver Street to woonerf with one-way westbound operations
- Convert 100 block of Roberson Street to one-way southbound operations
- Remove traffic signals at Main / Weaver / Roberson Streets
- Create a truck parking bay to replace the existing on-site delivery area serving Carr Mill Mall. Widen the east side of Greensboro Street by 10 feet, from the existing service driveway to Carr Mill Mall and the primary driveway to the Carr Mill Mall parking lot.

To gain the best public response (and fewest complaints), the best start to implement Alternative 4 improvements would be to begin with extending Roberson Street in conjunction with redevelopment of the Arts Center site and adjacent sites. A new connection across the railroad tracks to Lloyd Street would add capacity parallel to East Main Street and distribute traffic around the bottleneck at the intersection of Main / Weaver / Roberson Streets.

The additional capacity and spreading of traffic would be noticeable to the public and would mask the effect of other changes including conversion of Weaver Street to a woonerf operation. Therefore, in the private-sector driven implementation scenario, changes to Weaver Street could begin construction immediately following the opening of Roberson Street to Lloyd Street.

To test the Weaver Street concept, paint can be used to delineate lane changes before curbs are reconstructed. Similarly, hoods can be placed over traffic signal heads that aren't needed. In this way, public acceptance can be monitored over a two-week to two-month period before

construction contracts are let for more permanent-type improvements to Weaver, Main and Greensboro Streets.

Long-Range / Site Redevelopment Process

As appropriate parcels develop or redevelop, the Town is encouraged to consider strategies to acquire additional right-of-way to construct a new two-lane "complete" street that would extend Roberson Street easterly to Franklin Street. A "complete" street includes accommodations for all modes of travel including pedestrians, bicyclists, transit, motorists, and also provides on-street parking spaces. As shown in ***Figure 9***, an alignment for the Roberson Street extension could result split the existing property line between the Arts Center and the property due south of it. The roadway alignment shown in ***Figure 10*** is suitable for a 30 mph operation. Acquisition of an 80-foot wide right-of-way for the corridor would accommodate a "complete" street with one 11-foot wide travel lane in each direction, a 6-foot wide striped bicycle lane in each direction, an 8-foot wide area for on-street parking (includes curb and gutter), a five-foot wide landscape strip and a ten-foot wide sidewalk on each side of the street.

The Roberson Street extension could be accentuated with sharp horizontal curves limiting speeds to 30 mph and with several "T" intersections creating connections back to East Main Street via an extension of Lloyd Street and construction of a new street near the Bandidos Mexican Restaurant. If necessary, the Lloyd Street extension can be built on the ground floor of a proposed parking deck serving a redeveloped Arts Center site. The Roberson Street extension could be aligned on the "back" or south side of the new parking deck.

To avoid further complicating the intersection of East Main Street / Merritt Mill Street / Franklin Street, it is recommended that the Roberson Street extension serve as the through route from Franklin Street. East Main Street should "T" into the Roberson Street extension. To minimize concerns about loss of business along Main Street in Carrboro due to diversion of traffic, it is recommended that existing parking facilities along Roberson Street be clearly signed as "Municipal Parking" or "Public Downtown Parking".

Furthermore, the Town could serve as the lead agency in a study, design and construction of a multistory parking deck on some portion of the current site of the existing private 250-space surface parking lot that is operated by Carr Mill Mall for their employees. Consideration should be given to "wrapping" the deck in a combination of retail-office-residential uses along the southern portion of the site to create improved buffers to the adjacent residential neighborhood. To provide adequate internal traffic circulation within the parking deck, it may not be possible to wrap the eastern façade of the deck with anything other than parking uses. However, the architecture of the eastern façade should be given special treatment to enhance vistas from adjacent residential buildings.

Successful implementation of a multistory parking deck along Roberson Street could lead to conversion of the existing municipal lot between Armadillo Grill and the railroad tracks into a version of "Central Park" for Carrboro. With the natural tree canopy and elevated plateau above Main Street, the one-half acre site would complement the privately-owned but hugely popular Weaver Street "green". Furthermore, it would help bridge the barrier-effect created by the railroad tracks. Redevelopment of the site currently occupied by the Honda automobile repair shop could "address" Central Park with multistory, architecturally significant facades with windows to provide "eyes on the park".

Efforts should be initiated to expand use of the railroad corridor to include passenger rail service as well as extended shared-use path service. Linkages to "Carolina North" and intermediate neighborhoods would improve the accessibility of downtown Carrboro, leading to increased retail sales and vibrancy of the street scene.

Roundabouts

To reduce motorist, pedestrian and bicyclist confusion at odd-angled intersections and to change the quality of traffic flow, modern roundabouts could be considered at the following intersections:

1. West Main Street / Weaver Street / Laurel Street ***(see Figure 11)***
2. West Main Street / Jones Ferry Road ***(see Figure 12)***

These intersections have been analyzed to determine the feasibility of replacing the existing traffic signals with modern roundabouts. At both intersections, roundabouts would enhance safety and reduce delay. Illustrations of the proposed geometrics of each intersection are shown in Figures 11 and 12.

Transit Service

The Roberson Extension / Weaver Woonerf (Alternative 4) would impact existing bus service by eliminating the eastbound service on Weaver Street. An alternate route could be Main Street, perhaps with a public plaza and bus stop on the lot currently used to growth-of-way Christmas trees. There could be a short walkway connecting Weaver Street with Main Street through this site.

Walkway Improvements

The intersection of Main / Weaver / Roberson has the most incidents of pedestrians hit by vehicles within the study area. Not surprisingly, it has also the greatest number of pedestrians crossing and the highest combined sum of pedestrians and vehicles in conflict. Casual observers note that it is a confusing intersection to cross on foot. The consultant studied the intersection and gathered input from users including individuals in wheelchairs. The traffic analysis notes that vehicle queuing problems are associated, in part, with the close proximity of signalized intersections. The consultant therefore recommends a high-priority improvement to this intersection ***(see Figure 13)*** that includes the following measures in conjunction with changing Weaver Street to one-way westbound operation in the block between Main Street and Greensboro Street and changing Roberson Street to one-way southbound operation in the block between Main Street and Sweet Bay Place:

- remove the traffic signal
- reduce intersection width by reconstructing curbs as shown in Figure 13
- create left-turn lanes in both directions on Main Street
- provide one through-lane in each direction on Main Street
- reconstruct driveway serving Carr Mill Mall so that inbound and outbound traffic are separated by a landscaped median and align with separate parking lot drive aisles.

- Restrict outbound traffic from Carr Mill Mall to right-turn movements on Weaver Street
- Create unique public open-space with "umbrella-tables" within "The Point"

Similarly, the intersection of East Main / Rosemary Streets could benefit from a rebalancing project to ease the confusion that pedestrians and bicyclists currently experience there. As shown in ***Figure 14***, one concept is to create two continuous flow traffic lanes (eastbound Main Street and westbound Rosemary Street). By providing wide raised-curb median islands, pedestrians would have safe refuge in the center of each street as they wait for a break in traffic. The conflicting movements (westbound Main Street and eastbound Main Street to Rosemary Street) would each have one lane of traffic that could be signalized. Level of service results indicate LOS B during the morning and LOS D in the afternoon peak hour with a 1,000 foot-long queue extending from this intersection through the next adjacent signalized intersection of Franklin / Main / Merritt Mill. With such a queue, it is possible that some westbound traffic would detour to Rosemary Street to use the continuous-flow lane in the afternoon.

The consultant recommends that the Town of Carrboro implement a Walkway Spot Enhancement / Improvement Program. This program would be focused primarily on small scale improvement projects to enhance pedestrian, bicycling, and vehicular safety.

There are numerous recurring improvement needs throughout the study area. These issues would need to be studied in detail at specific locations with additional survey data not currently available to provide a finalized recommendation and specific solutions. In many instances these issues need to be solved as part of a larger project to provide continuity throughout all or a section of the study area.

Sidewalks

- Sidewalks west of Greensboro Street are generally four feet wide with a two-foot grass strip between the walk and back of curb. While the grass strip meets the minimal recommended separation between walk and back of curb, the four-foot wide walk does not allow for two-way pedestrian flow. A minimum five-foot wide walk is required to allow for two-way pedestrian flow. If possible the Town should look for opportunities to purchase right-of-way or acquire sidewalk easements to expand sidewalk and landscape verge widths.

- Sidewalks east of Greensboro Street generally are five-feet wide, however, there is no separation provided between the edge of walk and the back of curb. In some instances the width of the walk varies from four to ten feet in width). However, the lack of separation from the back of curb is fairly consistent due to the more urban nature of this section of the study area (except on the side streets). If possible the Town should look for opportunities to purchase right-of-way or acquire sidewalk easements to expand sidewalk widths and possibly add landscape or tree plantings along street frontage.

- Benches, trash receptacles, sign posts, utility poles, newspaper stands, etc., were located on the already narrow sidewalks. If possible the Town should look for opportunities to purchase right-of-way or acquire easements to expand areas outside the walkway for placement of these streetscape elements. Where the two-foot grass strip exists, efforts should be made to move all utility poles and signage to this utility strip. The use of "bulb

outs" where applicable could also aid in the relocation of these elements without additional land purchases or easement agreements.

- Numerous driveway aprons are located along all streets with in the study area. Many do not have a level sidewalk area either at the top or bottom of the driveway apron. If the driveway cut is necessary, the Town should look for opportunities to purchase additional right-of-way or acquire sidewalk easements to expand sidewalk widths.

- All damaged walks and curbs within the study area should be repaired.

- New sidewalk should be provided along at least the north side of Roberson Street to provide a path for pedestrians utilizing parking lots to the rear of the Main Street businesses. Appropriate cross walks and signage should also be added.

Wheelchair Ramps

- Numerous intersections were noted with only having one ramp per corner. Best design practices call for two ramps per corner, preferably on a corner "Bulb out" to not only reduce the pedestrian crossing distance, but also to allow the pedestrian to cross perpendicular to traffic and not be directed into the intersection in order to cross the street.
- Many of the wheelchair ramps were also noted to not have the four-foot wide continuous walkway clearance at the top of the ramp. If possible the Town should look for opportunities to purchase additional right-of-way or acquire sidewalk easements to expand sidewalk widths. If area is not available, the use of "bulb outs" should be explored to provide the needed space.
- Many of the wheelchair ramps need to be brought up to code with the newly reinstated requirement for truncated pavement domes.
- In some instances drainage structures may need to be relocated for wheelchair ramps to function properly.

Crosswalks and Signal Indications

- Three types of crosswalks were noted in the study area. These are:
    - High visibility crosswalks (crosswalk border stripes with cross bar striping)
    - Low visibility crosswalks (Crosswalk border stripes only)
    - No crosswalks
- Due to vehicular traffic congestion downtown, all crosswalks should be upgraded to high visibility crosswalks with appropriate vehicular warning indicators (signage, pavement markings, signals, etc…).
- Pedestrian push-buttons should be removed and replaced with countdown signals.
- Opportunities to create shorter crosswalk lengths should be evaluated with traffic improvements. Corner "Bulb outs" not only provide for shorter crossing distances but add to the pedestrian sidewalk area (increased area for adequately sized wheelchair ramps and alternative locations for street furnishings).
- The painted "islands" at the intersection of Main Street and Weaver Street as well as the intersection of Main Street and Jones Ferry Road need to be raised to provide a pedestrian refuge due to the long crossing distances.
- The crosswalks at the intersection of Rosemary Street and Main Street should be relocated (about 10 to 15 feet) to cross further east of the existing large oak tree on both

streets to allow for better pedestrian movement along the sidewalk next to the tree. The tip of the intersection can be landscaped to enhance this intersection.

- Explore the option of raised speed tables for all mid block crossings.
- Verify all site distance triangles. Numerous conflicts were noted throughout the study area.
- New crosswalks should be added at:
    - Jones Ferry Road and Main Street
    - Laurel Street and Jones Ferry Road (across Laurel Street only)
    - Elm Street and Weaver Street (across Elm Street only)
    - Lindsay Street and Weaver Street (only one Weaver Street crossing is needed)
    - Oak Avenue and Weaver Street (only one Weaver Street crossing is needed)
    - Center Street and Weaver Street (only one Weaver Street crossing is needed)
    - Sunset Drive and Rosemary Street (Sunset and Rosemary)
    - Merritt Mill Road and Rosemary Street (Merritt Mill Road crossing only)
    - Merritt Mill Road and Main Street / Franklin Street
    - Brewer Lane and Main Street
    - Roberson Street and Sweet Bay Place

Driveway Access

- It was noted earlier in this report that there are numerous driveway aprons throughout the study area. They typically fall into two categories:
    - Access drive/alley/parking lot entry
    - Perpendicular off street parking.
- If possible the Town should look for opportunities to close unnecessary access drives.
- Existing alleys, if not required, could be utilized as an enhanced pedestrian corridor for adjacent parking lots and neighborhoods.
- If possible, options for replacement of off-street parking located between the building and public street with on-street parallel parking should be explored in order to enhance pedestrian safety as well as vehicular safety.

Parking Lot Accessibility

- Opportunities to make parking lots more visible for users to access (i.e. signage, appropriate landscaping, etc…) need to be explored. There are numerous existing parking lots within the downtown area, however, visibility of directional signage is lacking.
- Improve ADA accessibility to parking facilities.
- Consider creating a flyer for public use showing the location of public parking.

Bicycle Facilities

- Re-stripe all current bike lanes as needed.
- Provide adequate bike route/lane signage (specifically Carr Street and Roberson corridor)
- Eliminate bicycle cut through traffic ”social trail” at the Roberson Street Greenway entrance.

Railroad Crossings

- Improve all pedestrian and bicycle crossings at Main St. and Greensboro St. railroad crossings to meet ADA requirements.

On Street Parking

- Look for opportunities to create on street parking.
    - Main Street and Weaver Street "Downtown Areas"
    - Replacement of perpendicular off street parking areas in front of existing businesses.
- Whenever done, use "bulb outs to define and protect the parking area.
    - These areas can be utilized for sidewalk expansion or landscaping.

Streetscape to Enhance Walkability

- Close the north end of Laurel St to access onto W. Main St. Make Laurel St. one way for this section of the street (exiting off of Main St.). Expand "The Point" for Civic Art opportunity – The "Civic Anchor" of Weaver Street or outdoor public tables with umbrellas.

- Special enhanced paving at the following intersections:
    - Weaver St. and West Main St.
    - Jones Ferry Rd. and Main St.
    - Main St. and Greensboro St.
    - Weaver St. and Greensboro St.
    - Weaver St. and Main St.
    - Main St. and Rosemary St.
    - Main St./Franklin St and Merritt St.

- Special paving the entire length of Weaver St. from Greensboro St to Main St.
- Realign Weaver St. sidewalk along north side of street to allow for on street parking. One option would be to make the primary pedestrian route along the store fronts of the Weaver Street Green.
- Street Trees – Most of the Study area has more of a suburban land use when it comes to landscaping. Work to enhance entire study area with more of an urban landscape layout utilizing "bulb outs" and expanded sidewalks.
- Remove gravel alley between municipal lot and the Main St Railroad crossing.
- Enhance all parking lots with landscaping for screening purposes. When landscaping is not applicable utilize short ornamental urban fences.
- With all road narrowing/"bulb outs" - street grades and drainage should be reworked due to the crown of this street elevation so that water is not running back towards buildings. The final elevation of the street surface may need to be lowered throughout downtown in order to accomplish this appropriately. This may or may not impact existing underground utilities. Additional survey and study is needed to determine the impacts of this concept.

All improvements should be made in accordance with the Town of Carrboro Design Guidelines to provide continuity throughout the downtown area. Larger streetscape projects would allow for greater flexibility of design as the continuity could be localized as needed.

Response to "**New Vision" report** – recommendations made by Walkable Communities, Inc. in their February 2002 report documenting the community visioning charrette were included in this study. The following is a summary of how each major recommendation is treated in this study (refer to previous pages for description of each alternative).

- promote new buildings oriented to fill-in vacant and under-utilized sites facing major downtown streets **(all alternatives)**
- encourage new buildings with a mix of uses that "share" parking and generate street life during all hours of the day and evening and weekend **(all alternatives)**
- preserve free parking but add more on-street parking and consider time restrictions if necessary (**Alternative 4**)
- adhere consistently to a streetscape and landscape master plan to build identity **(forthcoming)**
- provide buffer space between sidewalks and moving cars by adding landscape edges or on-street parking (**Alternative 4 or where additional right-of-way or easements can be obtained**)
- widen sidewalks to provide a minimum width of eight feet (**where additional right-of-way or easements can be obtained**)
- narrow driveway widths
- install two wheelchair ramps on each corner **(all alternatives)**
- distinguish crosswalk areas using colored, textured or patterned surface materials
- increase frequency of crosswalks and improve safety of each crossing **(all alternatives)**
- install sidewalk bulb-outs to shorten pedestrian crossing distance at crosswalks (in 100 block of Weaver Street, Alternative 4)
- provide pedestrian paths or links to shorten distance through downtown blocks
- combine three different sources of lighting to create welcome, secure conditions for evening and nighttime strolls
- consider replacing traffic signals with modern roundabouts designed for 15-20 mph vehicle speeds at up to seven downtown locations
- convert East Weaver Street to a pedestrian priority street, also known as a woonerf, with one direction of slow-moving traffic allowed to pass through **(Alternative 4)**
- provide bus stops conveniently and include bike racks, shade, benches, and bus information for riders **(all alternatives)**
- utilize the rail corridor to include parallel shared-use path and passenger train service on the rails, in addition to existing infrequent coal shipments to UNC **(all alternatives, although a Roberson Street extension across the tracks requires more planning)**
- promote bicycling and install signs and bicycle racks **(all alternatives)**
- invest public funds to improve Roberson Street to spur redevelopment of private property that contributes to a lively downtown core **(Alternative 4)**

III. EXISTING CONDITIONS

The downtown transportation system has a variety of functions including but not limited to serving property owners with access by car, truck, emergency vehicle, bus, walking and bicycling. Main Street, Rosemary Street, Greensboro Street, and Jones Ferry Road are all considered thoroughfares by the appropriate levels of state and metropolitan government, so therefore those streets and roads serve a mobility function to move the same cars, trucks, emergency vehicles, buses, bicycles and pedestrians through the downtown. Each of these functions is described below:

Access and Mobility

Humans first sought access. Only after several millenia, as trading and military forces created the need for speed and long-distance travel did higher forms of mobility develop. Following World War II, American engineers created what is known as the functional classification system to define a hierarchy of streets and highways with lower level streets emphasizing access to abutting land and higher level highways, expressways and freeways restricting access in order to increase speeds and facilitate longer distance travel. Today, studies are underway to update and append the functional class system to account for urban context; that is, the buildings, land use and pedestrian activity that comprise urban character. It is expected that adjustments can be made in the future to help blend streets into their environment. For example, major streets serving an historic district would no longer look like expressways.

Pedestrians

Table 3.1 lists in rank order intersections with the most pedestrians crossing during peak periods. Table 3.2 lists in rank order intersections with the highest combination of pedestrians and vehicles, showing the extent of conflicts on downtown crosswalks.

Table 3.1 Intersections with Highest Number of Pedestrians

Rank Order	Intersection	Number of Pedestrians
Most	Main / Weaver / Roberson Streets	384
2	Main / Greensboro Streets	328
3	Weaver / Greensboro Streets	291
4	East Main / Rosemary Streets	289
5	East Main / Lloyd Streets	243
6	East Main / Franklin / Merritt Mill Road	197
7	West Main / Jones Ferry Road	135
Source: 2004 Mobility Report Card, Town of Chapel Hill counts conducted March 2004		

Table 3.2 Intersections with Highest Sum of Pedestrians and Conflicting Traffic

Rank Order	Intersection	Combined Volume in Crosswalk (pedestrians plus vehicles)
Most	Main / Weaver / Roberson Streets	1824 (pm peak hour) 1400 (lunch peak hour)
2	Main / Lloyd Streets	1651 (lunch peak hour)
3	Main / Greensboro Streets	1269 (pm peak hour) 969 (lunch peak hour)
4	East Main / Rosemary Streets	1230 (lunch peak hour)
5	East Main / Franklin / Merritt Mill Road	1138 (lunch peak hour) 644 (pm peak hour)
6	Weaver / Greensboro Streets	1118 (am peak hour) 879 (pm peak hour)
7	West Main / Jones Ferry Road	837 (pm peak hour)
Source: 2004 Mobility Report Card, Town of Chapel Hill counts conducted March 2004		

Safety of pedestrians is an important factor in this study. Figure 1 shows the number of crashes involving pedestrians from January 2000 through December 2003. The most crashes (four) occurred at the intersection of Main / Weaver / Roberson Streets. At this intersection, there are 60 potential points of conflict between vehicles making various turning and through movements. Along the crosswalks at this intersection, there are an additional 24 points of potential conflict between pedestrians and vehicles. The quantification of points of potential conflict underscore the general sense felt when one tries to cross any of these streets on foot; that is, it's confusing and scary.

Bicyclists

A large percentage of travel in Carrboro is on bicycles, according to a plan prepared by the Town in 1989. This can be attributed to the fact that parking is scare at the University, and many UNC students and staff live in Carrboro. The Town has included bicycles in all parts of its planning, and the result is a comprehensive bikeway system that is among the best in the State. A good bicycle facility encourages ridership and therefore reduces congestion and pollution. Bikeway systems must be regularly re-evaluated and upgraded to meet future demands.

The Town's major objective is to increase the safety of bicycle riders in town. Crash statistics for the period from January 2000 through December 2003 were obtained from the North Carolina Department of Transportation which compiles police reports from Carrboro Police, the Sheriff and Highway Patrol. Crashes involving bicyclists are shown on Figure 1. The intersection with the most reported crashes involving bicyclists was East Main at Rosemary Street.

According to the Carrboro Bicycle Policy (adopted 1989), bicycle safety is improved in any of three ways:

1. Complete separation of bicycle traffic from motor vehicle traffic. The Libba Cotton Bikepath which runs along the railroad track is an example of a separated facility.

2. Separating bicycles from motor vehicles on the same roadway by use of designated bikelanes. Bikelanes exist on portions of major streets throughout Town (but not necessarily in the downtown study area) including Weaver Street, Jones Ferry Road, Greensboro Street, Main Street, and Hillsborough Road.

3. Automobiles and bicycles using the same roadway. Separation is typically not needed on less-traveled residential streets. Bicycles and motor vehicles can share the roadway without major safety problems.

The second major objective is access to major origin-destination points. In building a bikeway system, the Town has three priorities listed in descending order:

1. Connect the existing bicycle system with major community facilities such as schools, Town Hall, and the Downtown, as well as providing access to important points outside the Town, such as the University.

2. The system should expand to connect high density areas. An example of such an area is the apartment communities on Smith Level Road and BPW Road.

3. Lower density developments should be connected with the existing system. Consideration should also be made for safe bicycle facilities for recreational purposes.

Transit Routes

Public transportation service between downtown Carrboro, neighborhoods, the UNC community, Chapel Hill and various park-and-ride lots is provided by Chapel Hill Transit. It is a municipal department within the Town of Chapel Hill that operates fixed route and demand responsive service within approximately a 25 square mile service area. In January 2002, the system became fare-free. Chapel Hill Transit produces over 142,000 annual hours of service, has a budget of over $11 million. At the end of the 2003-2004 fiscal year, fixed route ridership was over 4.5 million.

The Town of Carrboro the University of North Carolina and the Town of Chapel Hill are partners in the operation of the transit system. Each sponsor is interested in providing safe, reliable and efficient transportation services to its constituents. Also each sponsor has an appointed advisory board that provides advice regarding the operation and funding of transit services.
Route CW connects downtown with various neighborhoods in northwest Carrboro, the UNC campus and downtown Chapel Hill. Service through the study area includes bus stops along East Main Street, Weaver Street, and Hillsborough Street. Service is provided twice hourly during peak periods and hourly during the off-peak. Service is provided between 6 a.m. and 9 p.m. Travel time between Carrboro Century Center and UNC campus is about six minutes.

Route J operates along Main Street and Jones Ferry Road connecting downtown Carrboro with Franklin Street in Chapel Hill, the UNC campus, the Jones Ferry Park and Ride lot, and neighborhoods to the south and southeast of downtown. Travel time between downtown and the UNC campus is about seven minutes. Service is provided every 15 to 20 minutes from 6 a.m. to 7:30 p.m. at which time buses depart hourly. Late-night service is provided to anyone on Friday and Saturday nights in a program called Safe Ride, connecting downtown Carrboro with the Franklin Street corridor from 11:15 p.m. to 2:30 a.m.

Streets

The trip between the UNC campus and northwest Carrboro is important because there are two viable routes to use including downtown Carrboro and the NC 54 bypass. It is debatable whether through traffic (that which does not stop along the way) uses the bypass or downtown. However, travel time comparisons between the signalized intersections of Manning Street / Columbia Street (on the UNC campus) and Main Street / NC 54 Bypass (in northwest Carrboro) during the afternoon peak period show an average of 11 minutes through downtown Carrboro compared with 4 minutes and 30 seconds along the NC 54 bypass. There was very little congestion experienced along either route during the 4:30 to 5:00 p.m. period on Monday, August 30, 2004 when the data were collected.

Level of service is a common term used in municipal government to identify varying levels of benefit received by citizens at varying levels of investment of public funds. In the transportation lexicon, level of service is used to denote different degrees of comfort and convenience experienced by motorists. The term can also be applied to pedestrians, bicyclists and transit patrons.

Level of Service A represents excellent conditions while Level of Service F denotes the worst condition, characterized by streets with no sidewalks, narrow lanes that don't accommodate bicyclists, and traffic congestion that delays motorists and bus patrons. LOS D represents the typical maximum acceptable delay for an intersection as a whole during any one given peak hour in an urban setting. In other words, LOS E and F typically indicate the need for improvements and higher potential for queue spillback. Traffic level of service (LOS) is based on the amount of delay in seconds per vehicle experienced by an individual driver, averaged over all motorists at an intersection.

Due to the shorter-than-average block lengths in downtown Carrboro, the level of service method understates the perceived congestion levels. That is, the recently prepared Carrboro Mobility Report Card suggests all downtown Carrboro study intersections operate at LOS B or better. However, based on observation by KHA the recurring queues on Weaver and Greensboro Streets would suggest LOS F operations at least during portions of the peak hour.

Parking

An August 2002 report of the Town of Carrboro Parking Task Force identifies "Town involvement in expanding parking availability as a critical component in reaching the town's goal of doubling commercial space in the downtown area." The report states that "the most critical immediate shortcoming in the central downtown area was a shortage of convenient short-term public parking in particular areas". This problem may have been addressed with the 2004 opening of a new municipal lot in the middle of the 100 block of Main and Roberson Streets, behind the right-of-way of historic Main Street buildings. A driveway and walkway connect the new parking lot with Main Street.

The Parking Task Force report recommends immediate collaboration with NCDOT to provide on-street parking on the following streets: Roberson Street, sections of East and West Main Street, East and West Weaver Street, and North Greensboro Street. Additional on-street parking was considered for streets within the study area that are at least 38 feet wide (measured from curb-face to curb-face). This is the critical dimension to provide one 11-foot wide travel lane in each direction and one 8-foot wide bay of on-street parking on each side of the street. The following streets in the study area were considered, as shown below.

Street	Section	Existing Width (feet)	Peak Hour Traffic Volume (vehicles per hour)	On-street Parking Recommendations
East-West Streets				
West Main St.	Ashe – Laurel	45	450	Not Recommended. Need two-way left-turn lane instead.
East Main St.	Lloyd - Rosemary	46		Not recommended unless Lloyd St. signal removed and Main Street converted to one lane each direction.
Roberson St.	Greensboro - Maple	38 *	165	Recommended when street is improved.
Weaver St.	Greensboro - Main	30		Recommended with conversion to one-way traffic (woonerf concept)
Rosemary St.	Main – Merritt Mill	36		Consider, if one-lane modern roundabout is built at Main / Rosemary intersection
North-South Streets				
Greensboro St.	Shelton Street – Old Pittsboro Rd.	34		Not recommended. Too narrow.
Laurel St.	Main – Jones Ferry	28		Not recommended. Too narrow.
Lloyd St.	Main - Cobb	24 - 32	140	Not recommended. Too narrow.
Merritt Mill Rd.	Main – Rosemary	24		Not recommended. Too narrow.
* denotes future street width of Roberson Street, as adopted by Carrboro Board of Aldermen in 2003.				

Historic District and Properties

Figure 1b shows the outline of existing historic properties and districts within the study area. These are currently listed on the National Register of Historic Properties. Public improvements should be designed to enhance, if possible, and not detract from these historic resources. If the Town decides to pursue state or federal funding for transportation improvements there will be a review of potential impacts on historic resources listed on the National Register. If it is determined, based on the initial environmental review, that an environmental document under the National Environmental Policy Act is required then a study of project alternatives that avoid right-of-way acquisition and visual impacts on the historic resources will be required. This requirement could add years to the implementation schedule.

IV. STUDY METHODS

Travel Demand

To ensure wise use of public resources, candidate transportation improvements are typically evaluated to determine effects on existing traffic conditions as well as forecasted conditions 20-years after construction. Based on an assumed completion of construction in 2010, this study includes an evaluation of conditions 20 years hence in 2030. Travel demand forecasts were obtained from the best available forecasting tool, the Triangle Regional Travel Demand Model. Each unit of local government in Orange, Durham and Wake Counties developed population and employment forecasts for their community at a zonal level. The zonal system is finely divided, with downtown Carrboro subdivided into about 15 zones. Growth at UNC and other Triangle institutions is also factored into the travel projections. Planned transportation improvements including Phase I of the Triangle Transit Authority's regional rail system is also included. Weaver Street is not included in the model. Therefore, the model over-forecasts traffic on Main Street. Coincidentally, the omission of Weaver Street in the model network better reflects Alternative 4 which assumes a woonerf on Weaver Street.

Results for 2030 suggest an average annual increase of 1.3 percent during the morning peak hour and 24-hour daily traffic volumes. Afternoon peak hour traffic projections are higher with an average annual increase of 1.7 percent. Compounded over the 27-year study horizon these projections result in a substantial increase over 2004 conditions. These percentages were used to factor-up the base traffic counts at each of the 10 study intersections.

Rerouted Traffic

Conversion of Weaver Street to a one-way woonerf prompted the need to consider how traffic would be re-routed. Due to the minimal number of interconnected streets around the downtown area, this study assumes nearly all of the diversion to occur on Main Street.

Extension of Roberson Street to Lloyd Street was analyzed assuming a direct re-routing of traffic to Lloyd Street. Leaving Roberson Street open to one-way southbound traffic in the short block south of Main Street still requires some re-routing of traffic to Lloyd Street.

Capacity Analysis Methods

In theory, streets can accommodate a high number of vehicles, however several factors are typically present that reduce street efficiency. The maximum number of vehicles passing a point on a street, referred to as capacity, is a function of speed and the number of lanes. Providing more than one lane in each direction accommodates more traffic but it also permits speeding and potentially dangerous conflicts with pedestrians whose line of sight is blocked by other cars. A strong argument can be made for downtown streets with only one lane in each direction. At 20 mph, one lane on a street can carry 1800 vehicles in a busy one-hour period. That figure is reduced somewhat if a pedestrian waits beside the road for the cars to pass before crossing. The capacity is reduced further if the pedestrian crosses in front of the vehicles. However, the greatest reduction in capacity occurs if a traffic signal is installed, reducing capacity by at least 50 percent. This explanation is provided as a prelude to discussion of existing and future traffic volumes and lays the groundwork for later discussion of eliminating some traffic signals in downtown Carrboro.

Traffic counts and coordinated traffic signal timings were obtained from the Town of Chapel Hill. Existing pedestrian crossing volumes are shown in ***Figure 2*** and existing traffic turning movement volumes are shown in ***Figure 3***. Traffic signal plans were obtained from NCDOT and intersection geometry was obtained from field reviews and aerial mapping. Traffic reroutes were established based on proposed revisions to the network geometry. A one-way pair was analyzed (Alternative 1) between the 100-block of Weaver Street (westbound) and Main Street (eastbound) resulting in the traffic volumes shown in ***Figure 4***. Year 2030 traffic volumes were based on the existing traffic volumes with growth factors applied. The growth factors were obtained from the Triangle Regional Model and were as follows: 1.3% annually for the AM peak, 1.4% annually for the Mid-Day peak, and 1.7% annually for the PM peak over 27 years of growth to 2030. The existing network with traffic growth to year 2030 is shown in ***Figure 5***. The one-way pair traffic in year 2030 is shown in ***Figure 6***. As a result of later analyses, the network was revised to provide an alternative with Weaver Street one-way (westbound) and Main Street maintained as two-way (Alternative 4). The future traffic for the revised alternative scenario is shown in ***Figure 7***.

The peak hour traffic volumes for each of the three periods were analyzed in "Synchro 6" capacity analysis software using Highway Capacity Manual methodology. Traffic capacity analyses were performed for the ten (10) study intersections in Carrboro for existing year 2003-2004 and future year 2030 conditions. Existing year 2003-2004 analyses were based on traffic counts conducted for the AM, Mid-Day, and PM periods. Future year 2030 analyses were based on the existing traffic volumes with growth factors applied. Sidra software (aaSidra 2.0) was used to evaluate the operation of roundabouts at select locations. Early in the study, roundabouts were considered at seven (7) of the study intersections.

Capacity Analysis Findings

The ten (10) study intersections were shown to operate with acceptable LOS in the AM, Mid-Day, and PM peak hours under existing traffic for the current geometry with the exception of the Main Street at Merritt Mill intersection. However, it was noted both through field observations and viewing queue results in the analysis that the LOS values were not completely indicative of the actual delay that drivers experience in Carrboro along the primary streets. Short block lengths and inadequate storage lanes create congestion in downtown Carrboro that appears to exceed what the existing LOS indicates, especially along Greensboro Street. Although LOS is one way to compare geometric alternatives, it is not the only measure of traffic congestion. During the study, both the levels of service and the anticipated queuing concerns along the major roadways are considered while keeping in mind the need to maintain and enhance the walkable characteristics of the downtown area.

For the most part, a comparison of existing network geometry and a one-way pair consisting of the 100-block of Weaver Street and Main Street (Alternative 1) shows acceptable operation. ***Table 3*** shows the existing year traffic comparison. A connector roadway was also provided to remove traffic from Roberson Street at Main Street, diverting those vehicles to the traffic signal at Lloyd Street. Main Street and Weaver Street operate in a free-flow condition with the proposed network revisions. With or without the one-way pair in the year 2030, more intersections start to operate unacceptably and queue conditions worsen. ***Table 4*** shows the future year traffic comparison. Deficiencies of the one-way pair starting in the current year and worsening for future conditions are listed as follows:

- The one-way pair significantly increases traffic on westbound Weaver Street and southbound Greensboro Street, increasing queue lengths and congestion.
- The one-way pair forces a merge to one lane westbound on Main Street past Lloyd Street which will be over-capacity or requires a two-lane section one-way on Weaver Street, which is not preferred due to pedestrian safety concerns.

Based on the results of the traffic analysis comparison with the one-way pair, further review of the geometric constraints, and coordination with the Town of Carrboro staff, an alternative was developed that keeps the one-way roadway on Weaver Street (westbound), but maintains two-way traffic on Main Street (Alternative 4). This revision allows the major traffic movements westbound along Main Street to continue along the normal path, avoiding the intersection of Greensboro Street at Weaver Street. ***Table 5*** shows the future year traffic comparison of the recommended alternative to the baseline (existing) network. It should be noted that queueing concerns still exist with or without the proposed changes to the downtown roadways. The Town should seek alternate access roadways, cross connections between parking lots, and seek to discourage through traffic that may have other reasonable alternate routes available. Alternative 4 also included an access roadway to parallel Main Street from west of Merritt Mill Road to connect with Roberson Street. This collector roadway will not divert major movements that are traveling west along Main Street, but it will serve to provide alternate access to businesses and help to facilitate traffic movements between south Greensboro Street and the east side of downtown Carrboro.

Some key features of Alternative 4 are as follows:

- allows the heaviest movements (westbound in the PM peak) to continue to be split between Weaver Street and Main Street.
- allows for two through lanes westbound at Lloyd Street while eliminating the merge created with the one-way pair (one lane splits to Weaver Street, and the other stays on Main Street).
- eliminates the traffic signal at the Main/Roberson/Weaver Street due to the proposed geometry (note that the signal was also eliminated in the one-way pair alternative).
- reroutes left-turn traffic from northbound Greensboro Street at Weaver Street to Main Street, allowing two full southbound lanes through the intersection to reduce queue spillback north of Weaver Street.

Alternative 4 is shown in ***Figure 8***.

Travel Safety

At the intersection of Main Street / Weaver Street / Roberson Street / Carr Mill Mall parking lot there are 60 potential points of conflict between vehicles making various turning and through movements. Along the crosswalks at this intersection, there are an additional 24 points of potential conflict between pedestrians and vehicles. Improvements for this intersection (described in the next chapter) would reduce the points of potential conflict to 22 vehicle-to-vehicle conflicts and 13 pedestrian-vehicle conflicts. This represents a 58 percent reduction in conflict points that are likely to have a commensurate decrease in crashes and near crashes. The key to reducing conflict points is the conversion of the 100 block of Weaver Street and the 100 block of Roberson Street to one-way movement and the restriction of left-turn movements from Main Street. The easterly extension of Roberson Street to intersect with a southerly extension of Lloyd Street with full turning movements provided at Main Street / Lloyd Street will replace lost access created with turn restrictions at Main Street / Weaver Street / Roberson Street / Carr Mill Mall. Further reductions in conflict points are possible, however it would require left-turn restrictions to and from the Carr Mill Mall parking lot that could have deleterious economic hardships on that business. For this reason, left-turn movements to and from the Carr Mill Mall parking lot are retained in Alternative 4.

Transit Level of Service

Rebalancing downtown streets could impact the level of service provided by Chapel Hill Transit if traffic levels of service deteriorate. Increased delays on Carrboro streets would affect buses ability to maintain schedule and reliability of schedule is arguably the primary issue faced by CHT today, an unintended byproduct of the high demand created when the service went fare-free in 2002.

APPENDIX A: Community Goals

The Vision 2020 document adopted by the Board of Aldermen embraces the following concepts to preserve and maintain the character and history of downtown Carrboro:

- balanced growth occurring at a reasonable rate.
- "Double commercial square footage in the downtown from that existing in the year 2000"
- retain unspoiled areas
- provide central open space for the public to meet and mingle
- music, festivals and an outdoor public art gallery
- central library and a senior center
- hub of activity with Carrboro Century Center as the downtown focal point
- activities for all ages including young adults
- year-round use of the Farmers Market
- shops that sell everyday goods
- downtown accessibility by all travel modes
- network of greenways or shared-use paths away from roadways linking neighborhoods with downtown destinations
- evening and weekend bus service to UNC Chapel Hill campus
- multilingual signs and transit information
- growth-of-way plants along streets and roadways
- "as a general policy, established roads should be widened to accommodate bike lanes and sidewalks, but not to provide additional lanes for automobiles"
- Improve pedestrian comfort and safety
- Consider pedestrian-only spaces
- Improve downtown parking
- Promote perimeter parking lots served by frequent shuttles
- Improve downtown sidewalks
- Improve lighting along sidewalks
- Provide shade along sidewalks
- medium-rise building heights
- develop under-utilized property downtown

Carrboro Downtown Street Circulation Study

Figure List:

Table List:

Footnote - LOS based on the following background data:
Intersection #1 AM/PM Counted by Summit Engineering for Kimley-Horn 4/6/04 and Mid-Day counted by Town of Chapel Hill consultant 10/16/03;
Intersection #2 through #8 counted by Town of Chapel Hill consultant Oct-Nov 2003; Intersection #9 and #10 counted by Kimley-Horn 3/2/04

Table 1: NCDOT (and Town of Carrboro) Crash Rate Summary by Intersection Crashes per Million Entering Vehicles, 2000-2003 – 3 years of data

Study ID	Intersection	Total Crash Rate	Injury Crash Rate	# Pedestrian Crashes	# Bicycle Crashes
1	Main Street/Franklin Street at Merritt Mill/Brewer Lane	47.11	14.5	1 (+1)	1
2	Main Street at Rosemary Street	**68.49**	17.12	0	2 (+1)
3	Main Street at Lloyd Street	**100.85**	28.01	0 (+1)	1
4	Main Street at Roberson Street/Weaver Street	64.94	**32.47**	3 (+1)	0 (+1)
5	Main Street at Greensboro Street	55.91	18.64	1 (+1)	0 (+1)
6	Greensboro Street at Weaver Street	50.74	25.37	1	2
7	Main Street at Jones Ferry Road	31.06	0	0	0
8	Main Street at Laurel Avenue/Weaver Street	**88.12**	**32.04**	0	0
9	Greensboro Street at Roberson Street	52.83	**37.74**	0	0
10	Greensboro Street at Carr Street	52.83	15.09	0	0

Note: No fatalities were recorded over the three year period; **Bold** indicates the highest three rates

Table 2: NCDOT Crash Rate Summary by Roadway Segment Crashes per 100 Million Vehicle Miles, 2000-2003 (3 years) *Statewide average = 422.44 Total Rate & 142.04 Injury Rate*				
Roadway Segment	**Total Crash Rate**	**Injury Crash Rate**	**# Pedestrian Crashes**	**# Bicycle Crashes**
Main Street from Weaver St to Merritt Mill/Brewer St (0.7 mi)	**575.22**	**160.11**	2	8
Weaver Street from Main St to Laurel Ave (0.4 mi)	**2087.41**	**956.73**	2	2
Roberson Street from Greensboro St to Main St (0.1 mi)	**3913.89**	**2283.1**	1	0
Greensboro Street from Old Pittsboro Rd to Shelton St (0.3 mi)	**1144.47**	**443.77**	2	3
Jones Ferry Road from Main St to Laurel Ave (0.1 mi)	**718.15**	0	0	0
Rosemary Street from Main St to Merritt Mill Rd (0.1 mi)	**707.94**	88.49	0	2

Note: No fatalities were recorded over the three year period**; Bold** indicates a segment exceeds the statewide average

Table 3: Existing Year 2003-2004 Peak Hour Level of Service (Delay in seconds per vehicle)
Existing Conditions and Alternatives

#	Intersection	Existing Street Circulation						Weaver/Main Street One-Way Pair Circulation With Roberson/Lloyd Street Connector					
		Signalized/*Unsignalized* (Existing Conditions)			Roundabout Alternative			Signalized/*Unsignalized*			Roundabout Alternative		
		AM	Mid-Day	PM	AM	Mid-Day	PM	AM	Mid-Day	PM	AM	Mid-Day	PM
1	Franklin St @ Merritt Mill Rd	B (12.4)	**F (86.6)**	D (43.2)	A (6.2)	A (7.6)	A (7.6)	B (12.4)	**F (86.6)**	D (43.2)	A (6.2)	A (7.6)	A (7.6)
2	Main St @ Rosemary St	C (22.1)	C (24.8)	B (19.9)	A (5.9)	A (6.6)	A (8.0)	C (22.1)	C (24.8)	B (19.9)	A (5.9)	A (6.6)	A (8.0)
3	Main St @ Lloyd St	A (7.3)	A (7.7)	A (7.7)	A (3.5)	A (3.9)	A (4.2)	A (7.9)	A (7.9)	A (8.0)	A (4.1)	A (4.2)	A (4.7)
4	Main St @ Roberson Street/ Weaver St	C (25.6)	C (21.2)	C (24.9)	A (7.9)	A (6.4)	A (7.0)	B (14.6)*	B (13.1)*	C (22.9)*	NA	NA	NA
5	Greensboro St @ Main St	C (31.8)	C (21.8)	C (25.0)				C (32.5)	C (32.5)	D (49.9)			
6	Weaver Street @ Greensboro St	C (23.0)	C (24.9)	C (32.1)	A (7.9)	A (6.5)	A (8.6)	C (29.2)	C (29.4)	**E (79.4)**	A (7.3)	B (10.7)	**E (63.9)**
7	Main St @ Jones Ferry Rd	B (14.4)	B (13.7)	B (15.3)	A (5.0)	A (5.0)	A (5.3)	B (16.4)	B (16.4)	B (18.8)	A (6.0)	A (5.9)	A (6.2)
8	Weaver St @ West Main St	B (16.9)	B (11.0)	B (15.2)	A (5.7)	A (5.4)	A (5.4)	B (12.5)	B (12.5)	C (20.4)	A (4.6)	A (5.4)	A (5.6)
9	Greensboro St @ Roberson St	*A (0.4)*	*A (0.6)*	*A (1.5)*				*A (0.4)*	*A (0.6)*	*A (1.5)*			
10	Greensboro St @ Carr St	*A (1.6)*	*A (3.0)*	*A (4.4)*				*A (1.6)*	*A (3.0)*	*A (4.4)*			

Note: Conversion of traffic flow to one-way in the 100 block of Weaver Street affects traffic circulation patterns on parallel and connecting streets.
*Shown as signalized operation for LOS comparison, but free-flow on Weaver/Main Streets anticipated with one-way pair conversion.
NA – not applicable (roundabout not proposed with one-way pair)

Table 4: Future Baseline Conditions and One-Way Pair Alternative Comparison
Future Year 2030 Peak Hour Level of Service (Delay in seconds per vehicle)

#	Intersection	Existing Street Circulation						Weaver/Main Street One-Way Pair Circulation With Roberson/Lloyd Street Connector					
		Signalized/*Unsignalized* (Existing Geometry)			Roundabout Alternative (No Additional Revisions)			Signalized/*Unsignalized*			Roundabout		
		AM	Mid-Day	PM	AM	Mid-Day	PM	AM	Mid-Day	PM	AM	Mid-Day	PM
1	Franklin St @ Merritt Mill Rd	C (22.4)	**F (251.0)**	**F (366.7)**	A (7.1)	C (25.3)	C (33.9)	D (38.7)	**F (115.9)**	**F (155.0)**			
2	Main St @ Rosemary St	**F (84.8)**	C (33.0)	D (51.8)	A (6.3)	B (14.0)	**F (133.3)**				A (6.3)	B (14.0)	**F (133.3)**
3	Main St @ Lloyd St	A (7.9)	A (8.9)	B (12.5)	A (3.8)	A (5.5)	C (30.9)	***F (954.4)***	***F****	***F****			
4	Main St @ Roberson Street/ Weaver St	C (34.7)	**E (57.4)**	**F (712.9)**	C (33.0)	B (12.3)	**E (73.6)**	*Free-flow*	*Free-flow*	*Free-flow*			
5	Greensboro St @ Main St	D (37.3)	C (30.7)	**F (99.5)**				**F (160.0)**	**F (116.1)**	**F (401.4)**			
6	Weaver Street @ Greensboro St	**E (55.1)**	D (38.0)	**F (148.2)**	D (36.1)	B (13.6)	**F (120.3)**	C (26.7)	**F (93.3)**	**F (244.1)**			
7	Main St @ Jones Ferry Rd	B (17.1)	B (16.7)	C (30.7)	A (5.6)	A (5.8)	A (7.5)	C (28.5)	C (23.3)	C (31.1)			
8	Weaver St @ West Main St	B (19.4)	B (11.9)	B (16.8)	A (6.1)	A (6.0)	A (6.7)	C (24.3)\	D (37.7)	**F (136.4)**			
9	Greensboro St @ Roberson St	*A (0.8)*	*A (1.7)*	***F (392.9)***				*A (0.8)*	*A (1.8)*	***F (393.7)***			
10	Greensboro St @ Carr St	*A (6.4)*	***E (43.6)***	***F (958.0)***	A (3.7)	A (4.2)	A (4.7)				A (3.7)	A (4.2)	A (4.7)

*Exceeds HCM calculation methods

Table 5: Future Baseline Conditions and One-Way Weaver Street [Recommended] Alternative Comparison
Future Year 2030 Peak Hour Level of Service (Delay in seconds per vehicle)

#	Intersection	Existing Street Circulation						Weaver Street 100-Block One-Way Conversion With Roberson/Main Street Connector					
		Signalized/*Unsignalized* (Existing Geometry)			Roundabout Alternative (No Additional Revisions)			Signalized*/*Unsignalized*			Roundabout		
		AM	Mid-Day	PM	AM	Mid-Day	PM	AM	Mid-Day	PM	AM	Mid-Day	PM
1	Franklin St @ Merritt Mill Rd	C (22.4)	**F (251.0)**	**F (366.7)**	A (7.1)	C (25.3)	C (33.9)	C (26.6)	**F (93.5)**	**F (91.1)**			
2	Main St @ Rosemary St	**F (84.8)**	C (33.0)	D (51.8)	A (6.3)	B (14.0)	**F (133.3)**	B (16.9)	B (19.1)	D (48.3)			
3	Main St @ Lloyd St	A (7.9)	A (8.9)	B (12.5)	A (3.8)	A (5.5)	C (30.9)	A (9.2)	A (9.5)	B (14.0)			
4	Main St @ Roberson Street/ Weaver St	C (34.7)	**E (57.4)**	**F (712.9)**	C (33.0)	B (12.3)	**E (73.6)**	*Free-flow*	*Free-flow*	*Free-flow*			
5	Greensboro St @ Main St	D (37.3)	C (30.7)	**F (99.5)**				**E (63.2)**	D (52.1)	**F (140.9)**			
6	Weaver Street @ Greensboro St	**E (55.1)**	D (38.0)	**F (148.2)**	D (36.1)	B (13.6)	**F (120.3)**	B (17.3)	C (24.2)	C (23.6)			
7	Main St @ Jones Ferry Rd	B (17.1)	B (16.7)	C (30.7)	A (5.6)	A (5.8)	A (7.5)	C (23.5)	C (20.0)	D (51.2)			
8	Weaver St @ West Main St	B (19.4)	B (11.9)	B (16.8)	A (6.1)	A (6.0)	A (6.7)	C (25.1)	C (25.0)	B (14.3)			
9	Greensboro St @ Roberson St	*A (0.8)*	*A (1.7)*	***F (392.9)***				*A (1.1)*	*A (2.9)*	***F (395.6)***			
10	Greensboro St @ Carr St	*A (6.4)*	***E (43.6)***	***F (958.0)***	A (3.7)	A (4.2)	A (4.7)				A (3.7)	A (4.2)	A (4.7)

*Signal timing was optimized for the network to account for geometric revisions and traffic shifts.

FIGURE 1 STUDY AREA

NOT TO SCALE

SHELTON ST
PARKER ST
E. POPLAR AVE
ASHE ST
ELM ST
LINDSAY ST
GREENSBORO ST
W. MAIN ST
EVAN CIR
OAK AVE
SHORT ST
CENTER ST
LLOYD ST
BROAD ST
SUNSET DR
COBB ST
LAUREL AVE
W. WEAVER ST
W. MAIN ST
E. WEAVER ST
E. MAIN ST
ROSEMARY ST
MERRITT MILL RD
MAIN ST
ROBERSON ST
S. GREENSBORO ST
E. CARR ST
W. FRANKLIN ST
BREWER LN
W. CARR ST
JONES FERRY RD
MAPLE AVE
OLD PITTSBORO RD
S. MERRITT MILL RD

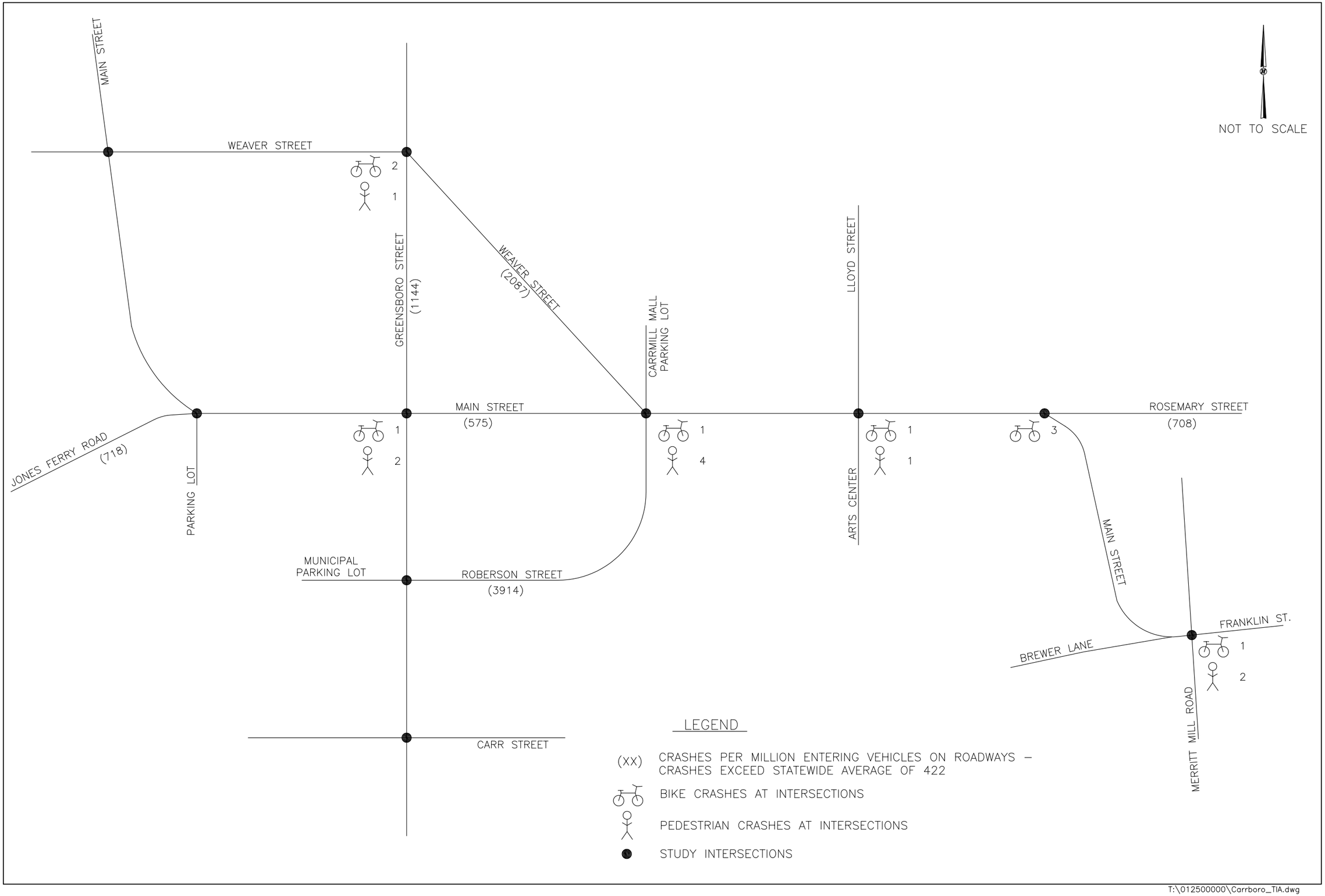

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FIGURE 1

YEAR 2000–2003
CRASH DATA SUMMARY

DOWNTOWN TRAFFIC CIRCULATION STUDY
CARRBORO, NC

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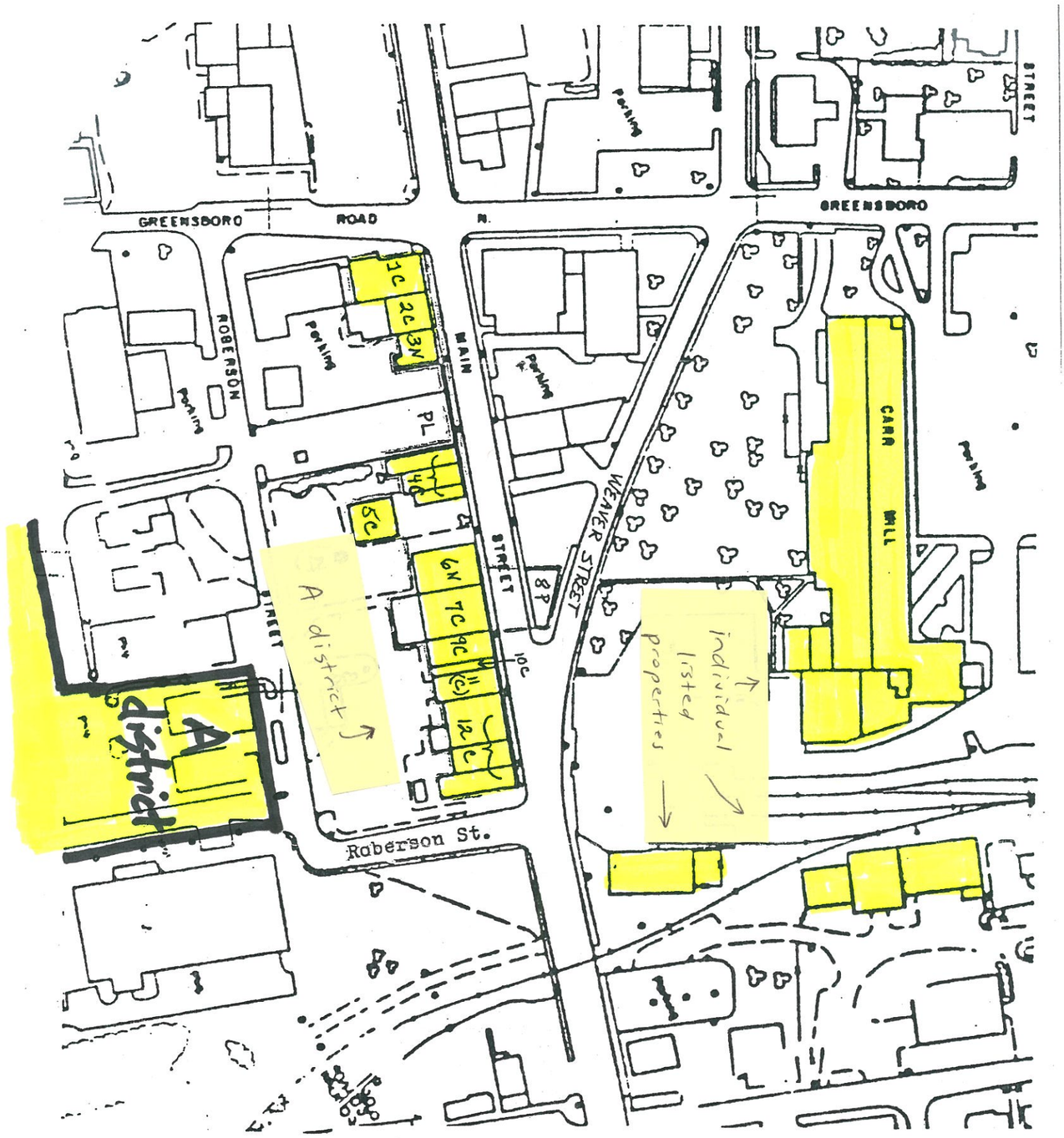

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CARRBORO DOWNTOWN STUDY
CARRBORO, NC

LISTED HISTORIC PROPERTIES

FIGURE 1b

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NOT TO SCALE

WEAVER STREET
0 (4) [2]
5 (1) [1]
34 (25) [20]
GREENSBORO STREET
34 (30) [20]
MAIN STREET
8 (9) [4]
0 (3) [10]
16 (5) [1]
20 (20) [44]
WEAVER STREET
12 (13) [19]
25 (22) [26]
25 (17) [56]
CARR MILL MALL
PARKING LOT
11 (23) [52]
LLOYD STREET
5 (7) [6]
8 (58) [40]
5 (21) [17]
3 (21) [32]
6 (50) [20]
8 (12) [29]
39 (40) [20]
MAIN STREET
25 (45) [26]
32 (58) [25]
35 (56) [49]
ROSEMARY STREET
JONES FERRY ROAD
20 (10) [22]
PARKING LOT
0 (2) [3]
13 (14) [40]
21 (22) [25]
1 (3) [0]
ARTS CENTER
9 (45) [34]
MAIN STREET
1 (10) [6]
5 (27) [45]
1 (48) [6]
FRANKLIN ST.
BREWER LANE
4 (27) [24]
MERRITT MILL ROAD
7 (35) [26]
MUNICIPAL
PARKING LOT
13 (0) [1]
2 (2) [1]
2 (0) [0]
ROBERSON STREET
6 (4) [3]
9 (2) [1]
0 (4) [1]
5 (0) [0]
CARR STREET
1 (4) [1]

LEGEND

XX AM PEAK HOUR BIKES/PEDESTRIANS
(XX) MID-DAY PEAK HOUR BIKES/PEDESTRIANS
[XX] PM PEAK HOUR BIKES/PEDESTRIANS

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FIGURE 2

YEAR 2003-2004
PEDESTRIAN CROSSING VOLUMES

DOWNTOWN TRAFFIC CIRCULATION STUDY
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MAIN STREET
ADT=8,500 VPD

WEAVER STREET

GREENSBORO STREET

WEAVER STREET

CARR MILL MALL
PARKING LOT

LLOYD STREET
ADT=2,200 VPD

MAIN STREET

ROSEMARY STREET

JONES FERRY ROAD
ADT=7,800 VPD

PARKING LOT

MUNICIPAL
PARKING LOT

ROBERSON STREET
ADT=2,700 VPD

CARR STREET

ARTS CENTER

MAIN STREET

BREWER LANE

MERRITT MILL ROAD

FRANKLIN ST.

NOT TO SCALE

LEGEND

XX AM PEAK HOUR TRAFFIC VOLUMES
(XX) MID-DAY PEAK HOUR TRAFFIC VOLUMES
[XX] PM PEAK HOUR TRAFFIC VOLUMES

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FIGURE 3

YEAR 2003-2004
TURNING MOVEMENT VOLUMES

DOWNTOWN TRAFFIC CIRCULATION STUDY
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NOT TO SCALE

MAIN STREET
ADT=8,500 VPD

WEAVER STREET

GREENSBORO STREET

WEAVER STREET
ONE WAY

CARR MILL MALL
PARKING LOT

LLOYD STREET
ADT=2,200 VPD

ONE WAY
MAIN STREET

ROSEMARY STREET

JONES FERRY ROAD
ADT=7,800 VPD

PARKING LOT

CLOSE
ACCESS

ARTS CENTER

MAIN STREET

MUNICIPAL
PARKING LOT

ROBERSON STREET
ADT=2,700 VPD

NEW ACCESS

BREWER LANE

FRANKLIN ST.

MERRITT MILL ROAD

CARR STREET

LEGEND

XX AM PEAK HOUR TRAFFIC VOLUMES
(XX) MID-DAY PEAK HOUR TRAFFIC VOLUMES
[XX] PM PEAK HOUR TRAFFIC VOLUMES

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FIGURE
4

YEAR 2003-2004
TURNING MOVEMENT VOLUMES
WITH ONE-WAY PAIR

DOWNTOWN TRAFFIC CIRCULATION STUDY
CARRBORO, NC

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NOT TO SCALE

MAIN STREET
ADT=8,500 VPD

WEAVER STREET

GREENSBORO STREET

WEAVER STREET

CARR MILL MALL
PARKING LOT

LLOYD STREET
ADT=2,200 VPD

MAIN STREET

ROSEMARY STREET

JONES FERRY ROAD
ADT=7,800 VPD

PARKING LOT

MUNICIPAL
PARKING LOT

ROBERSON STREET
ADT=2,700 VPD

CARR STREET

ARTS CENTER

MAIN STREET

BREWER LANE

FRANKLIN ST.

MERRITT MILL ROAD

LEGEND

XX AM PEAK HOUR TRAFFIC VOLUMES
(XX) MID-DAY PEAK HOUR TRAFFIC VOLUMES
[XX] PM PEAK HOUR TRAFFIC VOLUMES

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FIGURE 5

YEAR 2030
TURNING MOVEMENT VOLUMES

DOWNTOWN TRAFFIC CIRCULATION STUDY
CARRBORO, NC

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FIGURE 6

YEAR 2030
TURNING MOVEMENT VOLUMES
WITH ONE-WAY PAIR

DOWNTOWN TRAFFIC CIRCULATION STUDY
CARRBORO, NC

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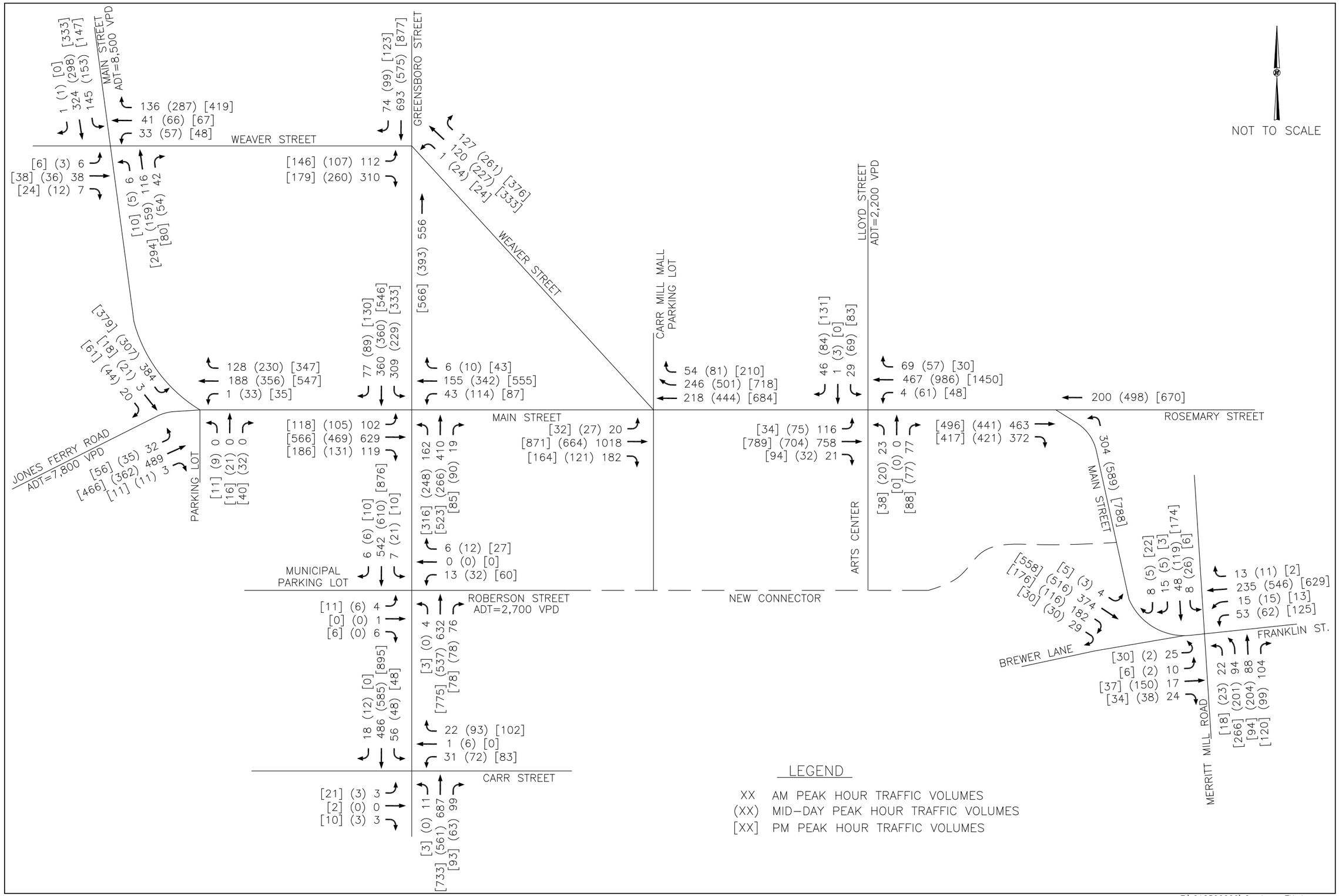

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FIGURE 7

YEAR 2030 TURNING MOVEMENT VOLUMES
100-BLOCK WEAVER STREET ONE-WAY
WITH MAIN STREET CONNECTOR

DOWNTOWN TRAFFIC CIRCULATION STUDY
CARRBORO, NC

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DOWNTOWN TRAFFIC CIRCULATION STUDY
CARRBORO, NC

EXISTING LANES AND ALTERNATIVE GEOMETRIC CHANGES

FIGURE 8

NOT TO SCALE

MAIN STREET

WEAVER STREET

CONVERT TO ROUNDABOUT AT CARR MILL MALL DRIVE ON GREENSBORO STREET

GREENSBORO STREET

WEAVER STREET ONE-WAY

INBOUND ONLY *

CARRMILL MALL PARKING LOT

LLOYD STREET

CONVERT TO FREE-FLOW

ROSEMARY STREET

JONES FERRY ROAD

PARKING LOT

MAIN STREET

CONVERT TO ONE-WAY SOUTHBOUND

CONVERT TO FREE-FLOW FOR MAIN/WEAVER WITH ONE-WAY PAIR

ARTS CENTER

CONVERT TO FREE-FLOW

MUNICIPAL PARKING LOT

ROBERSON STREET

NEW CONNECTOR

MAIN STREET

FRANKLIN ST.

BREWER LANE

MERRITT MILL ROAD

CONVERT TO ROUNDABOUT

CARR STREET

LEGEND

- EXISTING LANE
- EXISTING TRAFFIC SIGNAL
- NEW LANE
- PROPOSED LANE CONFIGURATION
- REMOVE/RESTRIPE LANE
- * NEW RIGHT-TURN OUT WEST OF THE INTERSECTION ON WEAVER STREET

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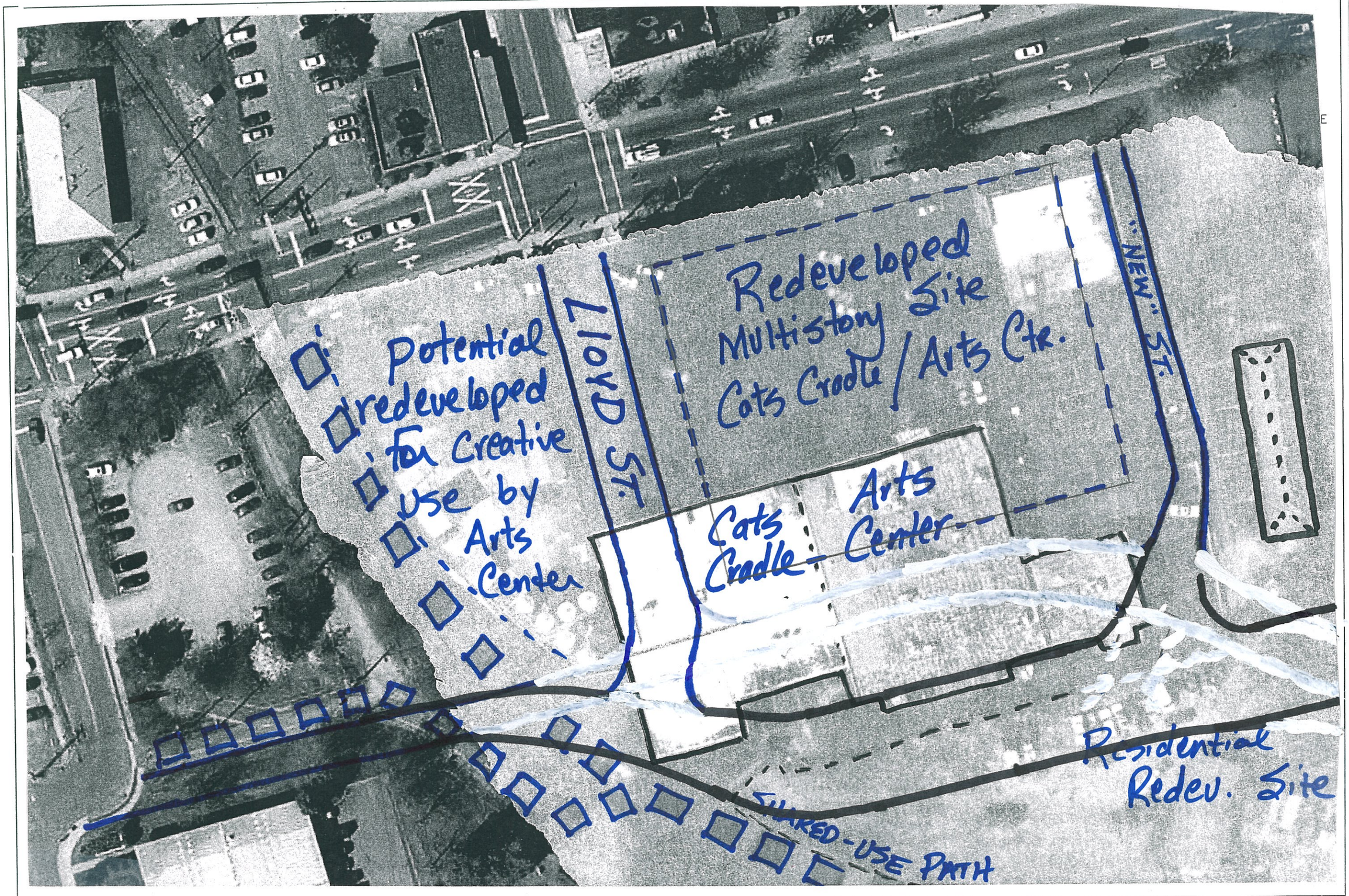

FIGURE 9

CARRBORO DOWNTOWN STUDY
CARRBORO, NC

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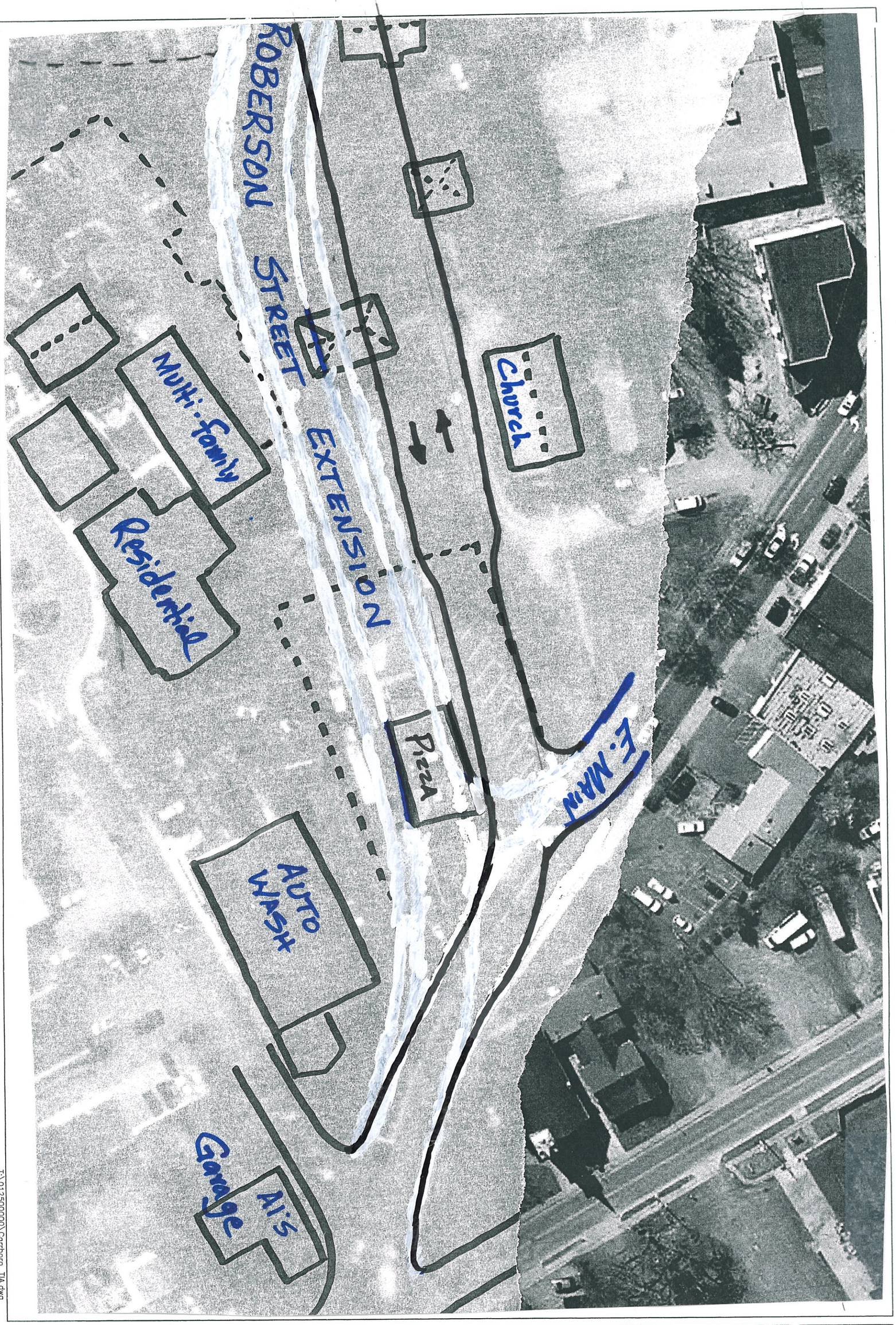

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CARRBORO DOWNTOWN STUDY
CARRBORO, NC

FIGURE
10

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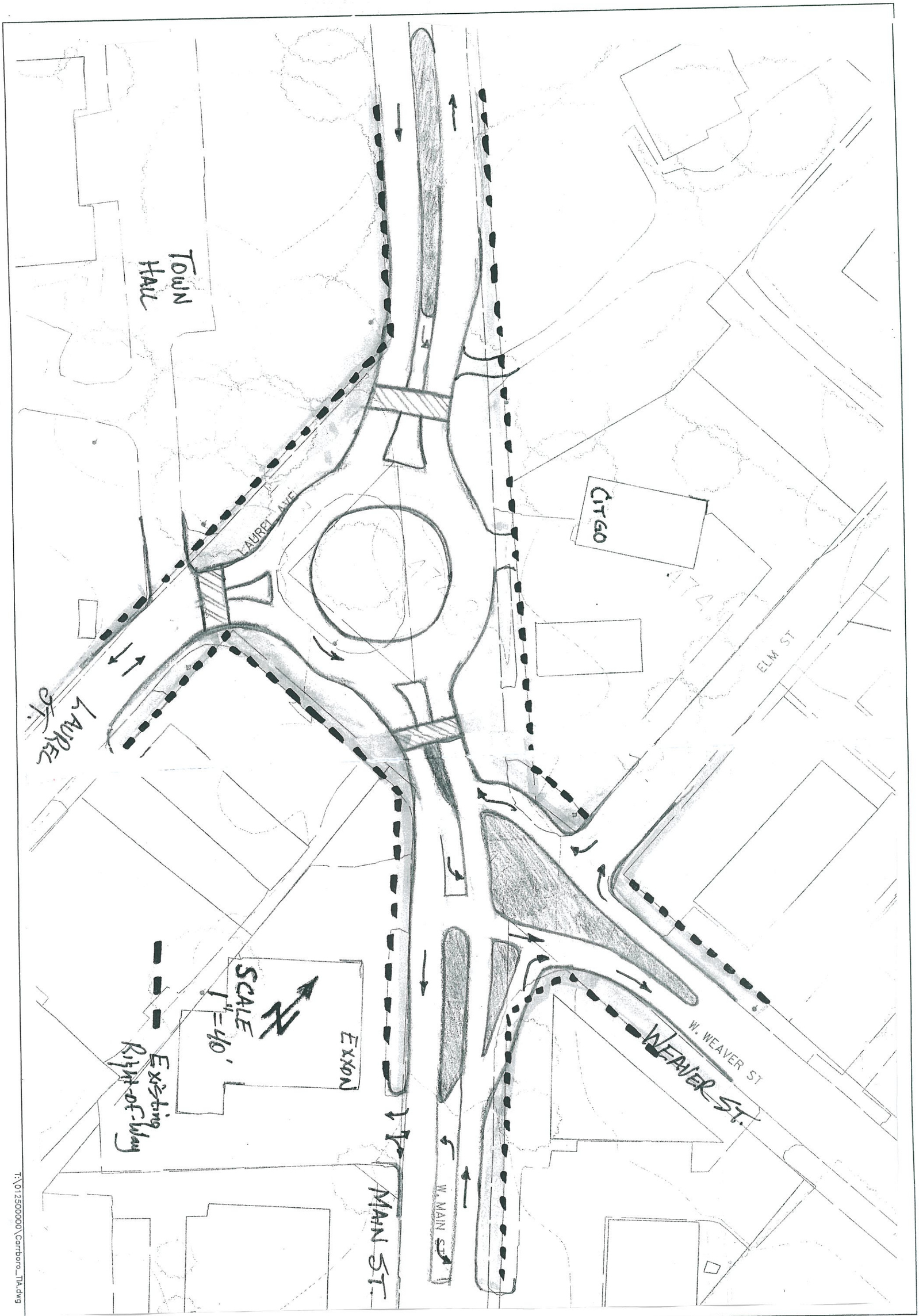

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CARRBORO DOWNTOWN STUDY
CARRBORO, NC

FIGURE
11

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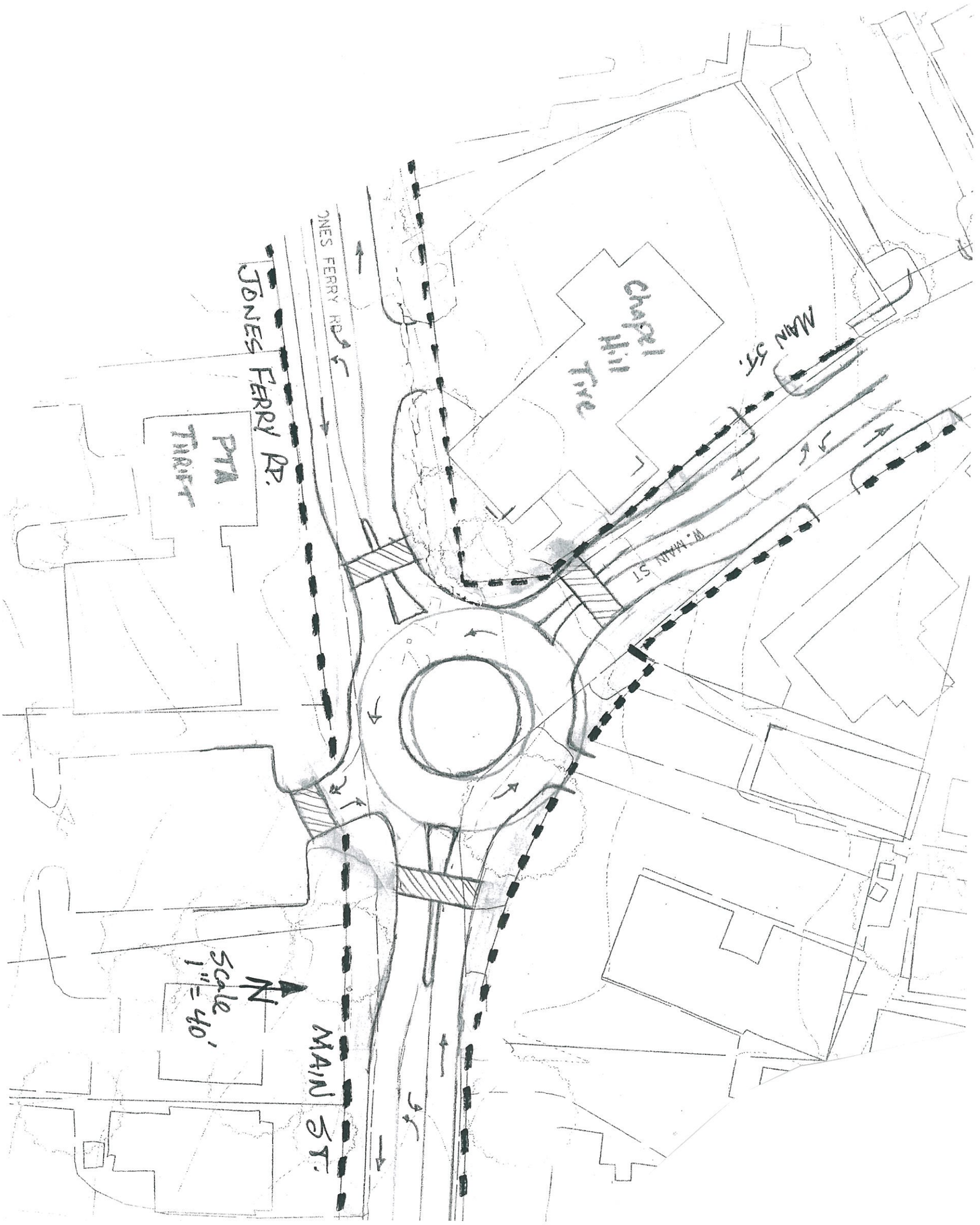

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CARRBORO DOWNTOWN STUDY
CARRBORO, NC

FIGURE
12

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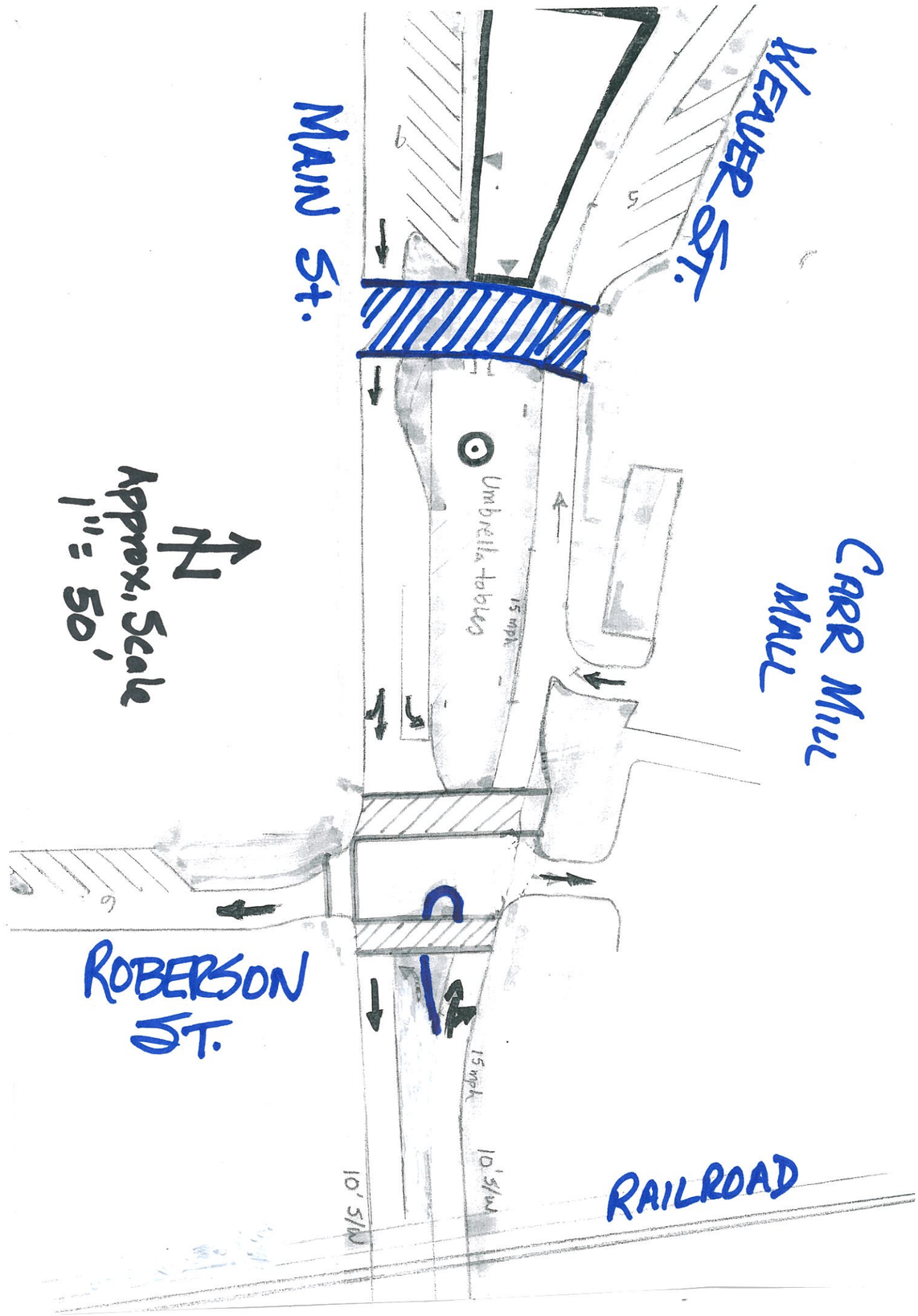

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Kimley-Horn and Associates, Inc.	CARRBORO DOWNTOWN STUDY CARRBORO, NC		FIGURE 13

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NOT TO SCALE

LOVE OVERBOARD PET GROOMING

PARKING

RIGGSBEE HINSON FURNITURE

ALLEY

KFC

PARKING

ART WALL

DON JOSE TIENDA MEXICANA

RESIDENCE

GRAVEL PARKING

RESIDENCE

SUNSET DR.

CONTINUOUS FLOW LANE

ROSEMARY ST

ROSEMARY ST

E. MAIN ST

CONTINUOUS FLOW LANE

PARKING

VALUE

CARR BURRITOS

PARKING

BARBER

HAIR CREATIONS

PARKING

PAVERS

BLEEKER ST. STUDIO

E. MAIN ST

ART GALLERY

BIKE SHOP

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FIGURE 14

CARRBORO DOWNTOWN STUDY
CARRBORO, NC

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