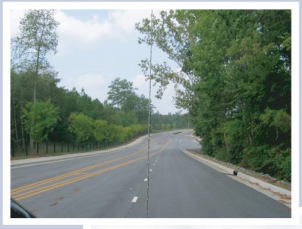
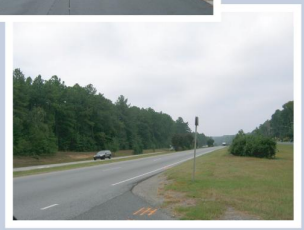
DCHC | *SW Durham County and SE Chapel Hill*

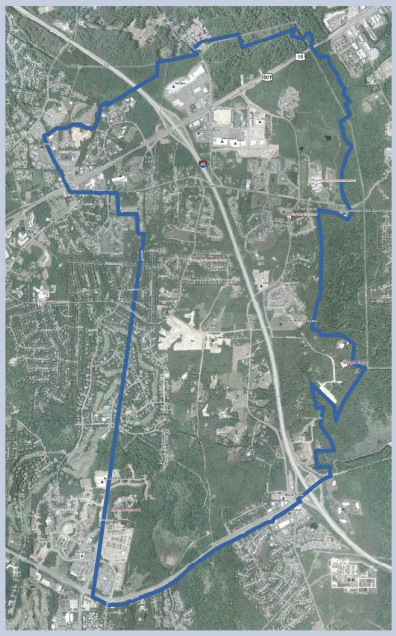
Adopted COLLECTOR STREET PLAN

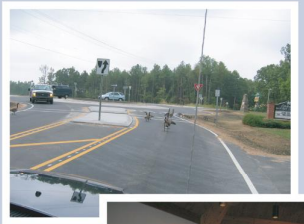
April 11, 2007

Kimley-Horn and Associates, Inc.









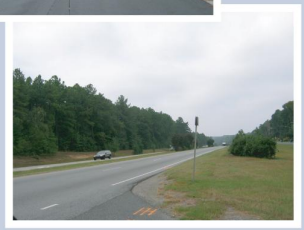
Executive Summary

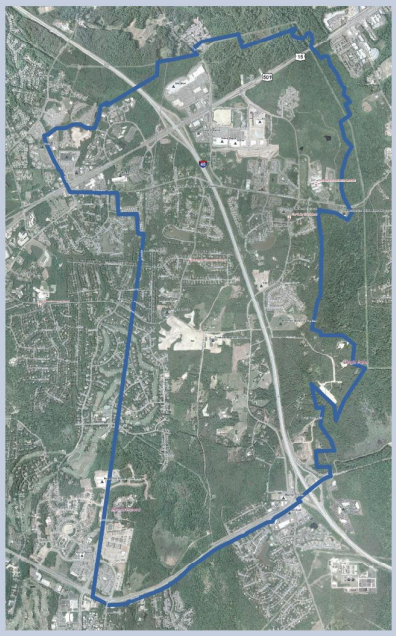
Who wouldn't want a 5-mile commute to Research Triangle Park or any of the other great job opportunities nearby? This prospect is only part of what makes southwest Durham and southeast Chapel Hill a great location. And being a great location is the primary reason why land in this area is the target of development interests.

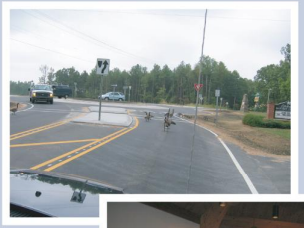
With this natural interest and growth, however, come challenges. To ensure that the increasing developments and people moving to southwest Durham and southeast Chapel Hill are linked with the rest of the area through proper transportation infrastructure and services, the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO) initiated a study of collector streets (shown on **Figure 1.1**). The study is intended to develop plans and policies that can be adopted and implemented by local governments as land development applications are received.

This study is specific to collector streets and utilizes currently adopted plans as its basis. For example, the plan to build a new arterial – Southwest Durham Drive – connecting Meadowmont Lane with the Farrington Road bridge over I-40 was established as early as 1991 by DCHC in the Regional Transportation Plan and again in the late 1990s when the Meadowmont development was approved by the Town of Chapel Hill. While outside the scope of the collector street plan, the alignment of this arterial was evaluated during the planning process. A large public response indicated significant concern that alternative alignments were not considered for Southwest Durham Drive to avoid connecting with Meadowmont Lane. It is recommended that public concerns be addressed in a follow-up study by DCHC. Another assumption evaluated includes the future of the NC 54 corridor between the interchange at I-40 and the signalized intersection at Meadowmont Lane. The North Carolina Department of Transportation (which is the agency responsible for maintenance of NC 54) is still considering several short-term and long-term options for improving safety and mobility along this important transportation corridor. In addition, there is considerable interest in evaluating the need for an interchange at I-40 and Farrington Road but such an arterial level study is outside the scope of this project.

While specific concerns such as these will inevitably appear during any collector street study, it is imperative to view the collectors within the context of the greater arterial network. The two systems are intended to work together to provide acceptable transportation options to the traveling public. Even though they were not focused directly on the collector streets in southwest Durham and southeast Chapel Hill, several broad public policy questions surfaced during the course of the collector street study, including the following:





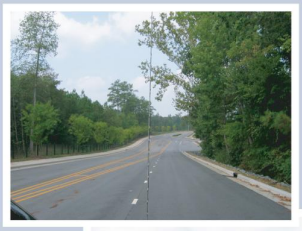


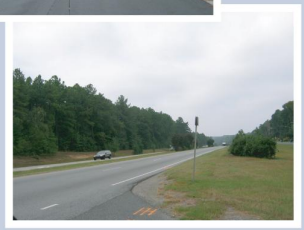
a.) Is the current Southwest Durham Drive alignment still appropriate?
b.) If so, is Southwest Durham Drive needed as an arterial or a collector?
c.) If an arterial, does it still make sense to connect Southwest Durham Drive to Meadowmont Lane or to consider an alternate route to NC 54?
d.) If signalized intersections are the source of existing motorist delay on NC 54, does it make sense to add more signals, even ones spaced far enough apart to achieve synchronization of green lights?
e.) Would unsignalized intersections along NC 54 with special median crossovers (called "left-overs") achieve sufficient access to secondary streets, knowing they provide substantial safety and mobility benefits?
f.) Can an alternate to Farrington Road be identified that would be acceptable to citizens so that the signals at the intersection of Farrington Road and NC 54 can be eliminated, thus providing mobility benefits to motorists on NC 54 and safety benefits to motorists who are vulnerable to rear-end and side-swipe crashes on I-40 as they queue up to exit to NC 54?
g.) What are the likely impacts and potential benefits of building a partial interchange (ramps to and from the east only) on I-40 at the existing Farrington Road interchange? (This last issue was raised during the collector street study public workshops; a formal response was postponed because the topic was "outside the scope" of the plan, but needs to be provided promptly.)

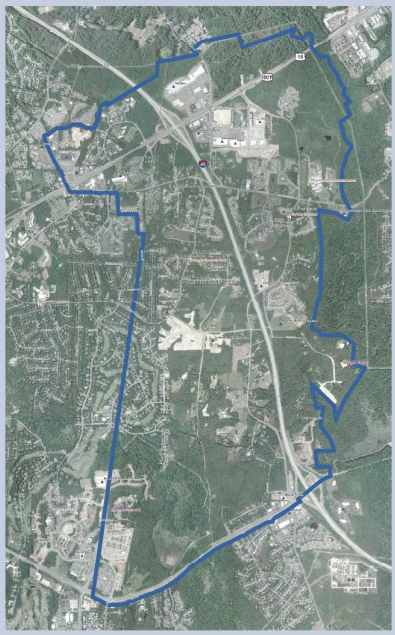
These questions present important decisions regarding broad public policy issues. Because these issues are critical to being able to develop plans and policies that can be adopted and implemented by local governments — it is recommended that DCHC initiate a process to address these issues, perhaps through a single study, as soon as practicable.

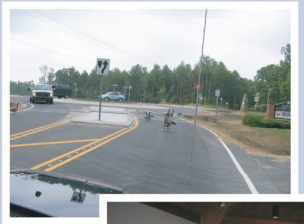
Following the adoption of this collector street plan, local governments will have the opportunity to make sure that an interconnected system of collector streets is built incrementally as development occurs. This strategy has the added advantage of timing the transportation infrastructure so that it coincides with the creation of transportation demand. This collector street plan recommends specific connections be made to improve connectivity and congestion. *It is important to note that the maps in this plan address potential connections but do not reflect the exact location or alignment of a proposed facility. The exact location will be decided during the development review process based on development design, traffic impacts and environmental factors.*

The following document addresses the existing conditions, public involvement, recommended network development, and design considerations that were used during this planning process. The document also provides general policy recommendations and an action plan to assist local decision makers and planning staff in the implementation of the *Southwest Durham County and Southeast Chapel Hill Collector Street Plan*. As shown in the collector street

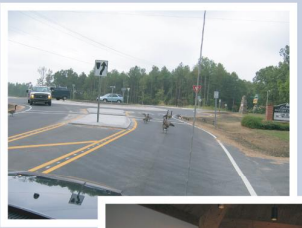








plan, an interconnected network of well designed collector streets can help develop safe, attractive, pedestrian-friendly neighborhoods — a worthwhile goal for any great location.



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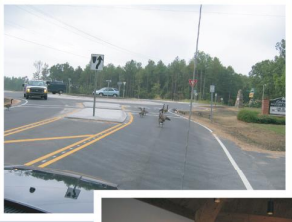


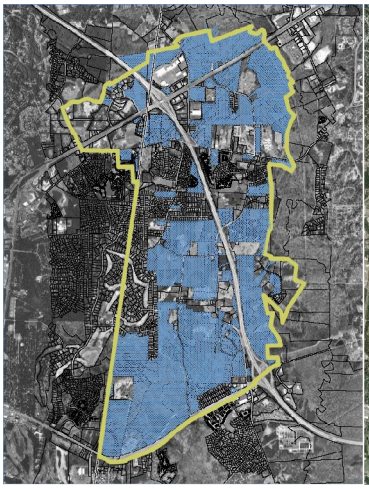
Chapter 1 – Introduction

The *Southwest Durham County and Southeast Chapel Hill Collector Street Plan* has been developed to provide the community with a tool to plan and provide appropriate connectivity throughout the study area such that vehicular, pedestrian, bike, and transit traffic would be dispersed more evenly, reducing the congestion and giving the citizens a better quality of life.

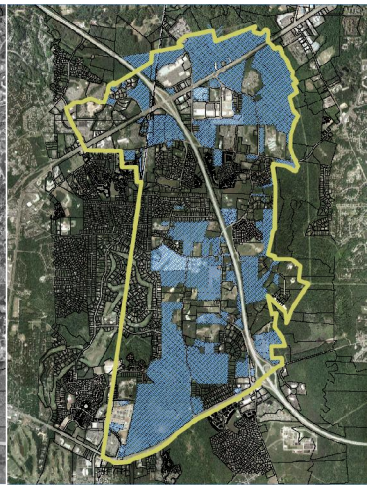
History and Background

The study area is bounded by the New Hope Creek wetlands and U.S. Army Corps of Engineer property, NC 54, US 15-501, and the Durham/Orange County line as can be seen in **Figure 1.1**. Historically, this area has been farmland and still retains much of its natural environment within the central portion of the study area.

However, this area is under study because it is experiencing significant growth that is expected to continue. The study area is currently not fully developed and its location and proximity to the Research Triangle Park, downtown Raleigh, Chapel Hill, and Durham is extremely attractive to developers and citizens. In addition, long-range plans exist for a fixed guideway regional corridor within the study area.



1999 Undeveloped Land in blue



2004 Undeveloped Land in blue

Given the forecasted increases in population and development within the study area and surrounding area, many plans have been developed and have been considered through this planning process. Recent planning efforts include:

- Durham Comprehensive Plan (2005)
- Land Use Plan (2005)

- Unified Development Ordinance (2005)
- Thoroughfare Plan (1991) – Durham and Chapel Hill
- 2030 Long Range Transportation Plan (LRTP) (2005)
- 2006-2012 Transportation Improvement Program (TIP) (2005)
- The US 15-501 Corridor Master Plan (1994)
- The US 15-501 Fixed Guideway Major Investment Study (2001)
- Triangle Transit Authority (TTA) Regional Rail Plan

With these plans in mind, the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO) embarked on the development of the *Southwest Durham County and Southeast Chapel Hill Collector Street Plan* (CSP), to provide the community with a planning tool.

Southwest Durham - Southeast Chapel Hill Collector Street Plan

Figure 1.1 - Study Area

Kimley-Horn and Associates, Inc.

SW Durham County and SE Chapel Hill COLLECTOR STREET PLAN

Study Area
Corps of Engineers Land
County Boundary
Destination Points
Schools
Stub Out
Proposed Transit Stations
Proposed Transit Alignment
1 Lane Roadway
2 Lanes
2 Lanes (with left turn lane)
4 Lanes Divided (Concrete Median)
4 Lanes (with left turn lane)
4 Lanes Divided (Grass Median)
6 Lanes Divided (Grass Median)
Approved SW Durham Drive on Existing Alignment
Approved SW Durham Drive

0 0.125 0.25 0.5 Miles

Plan Purpose

The purpose of the *Southwest Durham County and Southeast Chapel Hill Collector Street Plan* is to **inventory** the existing collector street network and **develop a plan, standards, and policies** that will **promote future connectivity** by creating an efficient network and accommodation for automobiles, transit, pedestrians, and bicycles as collector streets are constructed. It is the intent of this plan to provide city, town, and county staff with the necessary tools to encourage the construction of the collector street network as development occurs; it is not the intent of this plan to suggest that the local governments seek to fund and construct the network through property condemnation and land acquisition.

A Technical Steering Committee (TSC) was formed for this study, and the goals and objectives for the plan include the following:

- Prepare map showing existing and proposed interconnected streets
- Facilitate multimodal transportation options
- Recommend endorsement by MPO, then adoption and implementation by local governments

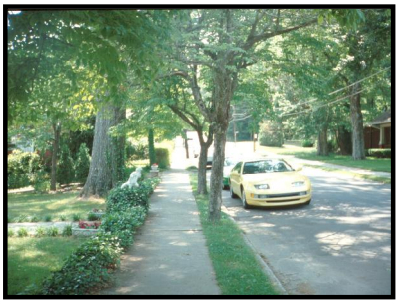
The collector street network will serve and provide benefits to the community throughout the immediate and surrounding areas. An effective interconnected collector street network can provide numerous benefits including:

- Reduced reliance on major arterials (thoroughfares) for short trips
- Reduced travel times without travel speed increases (improved connectivity) for pedestrians, bicyclists, city buses, school buses, cars, refuse collection, mail delivery, and newspaper delivery
- Compatible connections between complementary land uses
- Encouragement for mixed-use developments, resulting in the opportunity to bike or walk to local destinations
- More direct emergency response access
- Improvements to the non-vehicular transportation system (i.e., pedestrian and bicycle system improvements)
- Delay or avoid widening of major arterials beyond four lanes

While the collector street plan includes a map which depicts existing and future streets, it is important to note that the map is more qualitative than quantitative. ***The maps are not precise and do not reflect the actual location or alignment of a proposed facility.*** Location decisions can only be made after careful consideration and evaluation of a given facility, the specific constraints related to its construction,

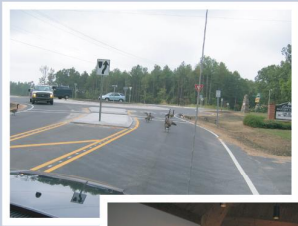
and proposed land use changes. The map associated with the CSP is intended to identify the general location of future collector streets and the desired level of connectivity.

It is also important to note that the proposal for collector streets assumes that development exists (or will exist at some future date) at a scale to warrant the construction of a collector street. To this end, the plan would not generally support the construction of collector streets in the absence of development. That is, the City of Durham and the Town of Chapel Hill do not intend to build collector streets in this study area. Instead, they intend to require developers to build collector streets as one condition of approval for any new development that is approved by the City Council in Durham or Town Council in Chapel Hill.



Typical Collector Street

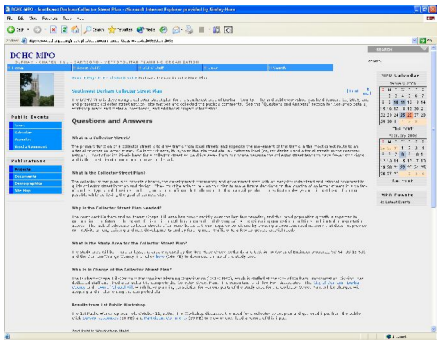
This document was created to reflect the previous planning efforts, the mission and purpose, goals and objectives, and public vision. It should help guide the planning, construction, and maintenance of a collector street system in the study area.



Chapter 2 – Public Engagement

A critical component of a successful collector street plan is engaging members of the public who live, work, and travel within the study area. These are the people who understand the transportation system as well as the shortcomings of the existing network. Beyond the intimate knowledge obtained from the public, it is ultimately these people who will live and work with the proposed future network. Therefore, they have a vested interest and responsibility to encourage their idea of the vision and function of their community for the future.

With this interest in mind, public engagement began early and continuously throughout the planning process. A project website (www.dchcmpo.org/) was maintained to inform the public of plan progress and upcoming events. Three public workshops were held and public input was obtained, summarized, and used as a guide in the development of the collector street proposal. A complete record of written public input can be found in the Appendix.

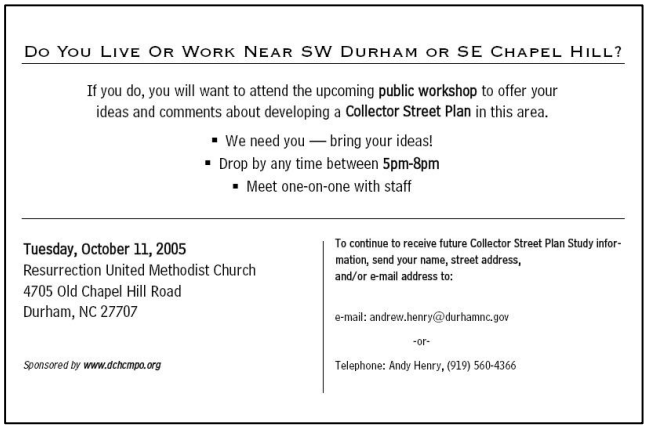


In addition to the general public outreach, a Technical Steering Committee was formed with local staff to represent the City and Town needs and interests. This committee met on a regular basis and was involved extensively throughout the process. The committee contributed technical knowledge, institutional understanding, and community familiarity. The Committee was heavily relied upon when developing the network and policy issues.

This public involvement process was developed to gain valuable knowledge and input from the community as well as build awareness and support for the collector street plan. It is hoped that the *Southwest Durham County and Southeast Chapel Hill Collector Street Plan* will be supported and promoted by the public.

Public Workshop #1

The first public workshop was held on Tuesday, October 11, 2005 as a drop-in session from 5pm to 8pm at Resurrection Methodist Church, located within the study area. Addresses inside of and adjacent to the study area were mailed a postcard invitation to this workshop and the MPO website provided an invite as well. Thirty-seven citizens attended and participated in the workshop activities. A PowerPoint presentation was presented and discussed at the beginning of the workshop and then played continuously throughout the evening. A complete record of workshop materials and public responses can be found in the Appendix.


DO YOU LIVE OR WORK NEAR SW DURHAM OR SE CHAPEL HILL?

If you do, you will want to attend the upcoming **public workshop** to offer your ideas and comments about developing a **Collector Street Plan** in this area.

- We need you — bring your ideas!
- Drop by any time between **5pm-8pm**
- Meet one-on-one with staff

Tuesday, October 11, 2005
Resurrection United Methodist Church
4705 Old Chapel Hill Road
Durham, NC 27707

Sponsored by ***www.dchcmpo.org***

To continue to receive future Collector Street Plan Study information, send your name, street address, and/or e-mail address to:

e-mail: andrew.henry@durhamnc.gov

-or-

Telephone: Andy Henry, (919) 560-4366

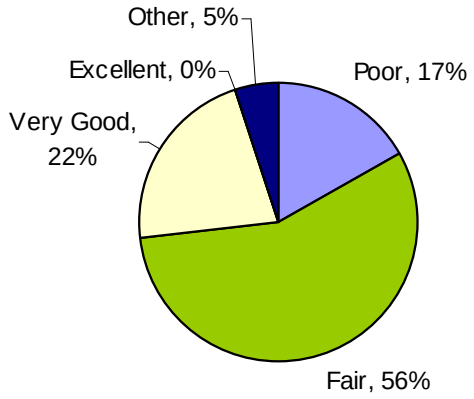
Public Workshop #1 – Direct Mail Postcard

Participants were asked to submit their responses to several questions, including "What is your vision for the study area in 20 years? What things are important to you?" A summary of all responses are included in the Appendix. Some of the responses included:

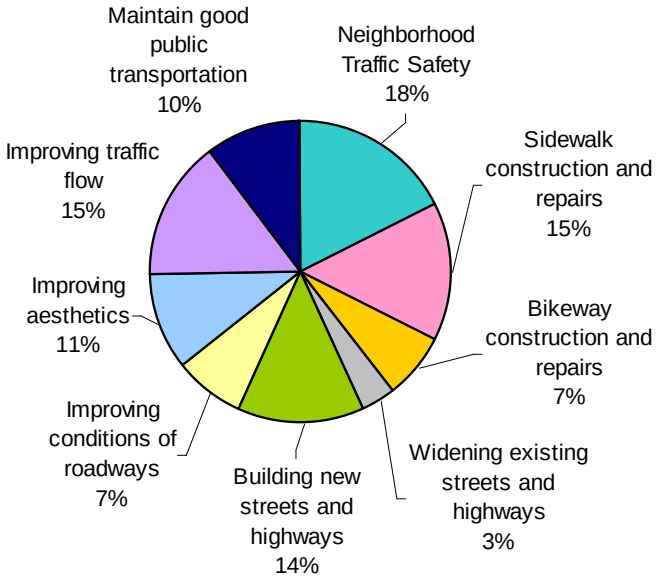
> *My 20 year vision would include "High density housing, large green belts between developed areas – bike and ped[istrian] paths everywhere. No more cookie-cutter subdivisions!"*
>
> *"Protect ponds and open space. Maintain wildlife corridors."*
>
> *My 20 year vision would include "Varied housing types, including some low-density development (with more rural character); more pedestrian-friendly areas."*
>
> *My 20 year vision would include a "Well-planned, dense transit village."*

Participants also were presented with a survey that asked for their input on the condition of the current transportation network. Some of the questions and responses asked at the first public survey included:

- Overall, how would you rate your experience traveling in the SW Durham/SE Chapel Hill area?



- If you had $100 to spend on transportation improvements, how would you spend it? *You can spend it all on one thing or spread it around.*

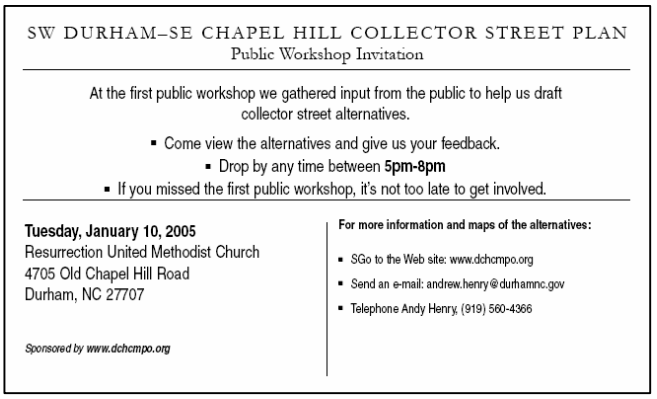


In addition to answering surveys and questionnaires, the public attendees were asked to review maps of the study area and give comments and concerns about existing and future problems and solutions. An extensive set of maps were available that clearly showed the location of existing homes, neighborhoods, stores, churches, wetlands, and other key items. The participants were encouraged to draw future collector street networks that they would like to see. These maps were then used to develop draft network alternatives.

Public Workshop #1 – Workmap Exercise

Public Workshop #2

The second public workshop was held on Tuesday, January 10, 2006, as another drop-in session from 5pm to 8pm at Resurrection Methodist Church. Prior to this public workshop, draft alternative collector street networks, that were developed based on response from the first public workshop and engineering principles, were sent out to study area residents. More than 140 attendees were present at the second workshop. A PowerPoint presentation was presented and discussed at the beginning of the workshop and was played continuously throughout the remainder of the evening. During the presentation, several questions and concerns were brought up and discussed. A complete record of workshop materials and public responses can be found in the Appendix.



SW DURHAM–SE CHAPEL HILL COLLECTOR STREET PLAN
Public Workshop Invitation

At the first public workshop we gathered input from the public to help us draft collector street alternatives.

- Come view the alternatives and give us your feedback.
- Drop by any time between **5pm-8pm**
- If you missed the first public workshop, it's not too late to get involved.

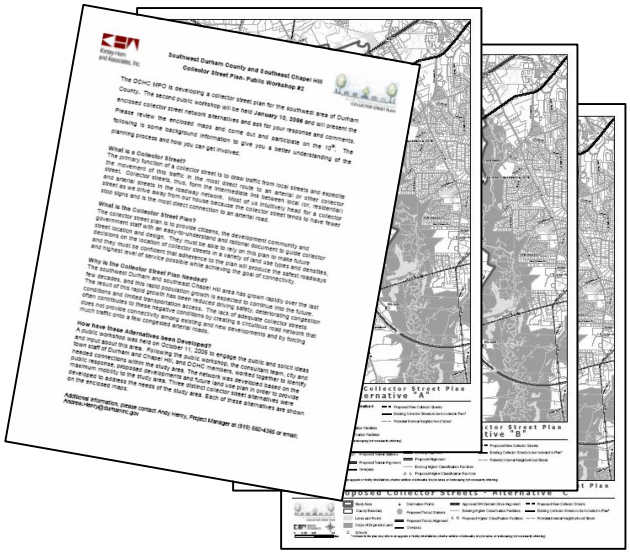
Tuesday, January 10, 2005
Resurrection United Methodist Church
4705 Old Chapel Hill Road
Durham, NC 27707

Sponsored by www.dchcmpo.org

For more information and maps of the alternatives:

- SGo to the Web site: www.dchcmpo.org
- Send an e-mail: andrew.henry@durhamnc.gov
- Telephone Andy Henry. (919) 560-4366

Public Workshop #2 – Direct Mail Postcard



Public Workshop #2 – Direct Mail Maps with CSP Proposed Alternatives

Surveys and maps of the Draft Network Alternatives were distributed and the public was asked for their input on the alternatives. Some of the comments that were received are shown below.

In reference to Alternative "A":

"This plan seems to be the most sensible."

"Good connection to transit stop and Hwy 54. Good alignment of SW Durham Drive"

"Dislike the direct connection of Lancaster to Highway 54."

"The present proposal will destroy the character of the Oaks neighborhood."

In reference to Alternative "B":

"Seems to distribute traffic more evenly. Don't make Lancaster the main road for Pinehurst residents heading to I-40 east."

"Good alignment of SW Durham Drive since it uses an existing road."

"Randall/Beaumont cannot support increased traffic."

"Do not turn Celeste Circle into a collector street."

In reference to Alternative "C":

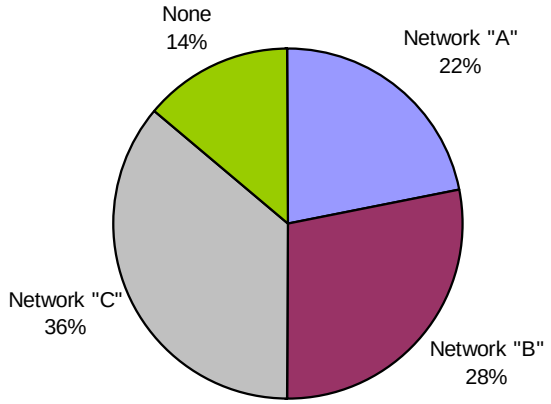
"Want Alternative C so less traffic. Buses are ruining the road, and kids are playing there, which isn't safe."

"Better direct connection from BCBS area and Meadowmont commercial area."

"Alterations need to made to the existing streets so that they are more pedestrian and bike friendly."

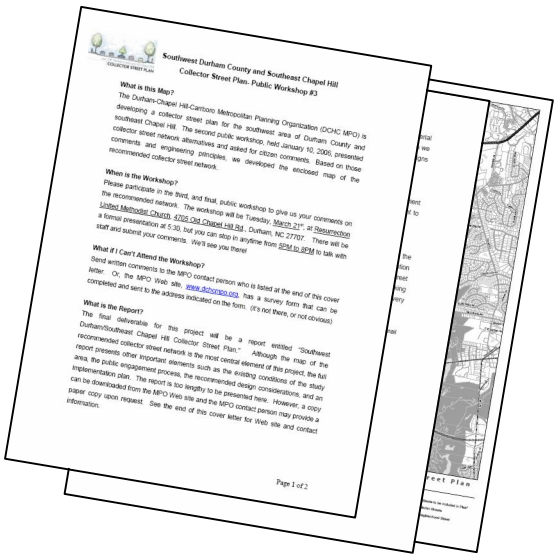
"Do not put a median at Farrington Road. There would be no logical way to get back on 54 going east."

Overall, the public participants responded in favor of Network Alternative "C" by 36%.



Public Workshop #3

The third public workshop was held on Tuesday, March 21, 2006, as another drop-in session from 5pm to 8pm at Resurrection Methodist Church. Prior to this public workshop, the recommended collector street network was developed based on public input from the previous workshops and engineering principles. Information about the plan and the recommended collector street network map were sent out to study area residents.


Southwest Durham County and Southeast Chapel Hill
Collector Street Plan: Public Workshop #3

Public Workshop #3 – Direct Mail Maps with Recommended Collector Street Network

More than 150 attendees were present at the third workshop. A PowerPoint presentation was presented and discussed at the beginning of the workshop and was played continuously throughout the remainder of the evening.

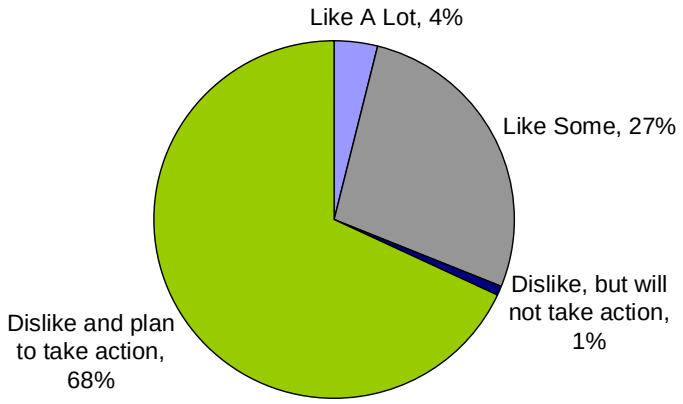
There was much public concern and comment pertaining to the Southwest Durham alignment and Highway 54 intersections within the study area. The public expressed concern and stated the following would cause them to actively oppose the adoption of this plan:

"SW Durham Drive unnecessarily connects into Meadowmont Lane."

"The SW Durham drive needs to be realigned before any further discussion on collector streets continues."

"The lack of study on Hwy 54…it really does not make sense to study potential development without looking at the whole picture."

While these issues are important, it is out of the scope of this project to address these larger issues. Many citizens mentioned that they could not support the plan until these issues were addressed.



Seventy-eight (78) participants responded to a survey distributed at the public workshop. Of those participants, 68% stated that they disliked the plan and intended to take action. One (1) percent said they disliked the plan, but would not take action. Twenty-seven (27) percent of the participants said they somewhat liked the plan and 4% said they liked the plan a lot.

Based on the feedback from the third public workshop, minor changes were made to the recommended collector street plan. However, due to the lack of support of the recommended collector street plan and the relating outstanding issues, it is recommended that the Southwest Durham Drive alignment, Highway 54 intersections, and potential interchange at I-40 be studied further, before adoption is sought.

A complete record of workshop materials and public responses can be found in the Appendix.

Chapter 3 – Existing Conditions

Chapter 1 mentions the significant growth that the study area is undergoing and identifies goals for the *Southwest Durham County and Southeast Chapel Hill Collector Street Plan* (CSP). Even though the community is changing, it is important to identify the current conditions in order to better understand the recommendations presented in this plan. A field investigation was completed at the onset of this project. **Figure 3.1** depicts the resulting data collected. Some of the influential factors that have helped shape this report include plans that have already been developed, the traffic and safety conditions, existing development, demographics, and environmental features.

Existing Plans

- Comprehensive Plan (2005) – The *Durham Comprehensive Plan* contains guidance for land use, housing, economic development, conservation, transportation, water/wastewater, solid waste, parks and recreation, schools, public safety, libraries, and capital improvements.

- Land Use Plan (2005) – The current land use plan was adopted as part of the *Durham Comprehensive Plan*. The plan proposes a flexible approach to the interaction of land uses, while limiting intensities and densities depending on the location.

- Unified Development Ordinance (2005) – This ordinance represents the first major overhaul of the development regulations in Durham in nearly 30 years. This ordinance, along with the *Comprehensive Plan*, provides Durham's development regulations.

- Thoroughfare Plan (1991) – Since its completion, the Durham County population has increased 23% (increasing from 181,835 to 223,314), and it contains some roads that are no longer in the 2025 Long Range Transportation Plan (LRTP).

- 2030 Long Range Transportation Plan (LRTP) (2005) – This contains highway, transit, fixed-guide way, bicycle, and other types of transportation projects that are planned through 2030.

- 2006-2012 Transportation Improvement Program (TIP) (2005) – This plan contains funded projects in the feasibility, scoping, environmental analysis, design, right-of-way acquisition, and construction phases.

A challenge to the process for developing a collector street plan is the existence of collector street, corridor, and fixed-guideway plans that cover areas within or adjacent to the study area. The contents of these plans will need to be incorporated and considered in a DCHC MPO collector street plan. The existing plans include:

Collector Street Plans

- Town of Chapel Hill Design Manual (2005) – The Chapel Hill Design Manual provides guidance for the design and construction of collector streets as well as street standards for collector street classification.

- CORE Collector Street Plan – The Triangle J Council of Governments (TJCOG) is developing a collector street plan in the Center of the Region Enterprise (CORE) area. Upon completion of the plan, the City and County of Durham shall evaluate the plan and consider amending the *Durham Comprehensive Plan* to incorporate the collector street plan.

- City of Durham NC 54/I-40 Corridor Study (2005) – This identifies the general location for some connector streets. Connector streets are similar to collector streets, as they provide a connection between local streets.

- In addition, the City of Durham "Public Works Reference Guide" provides design standards and guidelines for infrastructure construction, including street design standards.

Corridor Plans

- US 15-501 Corridor Master Plan (1994) – This evaluated several potential transit technologies and alignments.

- A group of citizens participated in a charrette to produce a transit oriented development (TOD) in the southwest area of Durham County to plan for the 15-501 fixed-guideway alignment.

- The DCHC MPO is implementing the "next steps" in the US 15-501 fixed-guideway major investment study that includes local decisions on alignment and proposed station changes, corridor protection and development characteristics, and the use of impact studies for proposed corridor changes.

Fixed-Guideway Plans

- The US 15-501 Fixed-Guideway Feasibility Study
- Triangle Transit Authority (TTA) Regional Rail Plan

Southwest Durham - Southeast Chapel Hill Collector Street Plan

Figure 3.1 - Existing Conditions

Kimley-Horn and Associates, Inc.

SW Durham County and SE Chapel Hill COLLECTOR STREET PLAN

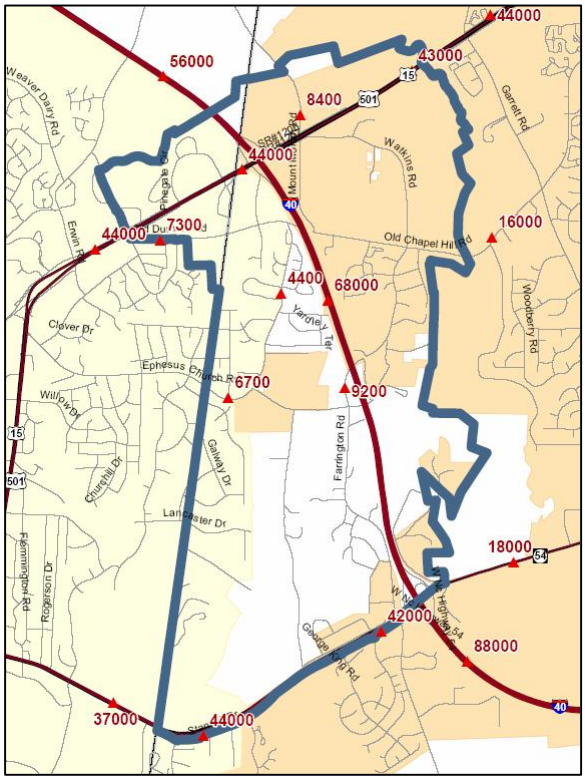
- Study Area
- Lakes, Rivers, Streams and Creeks
- Corps of Engineers Land
- County Boundary
- Chapel Hill Town Limits
- Durham City Limits
- Destination Points
- Schools
- Stub Out
- Highways
- 2 Lanes
- 2 Lanes (with left turn lane)
- 4 Lanes Divided (Concrete Median)
- 4 Lanes (with left turn lane)
- 4 Lanes Divided (Grass Median)
- 6 Lanes Divided (Grass Median)
- Dirt Roads
- Sidewalk One Side
- Sidewalk Both Sides

N W E S

0 0.125 0.25 0.5 Miles

Traffic

The *Southwest Durham County and Southeast Chapel Hill Collector Street Plan* (CSP) study area has many higher classified facilities (such as major thoroughfares, minor thoroughfares, and interstates) that are heavily traveled. Although it was not the intent of this plan to suggest any improvements to facilities other than collector streets, it is important to study the entire roadway network to understand the existing traffic patterns and areas of concern. Non-collector street facilities of key concern that exist in the study area include I-40, US15-501, NC 54, the proposed transit fixed-guideway corridor, and the proposed Southwest Durham Drive.



2004 Average Daily Traffic Volumes

Interstate 40 is currently a six-lane interstate that runs north/south, bisecting the study area. It is divided with a grass median and the speed limit is 65 mph. This facility carries daily commuters and regional traffic. I-40 currently carries an average daily traffic (ADT) volume of 68,000 vehicles.

Highway 54

NC 54 has three distinct cross sections along its routing through the southern portion of the study area. West of I-40, NC 54 is a four-lane divided thoroughfare with a grass median. As the facility crosses I-40, the median narrows to a four foot concrete island. East of Leigh Farm Road, NC 54 narrows to two lanes. Between Leigh Farm Road and Farrington Road, the signal spacing is approximately 1,000 feet between signals at Farrington Road and the I-40 ramps. Between Leigh Farm Road and the I-40 ramps, the signal spacing is reduced to approximately 500 feet. During the peak periods, heavy congestion occurs at these signals, backing up onto the I-40 ramps and even onto I-40 itself. The congestion is due to commuter traffic to and from UNC at Chapel Hill and people who live or work in RTP, Chapel Hill, and Durham. NC 54 serves as the southern boundary of the study area and carries an ADT volume of approximately 44,000 vehicles.

US 15-501 is a four-lane, grass median divided boulevard within the study area. US 15-501 has a distinct commercial character, surrounded by retail areas and various businesses. This facility is also heavily traveled and is often congested during peak hours. This facility carries an ADT volume of 44,000 vehicles.

Farrington Road is currently a two-lane undivided arterial. This facility is typically congested during peak hours, especially at the intersection of NC 54. This facility currently carries 9,200 vehicles per day.

Old Durham/Chapel Hill Road is a two-lane undivided arterial. This facility runs east/west through the study area and is often congested near signalized intersections. This facility carries an ADT volume of 16,000 vehicles.

Mt. Mariah Road is currently a three-lane road with a two-way left-turn lane. This facility serves the newly developed retail areas in the northern section of the study area. Mt. Mariah Road typically serves 8,400 vehicles per day.

Ephesus Church Road is a two-lane undivided arterial that is centrally located within the study area. New development has recently occurred in the vicinity of this facility and is expected to continue. Ephesus Church Road currently has an ADT volume of 6,700 vehicles.

Safety

Six corridors within the study area were analyzed using crash data obtained from the North Carolina Department of Transportation over a three-year period (March 30, 2002 to March 30, 2005). **Table 3.1** shows the corridor crash rates, corridor length, severity index, majority causational factor, and the statewide average crash rate for each type of facility. A crash "rate" is defined as the number of crashes per 100 million vehicle miles traveled. It should be noted that the NCDOT splits the statistics at the county line and therefore the table reports the rates by county.

Table 3.1 - Crash Statistics

Corridor (County)	Crash Rate (per 100 MVMT*)	Corridor Length (miles)	Severity Index**	Majority Crash Type	Statewide Average Crash Rate***
Watkins Rd	1130	1.16	6.55	Rear-end	347.58
Old Durham Rd (Orange)	71	0.64	5.93	Rear-end	178.42
Old Durham Rd (Durham)	1007	2.46	3.72****	Rear-end	178.42
NC 54 (Orange)	168	0.63	3.47	Rear-end	150.3
NC 54 (Durham)	250	1.98	2.96****	Rear-end	150.3
Farrington Rd	229	2.51	6.52	Rear-end	178.42
Ephesus Church Rd (Orange)	831	0.14	2.23	Rear-end	178.42
Ephesus Church Rd (Durham)	61	0.32	1	Left-turn	178.42
US 15/US 501 (Orange)	460	0.77	3.6	Rear-end	236.68
US 15/US 501 (Durham)	529	1.63	2.66	Rear-end	236.68

Source: North Carolina Department of Transportation

* MVMT = million vehicle miles traveled

** Severity Index = (76.8*(F+A) + 8.4*(B+C) + PDO)/TOTAL CRASHES

*** State averages for comparable roadway types (based on laneage and route type)

**** Fatal crash occurred

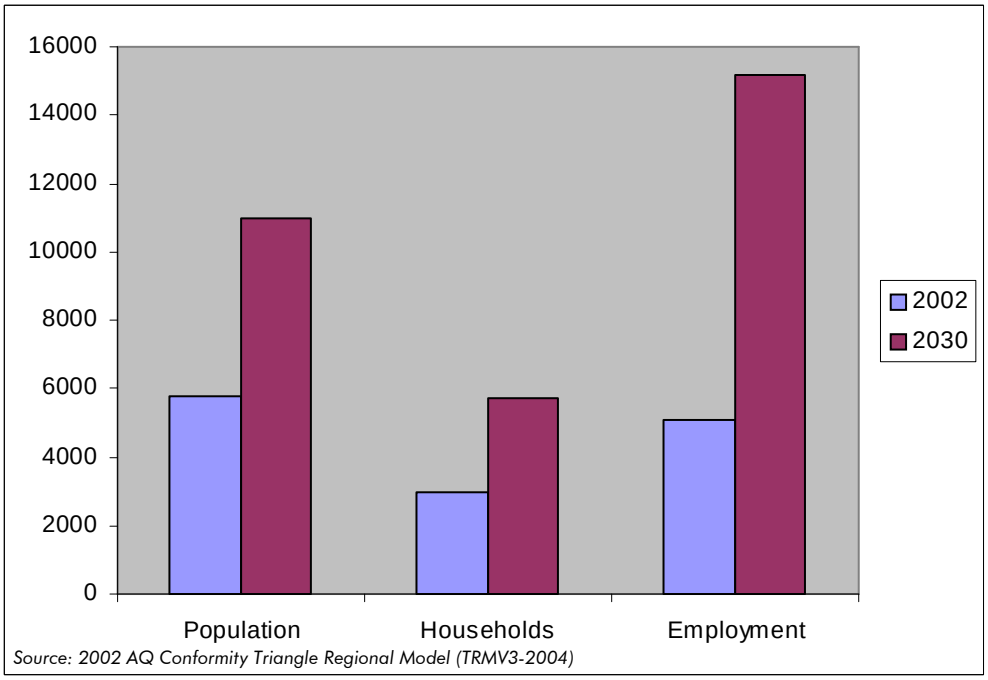
This analysis was used to help identify existing safety issues as a consideration in placing proposed collector street intersections with these facilities. As would be expected, the most heavily traveled facilities are experiencing the greatest number of crashes and the majority of those crashes are caused by rear-end collisions. The input from public workshops reinforced the safety problems identified by NCDOT data.

The adoption of a collector street plan in southwest Durham and southeast Chapel Hill may be an effective countermeasure for these crash patterns. The collector streets may reduce the volume of traffic on the major arterial routes and intersections, thereby reducing the total number of crashes occurring on these facilities. In addition, the low speed of the collector streets themselves should create a safer driving environment.

Existing Development

As mentioned previously, development has been taking place in the study area and is expected to increase in the near future. The chart below indicates the expected growth in population, households, and employment. Based on the approximate number of households within study area (Durham County only), an estimated 42,600 trips per day are expected in 2030 vs. an estimated 22,600 trips per day in 2002.

One factor in this growth is the regional rail corridor that is projected to be built. It will provide citizens with convenient travel options and thus has the potential to attract more citizens to the area.



2002 vs. 2030 Study Area Statistics

The northern portion of the study area has experienced significant growth over the past couple of years with the development of shopping centers (including stores such as Wal-Mart, Home Depot, Kohl's, and Kroger) along US 15-501 and Mt. Mariah Road. Undeveloped land in the central portion of the study area is currently being developed as residential communities. This is illustrated in **Figure 3.2**.

It is expected that parcels throughout this study area will continue to be developed and redeveloped. Therefore, it is imperative that the *Durham County and Southeast Chapel Hill Collector Street Plan* be completed and adopted so that the future development will be supported by an appropriate infrastructure.

Southwest Durham - Southeast Chapel Hill Collector Street Plan

Figure 3.2 - Approved & Proposed Developments

Kimley-Horn and Associates, Inc.

SW Durham County and SE Chapel Hill COLLECTOR STREET PLAN

- Study Area
- County Boundary
- Lakes, Rivers, Streams and Creeks
- Corps of Engineers Land
- Chapel Hill Town Limits
- Durham City Limits
- Schools
- Destination Points
- Stub Out
- Highways
- Proposed Transit Alignment
- Proposed Transit Stations
- Approved Internal Neighborhood Street
- Proposed Internal Neighborhood Street
- Proposed Development
- Approved Development
- Approved SW Durham Drive
- Approved SW Durham Drive on Existing Alignment
- Overpass

0 0.125 0.25 0.5 Miles

Environmental Resources

Because the land within the study area will continue to develop, awareness regarding the impacts to the surrounding environment have become heightened. It is imperative to manage and minimize these impacts to continue to serve this area with clean air and water and unpolluted land.

Figure 3.3 illustrates important environmental resources within the study area. Wetlands and U.S. Army Corps of Engineers land in the southern and eastern portions of the study area have forced street planning activities to the edges of these environmental resource areas.

The collector street network was developed in a way to minimize impacts to the wetlands. Potential wetlands crossings should be recommended at the smallest geographic locations. It was extremely important to be sensitive to the natural environment while developing this plan so that the potential impacts would be minimal while making sure that the plan would be reasonable and feasible.

Southwest Durham - Southeast Chapel Hill Collector Street Plan

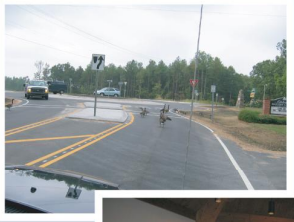
Figure 3.3 - Environmental Features

Kimley-Horn and Associates, Inc.

SW Durham County and SE Chapel Hill COLLECTOR STREET PLAN

Study Area
County Boundary
Wetlands
Gamelands
Corps of Engineers Land
Chapel Hill Town Limits
Durham City Limits
Lakes, Rivers, Streams and Creeks
Vascular Plant
Invertebrate Animal
Natural Community
Approved SW Durham Drive on Existing Alignment
Approved SW Durham Drive
10-Foot Elevation Contours
Water Treatment Facility

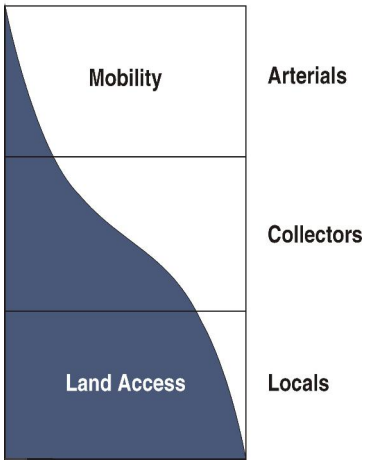
0 0.125 0.25 0.5 Miles



Chapter 4 – Recommended Network

Introduction

The focus of the *Southwest Durham County and Southeast Chapel Hill Collector Street Plan* is transportation; however, integration of the transportation system into the overall community fabric necessitates a discussion about urban design and land use issues. These must be considered in order to reinforce the local character of the community and create the "sense of place" desired within these public rights-of-way. In many cases, collector streets are not considered in long-range transportation plans which are oriented toward "regional" transportation. However, it is the case in many situations that collector streets serve as the backbone for local mobility, property access, and non-vehicular transportation modes. Without adequate interconnected collector streets, regional routes bear the burden of both access and mobility, becoming overcrowded with the combination of local and regional traffic.



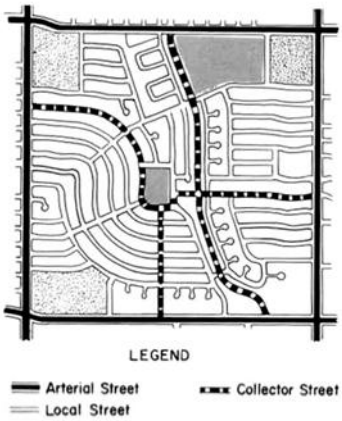
Relationship of Classification to Service

The *Southwest Durham County and Southeast Chapel Hill Collector Street Plan* looks holistically at the hierarchy of streets within the community and identifies policies, guidelines, and recommendations for reinforcing the community vision with the collector street system – taming traffic, providing mobility options, and reinforcing community character.

Defining the Network

Functional Classification

Roadways are categorized into functional classification groups according to the character of service they provide. The functional classification groups for urban areas are freeways/controlled access facilities,



principal and minor arterials, collectors, and local streets. The extent and degree of access control is a significant factor in defining the functional classification of a roadway. Regulated limitation of access is necessary on arterials to enhance their primary function of mobility, while the primary function of local streets is to provide access to adjacent land use. Collector streets must strike an appropriate balance of moving local traffic at safe reasonable speeds.

The existing thoroughfare plans as well as quantitative and qualitative classification criteria were used to develop the hierarchy of streets within the study area transportation system. This hierarchy was necessary to focus our efforts toward developing recommended collector street design standards.

Roadway Classification

Functional classifications for roadways are defined in *A Policy on Geometric Design of Highways and Streets* (American Association of State Highway and Transportation Officials, 2004) and summarized below.

Freeways – "Freeways are arterial highways with full control of access. They are intended to provide for high levels of safety and efficiency in the movement of large volumes of traffic at high speeds. Control of access refers to the regulation of public access rights to and from properties abutting the highway. With full control of access, preference is given to through traffic by providing access connections with selected public roads only and by prohibiting crossings at grade and direct private driveway connections." Interstate I-40 is an example of a freeway.

Principal Arterials – "Principal arterials serve major centers of activity and carry the highest volume of traffic for urbanized areas. Principal arterials typically serve longer distance trips. Although principal arterials constitute a small percentage of the total roadway network, they carry a high proportion of total urban traffic. The principal arterial system also carries most of the trips entering and leaving the urban area. Service on principal arterials is normally continuous with relatively high traffic volumes, long average trip lengths and high operating speeds. Service to abutting land is typically

Highway 54

subordinate to major traffic movements. Typical principal arterials include interstates, freeways and other limited access facilities."

Examples of principal arterials within the project study area include NC 54 and US 15-501.

Minor Arterials – These interconnect and support the principal arterial system. They accommodate trips of moderate length at a lower level of mobility than provided on principal arterials. Minor arterials provide continuity among communities and may also carry local bus routes. The spacing of minor arterials is typically not much greater than two miles in most urbanized areas.

Mt. Moriah Road

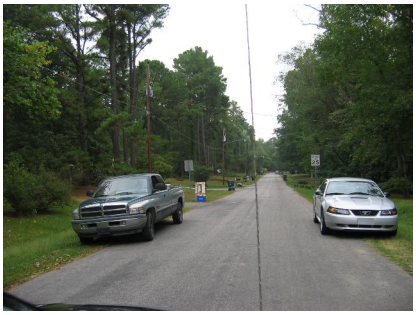
Examples of minor arterials within the project study area include Mt. Moriah Road, Old Durham/Chapel Hill Road, and Southwest Durham Drive.

Collector Streets – These provide vehicular access to and mobility within residential neighborhoods as well as commercial and industrial areas. They differ from the arterial system in that they provide connection to neighborhoods and distribute trips from arterials to their ultimate destinations.

Lancaster Drive

Conversely, collectors also transition vehicular traffic from local streets onto the arterial system. The collector street system may carry local bus routes, bicycles, and pedestrians. Examples of collector streets within the project study area include Barbee Chapel Road and Lancaster Drive.

Local Streets – These comprise all roadways not in one of the higher classifications. They provide direct access to abutting land uses and connections to the higher order systems. They offer the lowest level of vehicular mobility and usually contain no bus routes. Service to



Celeste Circle

through traffic is often discouraged on local streets. Local streets usually have relatively low average traffic volumes, short average trip length, no through traffic movements, and high land access for abutting property. Examples of local streets within the project study area include Clark Lake Road and Meetinghouse Lane.

Classification Criteria

The following criteria were used to evaluate new collector streets to develop the *Southwest Durham County and Southeast Chapel Hill Collector Street Plan*.

Quantitative Measures

- Traffic volume
- Posted speed limit
- Number of travel lanes
- Points of access (per mile)
- Roadway capacity

Qualitative Measures

- Adjacent land use
- Access function
- Mobility function
- Transit routing
- School locations
- Bicycle facilities
- Median treatment
- Presence of on-street parking

These criteria were developed based on federal, state, and local guidelines in addition to the existing street inventory database.

The Town of Chapel Hill defines their collector streets in the following way:

> *"Collector streets penetrate neighborhoods, public service areas, and districts. They are intended to provide both through-traffic and land-access services in relatively equal proportions, often linking the local street system to the arterial street system." (Town of Chapel Hill Design Manual, 2005, Appendix 4-A)*

The City of Durham does not explicitly give a definition of their collector streets; however, specifications for residential collectors are given.

Table 4.1 displays a portion of Chapel Hill and Durham's street standards. Full text pertaining to Chapel Hill and Durham's collector streets can be found in the Appendix.

Table 4.1 - Collector Street Standards

	Chapel Hill	Durham
Design Volume (ADT)	1,000 - 7,500	2,500 - 4,000
Design Speed	25 - 35 mph	35 mph
Number of Travel Lanes	2 typical	2 typical
Intersection Spacing	400' minimum	

Source: Town of Chapel Hill Design Manual, 2005, Table 4-A-1 and City of Durham Reference Guide for Development, 2003, Section 9

The collector street planning process must have a degree of flexibility to accommodate exceptions; therefore, final classifications assigned to the street network were made collectively through a process of consensus building.

Collector Street Network Development

Designating a collector street network is a process of respecting what present and future conditions exist, what the public wants for the future, and what network will offer the most benefits to balance connectivity, access, mobility, safety and the natural environment. **Figure 4.1** gives a visual of some of the key components of this process and the order in which they occurred in this study.

Designating the Network

Public Workshop #1

At the onset of the *Southwest Durham County and Southeast Chapel Hill Collector Street Plan* project, a Technical Steering Committee (TSC) was formed with County and City of Durham, Town of Chapel Hill, and North Carolina Department of Transportation (NCDOT) staff. These committee members met on a regular basis with the consultant team to help identify key issues and needs within the study area and to represent their communities from a technical background. Together, the TSC and the consultant team identified existing conditions (outlined in Chapter 3) to be used in the development of this plan.

In an effort to build consensus, a public workshop was held in the early stages of the project to obtain public and developer input and vision. As mentioned previously in Chapter 2, surveys were distributed and participants were asked to state their vision for the future of the study area. Developers also participated in the workshop and shared their vision plans for the area. In addition, participants used markers to depict their vision on poster maps.

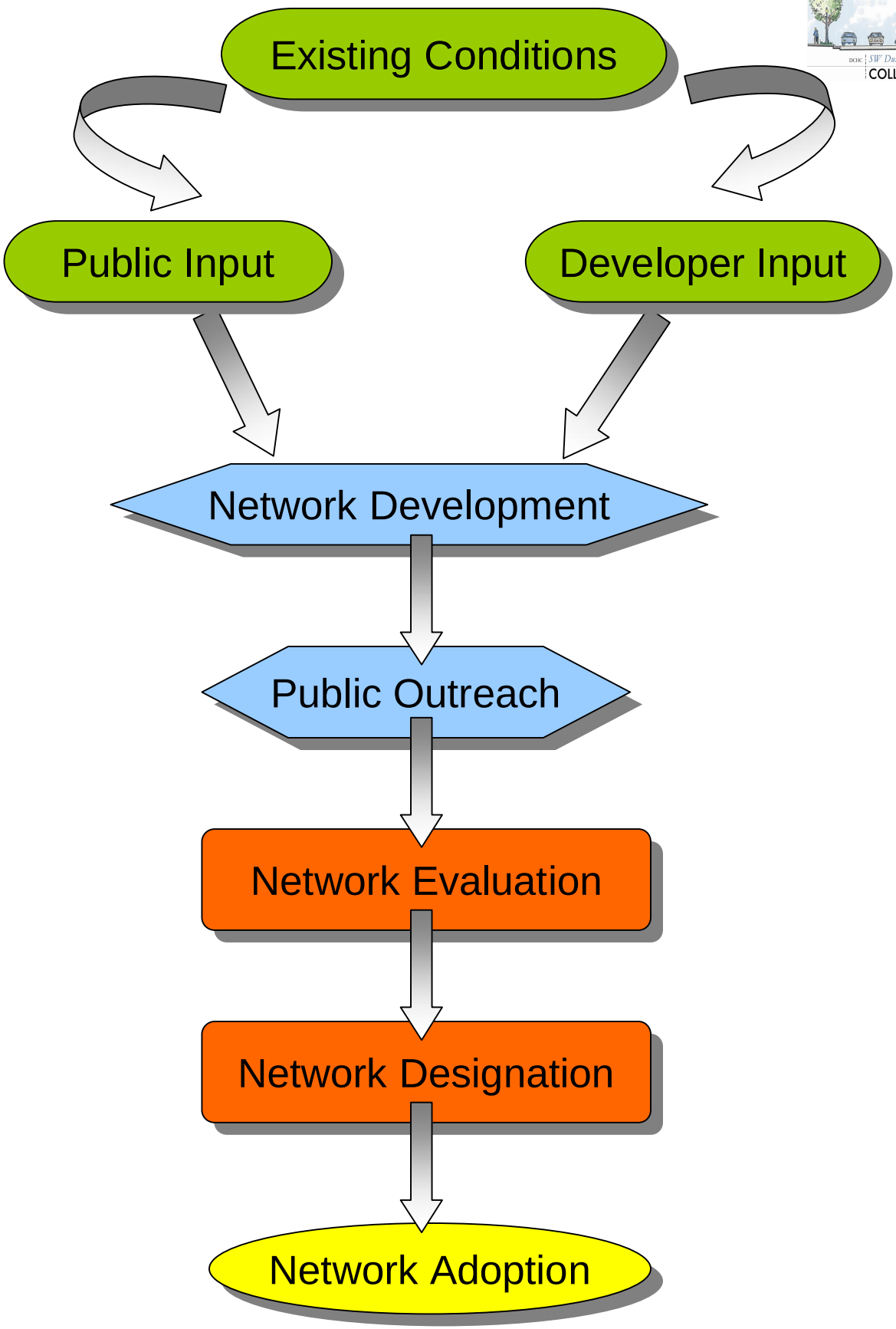


Figure 4.1 – Collector Street Planning Process

A project work-session was held following the first public workshop with a subset of the TSC. During the work-session, participants used the following general resources to develop network alternatives.

- Recent aerial photo
- Planimetric mapping (including parcels, right-of-way, and buildings)
- Environmental and social features (including rivers, streams, lakes, buffers, protected lands, open space, protected species, severe topography, railroads, and historic districts)
- Planned development (adopted)
- Land use/zoning
- Future roads and projects (including TIP, CIP, and enhancement projects)
- ADTs
- Crash data
- Existing plans (including thoroughfare, greenways, comprehensive, and water and sewer extension plans)
- Existing policy (e.g., street design standards and subdivision ordinance)

Factors unique to this study area that played an important role in network development include:

- Avoidance of U.S. Army Corps of Engineers Land and Leigh Farm Park Historic Site
- Access to Highway 54
- Access to US 15-501
- Southwest Durham Drive alignment
- Future land use plan
- Future transit corridor and station locations
- Approved and proposed development
- Existing bus network
- Street spacing guide to support likely development densities
- Impact on existing streets & neighborhoods

Table 4.2 gives general "rules of thumb" that were used to guide when it was appropriate to cross natural or manufactured barriers.

Table 4.2 - Crossing Barriers - Rules of Thumb

Freeways Considerations	Consider grade separated crossings between interchanges Collectors may need to parallel the facility
Stream Crossings	Parallel the stream at a distance sufficient to avoid water quality imparts
	When necessary, space a minimum of 2,500-3,000 feet apart
Railroad	Must close 3 existing at-grade crossings to build 1 new at grade crossing
	Let NCDOT study dictate which crossings to close
	A parallel arterial system supports good circulation

It should be noted that participants from the first public workshop were very concerned with the idea of a new interchange on Interstate 40 between NC 54 and US 15-501. Some participants were adamantly against a new interchange while others were in strong support; however, a new interchange is not in the scope of this project and should be studied further at a later date. To determine if a new interchange is a solution to some of the circulation issues in the study area is beyond the scope of a plan focused at the collector street. However, based on the public response to this issue, further focused study of this should be pursued.

The consultant team, staff from the City of Durham and the Town of Chapel Hill, and DCHC members collectively developed three distinct collector street network alternatives based on public input, environmental and existing constraints, and engineering principles. Each alternative has similar networks in the northern portion of the study area. However, the networks differ in the assumed alignments of Southwest Durham Drive and the southern portion of the study area. **Table 4.3** gives a general Alternative comparison of specific areas of interest.

Table 4.3 - Network Alternative Comparison

	Alternative "A"	Alternative "B"	Alternative "C"
NC 54/ Falconbridge Road	Left-Over	Left-Over	Signal
NC 54/ Huntingridge Road	Signal	Signal	Left-Over
NC 54/ Farrington Road	Eliminate Signal	Eliminate Signal	Eliminate Signal
NC 54/ Vauxhall Road	Signal	Right-In/Right-Out	Right-In/Right-Out
George King Road	Re-Routed	Retained and Emphasized	Re-Aligned
Southwest Durham Drive Alignment	Revised Alignment between I-40 and NC 54	Portion Aligns with Farrington Road	Adopted Alignment

During this phase of the project each proposed network alternative considered intersection configurations along Highway 54 and these were presented to the public at the second public workshop. However, the signal configurations were not recommended as part of the recommended collector street network.

Each proposed network alternative (A, B, C) assume different intersection locations and configurations. The intersection configurations (e.g. signalized, right-in/right-out, left-over, etc.) are beyond the scope of this project. The intersection configuration and access along Highway 54 will need to be determined after further study by or in conjunction with NCDOT.

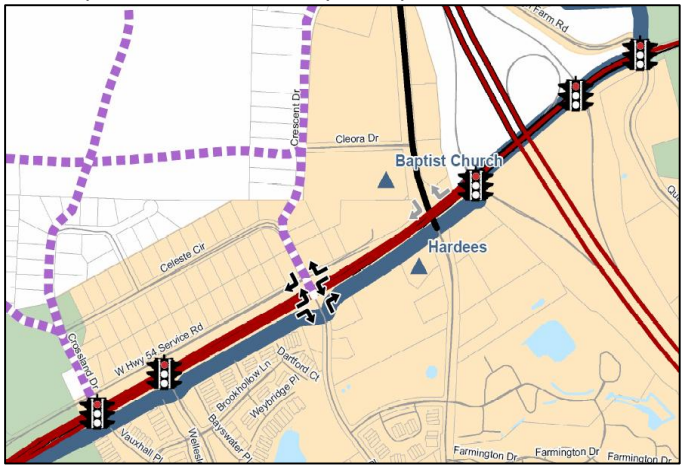
Proposed Network Alternative "A"

Alternative "A" was developed considering moderate (when compared with Alternative "B" and Alternative "C") density in the southern portion of the study area.

This alternative recognizes the future fixed-guideway alignment and supports the proposed transit station by providing an east/west parallel collector street. This would provide convenient access to those citizens using the proposed transit station.

Alternative "A" makes use of existing George King Road alignment by using two discontinuous sections of the existing alignment as a proposed collector street. However, this alternative proposes a shift in alignment of the George Kind Road and NC 54 intersection in an effort to minimize environmental impacts to the Army Corps land.

Alternative "A" recommends signals at Crossland Drive, Huntingridge Road, I-40 ramps, and Quadrangle Drive; right-ins/right-outs and a left-over at Falconbridge Road/Crescent Drive; and a right/in-right-out at Farrington Drive.



Alternative A (NC 54 Recommendations)

Wal-Mart
Haywood Suites
Kroger
Kohls
Home Depot
Grace Church
Lowes
Borders
BCBS
Resurrection United Methodist Church
Glenview Park
Ephesus Church
Markham Memorial Gardens
Creekside Elementary School
Leigh Farm Park
Mel & Zora Rashkis Elementary
Harris Teeter
Hardees
Rho Quad
Providence Rd
New Hope Commons Dr
Eastowne Dr
Durham-Chapel Hill Blvd
W Lakeview Dr
E Lakeview Dr
N White Oak Dr
Mt Moriah Rd
Honeycutt Dr
Witherspoon Blvd
Danziger Dr
Northcreek Dr
Kodiak Ave
Sayward Dr
Garrett Rd
Grapevine Trl
Dunsinane Dr
Ashworth Dr
Kelly Dr
Five Oaks Dr
Rosemont Pkwy
Watkins Rd
Old Chapel Hill Rd
Old Durham Rd
Dobbins Dr
Scarlett Dr
Legion Rd
Standish Dr
Variee St
St Richard Ln
Saint Thomas Pl
St Albans Pl
St Andrews Ln
Forsyth Dr
M L King Jr St
McGregor Dr
Sage Rd
Erwin Rd
Weaver Dairy Rd
I-40
Butterfly Ln
Sunlight Dr
Alexan Dr
Candlelight Ct
Alba Ln
White Oak Dr
Rother Ln
Pope Rd
Olde Coach Rd
Crystal Oaks Ct
Clark Lake Rd
Fireside Dr
Highview Pl
Beaumont Dr
Yardley Ter
Randall Rd
Bakers Mill Rd
Charlesbery Ln
Fountain Ridge Rd
Thornwood Rd
Landerwood Ln
Sharon Rd
Overland Dr
Colony Woods Rd
Ferrell Rd
White Plains Rd
Newton Dr
Ephesus Church Rd
Eden Ln
Lamont Ct
Churchill Dr
Lynwood Pl
York Pl
Manly St
Boxwood Pl
Long Leaf Dr
Holly Ln
Willow Dr
Emory Dr
Leclair St
Trinkerbell Rd
Wildwood Dr
Deerwood Ct
Grove St
Brigham Rd
Little St
Pinehurst Dr
Black Oak Pl
Sheffield Cir
Patton Pl
Kinsale Dr
Galway Dr
New Castle Dr
Donegal Dr
Nottingham Dr
Tweed Pl
Lancaster Dr
Cleland Rd
Whitley Dr
Cleveland Dr
Tony Pines St
Oakwood Dr
Rogerson Dr
Helmsdale Dr
Trenton Rd
Carmen Ln
Stockton Way
Hunters Ridge Trl
Chicopee Trl
Clubhouse Dr
Pavillion Pl
Thetford Rd
Edenton Ln
Woodberry Dr
Cobscook Dr
Amesbury Ln
Livingstone Pl
Colorado Ave
Pin Oak Dr
Butternut Rd
Pine Cone Dr
Beechnut Ln
Butler St
Buchanan Dr
Marvin Dr
Wendell Rd
Rutgers Pl
Leigh Farm Rd
W Hwy 54
Quadrangle Dr
Cleora Dr
Crescent Dr
George King Rd
Celeste Cir
N Hwy 54 Service Rd
Brookhollow Dr
Farmington Dr
Farmington Rd
Dunbrook Dr
Shallowford Ln
Burnwood Pl
Hampton Hill Pl
Huntingridge Rd
Glen Forrest Dr
Knotty Pine Dr
Ridgefield Dr
Dunmore Pl
Kingswood Dr
Dunning Creek Pkwy
Little John Rd
Pearl Ln
Finley Forest Dr
Friday Center Dr
Finley Golf Course Rd
Prestwick Rd
Berkley Rd
W Barbee Chapel Rd
Barbee Chapel Rd
Meadowmont Ln
Sterling Ridge Dr
Sample Residential Collector Street Cross-Section

Southwest Durham - Southeast Chapel Hill Collector Street Plan

Figure 4.2 - Alternative "A"

Kimley-Horn and Associates, Inc.

DCHC | SW Durham County and SE Chapel Hill
COLLECTOR STREET PLAN

Study Area
County Boundary
Durham City Limits
Chapel Hill Town Limits
Corps of Engineers Land
Lakes, Rivers, Streams and Creeks
Destination Points
Schools

Proposed SW Durham Drive Alternative A
Existing Alignment
Proposed Alignment
Approved SW Durham Drive Alignment

Proposed New Collector Streets
Existing Collector Streets to be Included in Plan*
Existing Higher Classification Facilities

Overpass
Highways
Proposed Transit Alignment
Proposed Transit Stations

Approved Internal Neighborhood Street
Proposed Internal Neighborhood Street
Proposed Development
Approved Development

0 0.125 0.25 0.5 Miles

* Inclusion in the plan may refer to an upgrade or facility rehabilitation, whether addition of sidewalks, bicycle lanes, or landscaping (not necessarily widening).

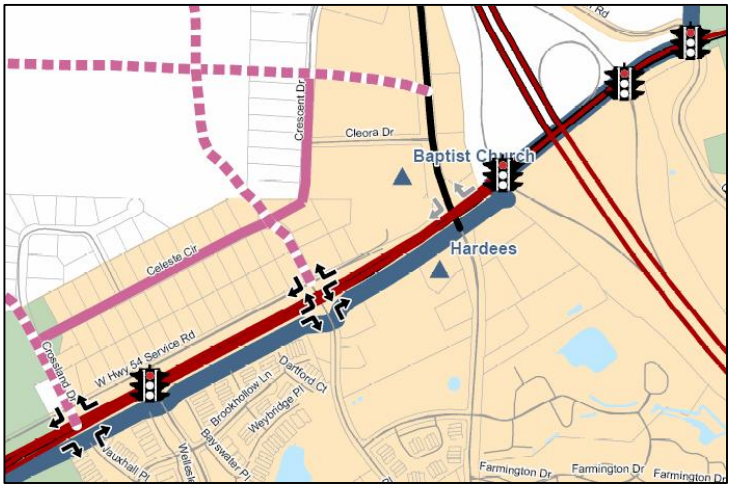
Proposed Network Alternative "B"

Alternative "B" shows a significant shift to the adopted Southwest Durham Drive alignment and was created considering the least dense future development in the southern portion of the study area when compared with the other network alternatives.

This alternative does not directly serve the proposed future fixed-guideway alignment.

Alternative "B" makes significant use of the existing George King Road alignment. This alternative proposes a collector street to be built on the existing George King Road alignment; however, the proposal includes a shift in alignment at the intersection of NC 54 in an effort to minimize environmental impacts to the Army Corps land.

Alternative "B" recommends signals at Huntingridge Road, I-40 ramps, and Quadrangle Drive as well as right-ins/right-outs and a left-over at Falconbridge Road/Crescent Drive; right-ins/right-outs at Crossland Drive/Vauxhall Place; and a right-in/right-out at Farrington Drive.



Alternative B (NC 54 Recommendations)

Southwest Durham - Southeast Chapel Hill Collector Street Plan

Figure 4.3 - Alternative "B"

Kimley-Horn and Associates, Inc.

SW Durham County and SE Chapel Hill COLLECTOR STREET PLAN

Study Area
County Boundary
Durham City Limits
Chapel Hill Town Limits
Corps of Engineers Land
Lakes, Rivers, Streams and Creeks
Destination Points
Schools

Proposed SW Durham Drive Alternative B
Existing Alignment
Proposed Alignment
Approved SW Durham Drive Alignment

Proposed New Collector Streets
Existing Collector Streets to be Included in Plan*
Existing Higher Classification Facilities

Overpass
Highways
Proposed Transit Alignment
Proposed Transit Stations

Approved Internal Neighborhood Street
Proposed Internal Neighborhood Street
Proposed Development
Approved Development

0 0.125 0.25 0.5 Miles

* Inclusion in the plan may refer to an upgrade or facility rehabilitation, whether addition of sidewalks, bicycle lanes, or landscaping (not necessarily widening).

Sample Residential Collector Street Cross-Section

Proposed Network Alternative "C"

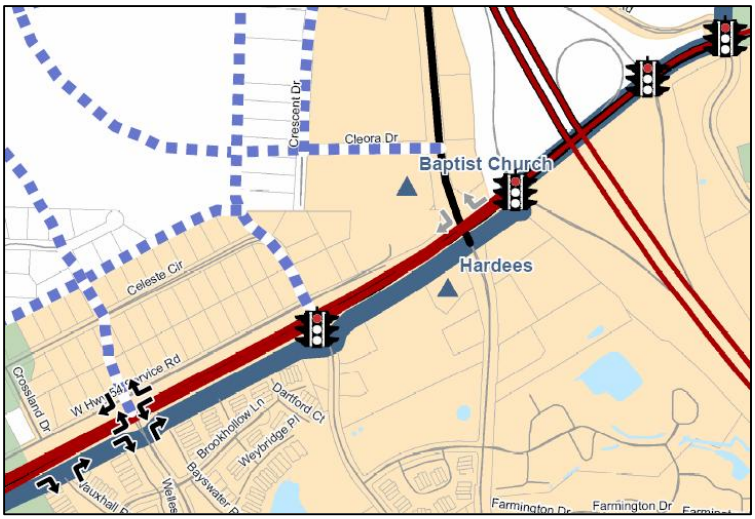
Alternative "C" shows the currently approved Southwest Durham Drive alignment and was developed considering a denser development pattern in the southern portion of the study area in anticipation of a future transit station in this area.

This alternative recognizes the future fixed-guideway alignment and supports the proposed transit station by providing an east/west parallel collector street. In addition, this alignment provides excellent circulation around the proposed transit station. This would provide convenient access to those citizens using the proposed transit station.

The Southwest Durham Assemblage (prepared by Coulter Jewell Thames), Southwest Durham Transit Opportunities Small Area Plan Study (prepared by The Farrington/George King Neighborhoods & Durham Area Designers), and the SW Area Durham Plan (prepared by Chas. H. Sells, Inc. and Land Planning Solutions) were used as well as feedback from citizens and developers in the development of this alternative. Each of these plans considers the proposed fixed-guideway transit network.

Alternative "C" makes significant use of existing George King Road alignment. This alternative proposes a collector street to be built on the existing George King Road alignment; however, the proposal includes a shift in alignment at the intersection of NC 54 in an effort to completely avoid environmental impacts to the Army Corps land and to align the intersection with Wellessley Place.

Alternative "C" recommends signals at Falconbridge Road, I-40 ramps, and Quadrangle Drive as well as right-ins/right-outs and a left-over at Huntingridge Road; right-in/right-out at Vauxhall Place; and a right-in/right-out at Farrington Drive.



Alternative C (NC 54 Recommendations)

Southwest Durham - Southeast Chapel Hill Collector Street Plan

Figure 4.4 - Alternative "C"

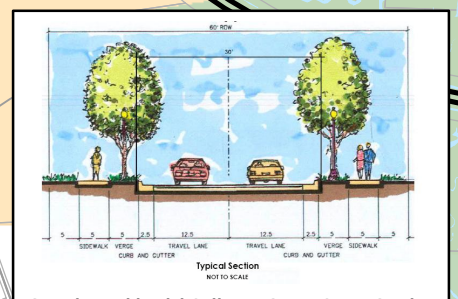
Kimley-Horn and Associates, Inc.

SW Durham County and SE Chapel Hill COLLECTOR STREET PLAN

Study Area
County Boundary
Durham City Limits
Chapel Hill Town Limits
Corps of Engineers Land
Lakes, Rivers, Streams and Creeks
Destination Points
Schools
Approved SW Durham Drive Alignment
Proposed New Collector Street
Existing Collector Streets to be Included in Plan*
Existing Higher Classification Facilities
Overpass
Highways
Proposed Transit Alignment
Proposed Transit Stations
Approved Internal Neighborhood Street
Proposed Internal Neighborhood Street
Proposed Development
Approved Development

0 0.125 0.25 0.5 Miles

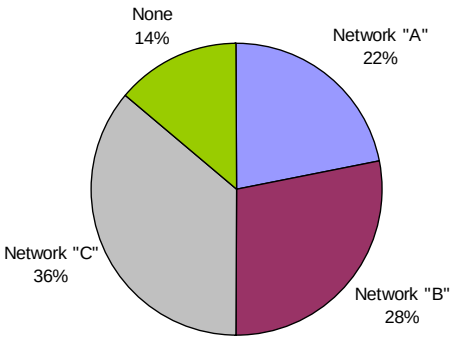
* Inclusion in the plan may refer to an upgrade or facility rehabilitation, whether addition of sidewalks, bicycle lanes, or landscaping (not necessarily widening).



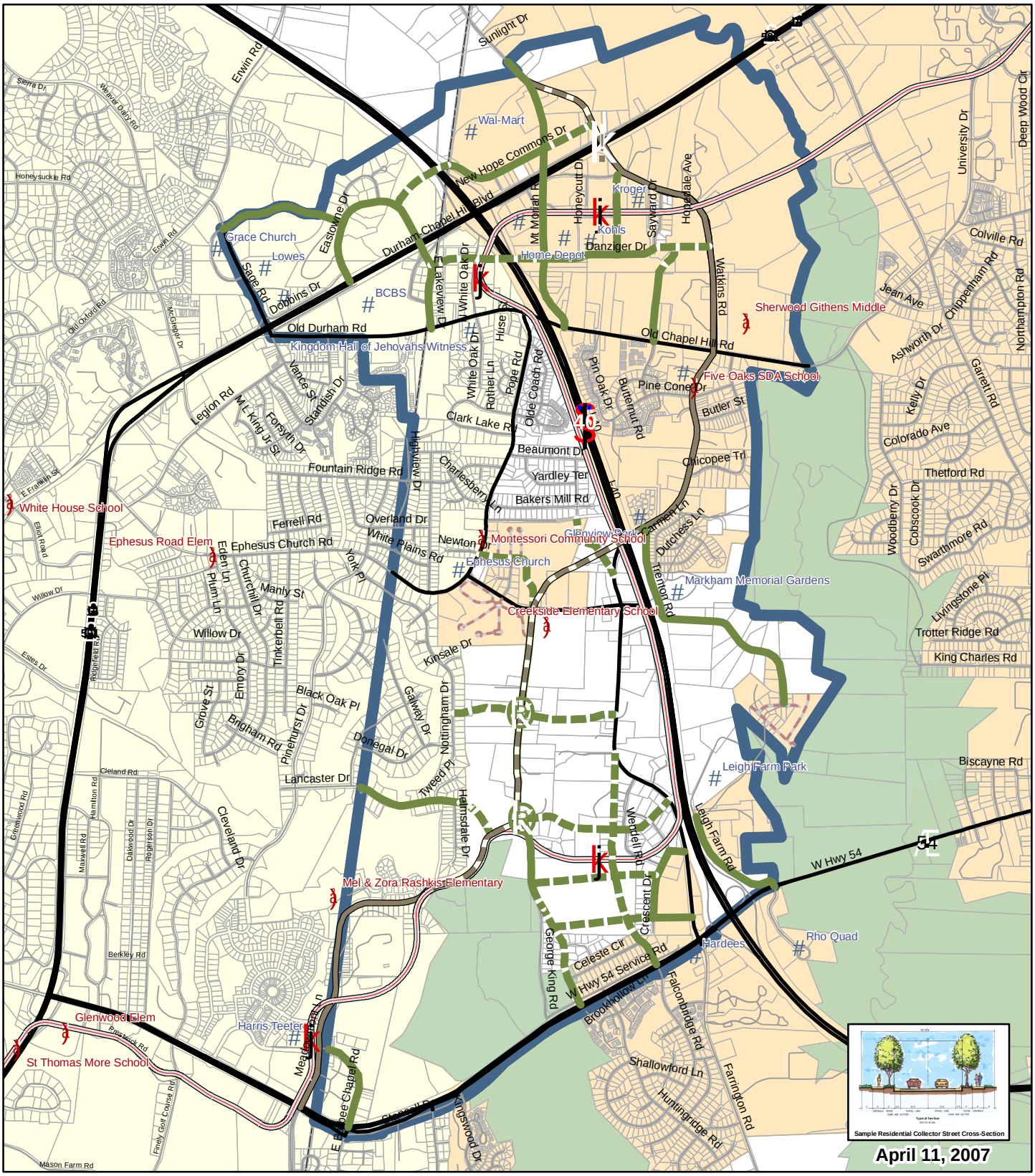
Sample Residential Collector Street Cross-Section

Recommended Collector Street Plan

The three Network Alternatives were then presented for public review and response at a second public workshop. Prior to the workshop, maps of each alternative were mailed to those within the study area. The alternatives were not presented in an all-or-nothing manner; that is, participants were asked which things they liked and disliked about each alternative. It was explained that a recommended collector street plan would be developed based on the input received from this workshop and would likely contain features from all three of these proposed alternatives. Overall, participants said they preferred Alternative "C" by 36%, followed by Alternative "B" (28%), Alternative "A" (22%), and None (14%).



Following the second public workshop, another work-session was held with a subset of the Technical Steering Committee (TSC). Collectively, the consultant team, staff from the City Durham and Town of Chapel Hill, and DCHC members developed the Recommended Collector Street Plan based on the public input received at the public workshop #2 which can be seen in **Figure 4.5**. In addition to the public workshop input, transit circulation was considered closely to provide proper connectivity and access to the existing and future transit networks.



Southwest Durham - Southeast Chapel Hill Collector Street Plan

Figure 4.5 - Adopted CSP Network

Study Area
County Boundary
Durham City Limits
Chapel Hill Town Limits
Corps of Engineers Land
Destination Points
Schools
Proposed Interchange
Approved SW Durham Drive Alignment
Southwest Durham Drive
Existing Higher Classification Facilities
Approved Internal Neighborhood Street
Proposed Transit Alignment
Proposed Transit Stations
Recommended Collector Street (1)
Existing Road to be Classified as Collector*
Proposed New Collector Streets
Proposed Roundabout

0 0.125 0.25 0.5 0.75 1 Miles

(1) The maps are not precise, thus the exact location and design of collector streets, roundabouts and intersections are to be determined.

Transit Circulation

During the development process of the recommended collector street plan, existing and future transit facilities were again considered more closely. The future success of the transit system within the study area is dependant on the circulation and ease of use in the area. It is important that the existing bus stops and future transit stations be accessible and safe. By providing better connectivity in and around existing and future facilities, citizens will have better accessibility to the services themselves.

Figure 4.6 shows the existing and proposed future transit facilities. It is expected that the denser development will center near the proposed transit stations, providing more mode choices for those close to this area. In addition, **Figure 4.6** shows a ¼-mile and ½ -mile radius from the location of the proposed transit stations. This is the distance found to be most reasonable by those willing to walk to access transit facilities.

In addition to providing better access to the transit stations, potential bus route changes could be implemented to better serve those within the study area.

Figure 4.7 displays potential bus route changes that could occur in the interim if the recommended collector streets and Southwest Durham Drive are built before the proposed fixed guideway and transit stations are constructed. These potential bus changes would utilize the collector street system to serve those areas that have developed and redeveloped as transit oriented developments based on the future land use plan.

Figure 4.8 displays potential bus route changes that could occur assuming that the collector streets and Southwest Durham Drive have been constructed and that the fixed guideway and transit stations are functional. Phase II potential bus route changes utilize the recommended collector street plan to support the transit stations and serve the study area with feeder routes.

The collector street plan will provide better access for all mode choices. Citizens will have safer and more efficient options available to reach transit facilities with the implementation of this collector street plan.

Southwest Durham - Southeast Chapel Hill Collector Street Plan

Figure 4.6 - Existing/Future Transit

Kimley-Horn and Associates, Inc.

SW Durham County and SE Chapel Hill COLLECTOR STREET PLAN

Study Area
County Boundary
Lakes, Rivers, Streams and Creeks
Quarter Mile Buffer
Half Mile Buffer
Existing Durham Area Transit Authority (DATA)
Existing Chapel Hill Transit
Existing TTA
Proposed Transit Alignment
Proposed Transit Stations

0 0.125 0.25 0.5 Miles

Southwest Durham - Southeast Chapel Hill Collector Street Plan

Figure 4.7 - Potential Bus Route Changes - Phase I

Phase I assumes that the proposed fixed guideway and transit stations have not been constructed, but that all recommended collector streets and approved SW Durham Drive have been constructed.

Kimley-Horn and Associates, Inc.

SW Durham County and SE Chapel Hill COLLECTOR STREET PLAN

- Approved SW Durham Drive on Existing Alignment
- Approved SW Durham Drive
- Durham Area Transit Authority (DATA)
- Chapel Hill Transit
- Existing TTA

Recommended Collector Street Network

- Existing
- Proposed

Potential Bus Changes - Phase I

- Potential Chapel Hill Transit Routes
- Potential DATA Routes

0 0.125 0.25 0.5 Miles

Southwest Durham - Southeast Chapel Hill Collector Street Plan

Figure 4.8 - Potential Bus Route Changes - Phase II

Phase II assumes that the proposed fixed guideway and transit stations as well as all recommended collector streets and approved SW Durham Drive have been constructed.

Approved SW Durham Drive on Existing Alignment
Approved SW Durham Drive
Durham Area Transit Authority (DATA)
Chapel Hill Transit
Existing TTA

Potential Bus Changes - Phase II

Chapel Hill Transit Proposed Deletion
Potential Chapel Hill Transit Routes
Potential DATA Routes
TTA Transit Proposed Deletion
Potential TTA Routes

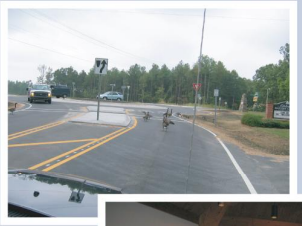
Recommended Collector Street Network

Existing
Proposed

0 0.125 0.25 0.5 Miles

Kimley-Horn and Associates, Inc.

SW Durham County and SE Chapel Hill COLLECTOR STREET PLAN



Chapter 5 – Recommended Design Considerations

Policy and Guidelines

General street spacing and connections into the existing transportation hierarchy will be monitored by local officials when reviewing new development plans proposed for the community. They will make sure that a sustainable system is maintained. Special policies and guidelines that the City of Durham and the Town of Chapel Hill may want to consider for amending their development review process are summarized below.

Street Spacing and Access

Local officials should consider street spacing guidelines to promote efficient development of an expanding transportation system. Ultimately, these street spacing guidelines could be used as "rules of thumb" during the development review process. Spacing guidelines recommended for collector streets are summarized below.

Land Use/Type of Collector Street	Intensity	Access Function	Approximate Street Spacing
Very Low Intensity Residential	Less than 2 dwelling units per acre	High	3,000 to 6,000 ft apart
Low Intensity Residential	2 to 4 dwelling units per acre	High	1,500 to 3,000 ft apart
Medium and High Intensity Residential	More than 4 dwelling units per acre	High	750 to 1,500 ft apart
Activity Center	Mixed-use residential/commercial	Medium	750 to 1,500 ft apart

In addition to these recommendations, it is desirable to provide all driveway access on collector and local streets. In some cases, however, it may be warranted to provide property access from an arterial roadway.

Design Elements

As the public realm, streets need to reflect the values of the community and reinforce a unique 'sense of place' to be enjoyed by citizens – whether in urban, suburban, or rural contexts. This is especially true for a collector street system in that it serves as the backbone for local mobility, property access, and non-vehicular transportation modes.

In recent years, municipalities across the country have started implementing **"complete streets"** as one way to transform their transportation corridors from vehicle-dominated roadways into community-oriented streets that safely and efficiently accommodate all modes of travel – not just motor vehicles. The complete street movement does not advocate for one size fits all; a complete street in an urban area may look quite different from a complete street in a more rural area. However, both facilities are designed to balance mobility, safety, and aesthetics for everyone using the travel corridor. Furthermore, design considerations supportive of complete streets include elements in both the traditional travel corridor (i.e., the public realm) as well as adjacent land uses (i.e., the private realm) for reinforcing the desired 'sense of place.'

The following design considerations serve to create the foundation for implementing complete streets:

- Travel lane width
- Pedestrian circulation
- Bicycle circulation
- Transit accommodations
- On-street parking
- Median treatments
- Street lighting
- Street trees
- Pedestrian crossings
- Stream crossings

Each of these design elements is discussed in more detail below.

Travel Lane Width

Motorists typically drive at a speed which they perceive to be safe. Therefore, one of the primary design elements for managing vehicle travel speeds is lane width. This is typically measured between the yellow centerline of a street and the outside white lane line or edge of gutter. Over the last 50 years, communities across the country have studied the range of recommended travel lane widths published by the American Association of State Highway and Transportation Officials (AASHTO) and adopted their maximum range from these guidelines (i.e., 12 feet) as their minimum design standard.

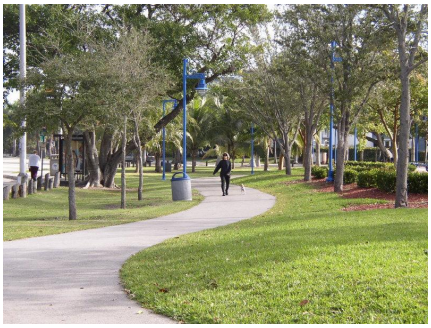
Today, excessive travel speeds are one of the top concerns for citizens and elected officials alike. The use of other travel modes within the corridor is often discouraged because of safety concerns associated with excessive travel speeds. One solution for addressing these excessive travel speeds is traditional traffic calming; these spot improvements, however, sometimes only shift the problem to other streets.

A second solution gaining momentum among design professionals across the country is to incorporate varying minimum travel lane width standards into local rules and regulations that offer some flexibility to better relate design speed and posted speed limit. Forthcoming publications by the Institute of Transportation Engineers (ITE) and the Congress for New Urbanism (CNU) recommend the following general relationships between travel lane width and anticipated travel speeds:

- 10' travel lane = 20 MPH
- 11' travel lane = 25 MPH
- 12' travel lane = 35 MPH

The application of varying travel lane width standards for the collector street system would allow design officials the flexibility to reinforce a 'constant' travel speed (by design) that is supportive of more livable, complete streets. The City of Durham currently requires an eighteen foot travel lane with a 35 mph speed. The Town of Chapel Hill currently requires an eleven foot travel lane with a recommended speed limit of 25 to 35 mph.

Pedestrian Circulation

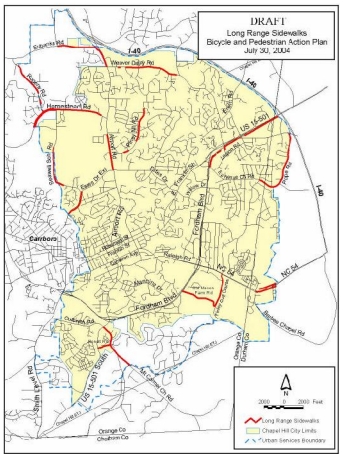


The pedestrian realm is present and should be provided for in all developed areas. In urban areas, this means the provision of a sidewalk on each side of the street, often accompanied by shade trees and places of rest. In more suburban areas, a two-way shared-use path can substitute for sidewalk. In the rural to natural environment, the multi-use paths may meander away from the street system and converge into a trail system with great success. In all developments, including those of low density near the rural realm, sidewalks or paths should be provided. Similar to other features of street design, provisions for pedestrian circulation are unique to each context. The pedestrian realm should provide for recreational and functional activity, and should be a safe and inviting environment both day and night. A successful pedestrian environment is a place where people gather to interact, observe, linger, and pass through, and is beneficial to commerce, the safety of the community, and

to the development of transit. Both the City of Durham and the Town of Chapel Hill provide regulations that incorporate sidewalks on both sides of the street. It is recommended that Durham's design standards reference the pedestrian plan to ensure that the correct facility type (i.e. sidewalk, shared-use path, etc.) is being specified.

Bicycle Circulation

Bicycling provides both transportation and recreational opportunities for citizens, employees, and visitors alike. Bicycle facilities can range from wide outside lanes with no striping to marked bicycle lanes to off-road bicycle paths (i.e., shared-use paths/greenways). The target user for each application and the unique circumstances of the particular roadway help to determine the bicycle treatment that is most appropriate. For example, experienced bicyclists often feel comfortable riding in mixed-flow traffic with no specific bicycle facilities provided. Marked bicycle facilities or adjacent bicycle paths are desirable for cyclists with basic or beginning skills.



Chapel Hill Bicycle and Pedestrian Plan

In transportation planning, bicyclists are often separated into three levels of bicycling ability. An improvement deemed adequate for one group may not be suitable for another group. Therefore, user profiles are established to help local officials target appropriate bicycle improvements. Three profile user groups for bicyclists are:

- **Experienced** riders can handle most traffic conditions. Some experienced riders travel mainly for recreation while others use the bicycle for primary transportation. This group is comfortable riding on collector streets and is best served by direct access to destinations via the existing street system. Requirements include sufficient width on the roadway for an on-street bicycle lane or wide shoulder so that neither the motorist nor the bicyclist needs to change positions when passing.

- **Basic** riders comprise the majority of adult or teenage riders in the United States. This group uses bicycles too infrequently to develop advanced cycling skills and prefers comfortable direct access to destinations via low volume streets or designated bicycle facilities. Most basic riders ride for recreation; however, for some members of this group bicycles may be the primary means of transportation to work or school.

- **Children** riders lack experience mixing with vehicular traffic and their bicycle use is primarily for recreation and may be monitored by their parents. This group prefers residential streets with low motor vehicle speed limits and traffic volumes. Well-defined separation of bicycles and motor vehicles on collector streets should be required as a minimum. Ideally, separate bike paths would be provided as part of a greenway system.

In addition to user groups, the 'toolbox' established by transportation professionals for implementing bicycle improvements across the country usually contains at least four design elements or alternatives – wide travel lanes, on-street bicycle lanes, shared multi-use paths (i.e. greenways), and bicycle routes. These applications are generally characterized by:

- **Wide Travel Lanes** — These facilities allow a motorist to safely pass a bicyclist while remaining within the same lane of travel. This improvement is considered a significant benefit and improvement for experienced and basic cyclists. The typical recommendation is 14 feet for the width of a wide travel lane meant for use by both motorists and bicyclists. Continuous stretches of pavement wider than 15 feet may encourage speeding on the undesirable operation of two motor vehicles in one lane.

- **On-Street Bicycle Lanes** — These form the portion of the roadway that has been designated by striping, signing, and pavement markings for the preferential or exclusive use by bicyclists. Bicycle lanes make the movement of both motorists and bicyclists more predictable. State and national design manuals for the construction of on-street bicycle lanes generally recommend a minimum of 4 feet in width measured from the edge of gutter for a bicycle lane and a minimum of 5 feet in width when adjacent to on-street parking. Collector streets create good places to stripe bicycle lanes.

- **Shared-Use Paths** — These facilities can serve bicycles and pedestrians in one "non-motorized" transportation corridor either adjacent to or completely independent of (e.g., a greenway) the street system. One path usually accommodates two-way travel and is constructed up to 12 feet in width to facilitate passing and mixing of modes. These facilities are typically separated from a motor vehicle travel lane by 5 feet or more. One drawback to shared-use paths is the number of safety conflicts at intersections and driveways presented by having a two-way

facility on only one side of the street. The location of destinations along the path may also lead to additional street crossings in order to access homes and businesses opposite the path.

- **Bicycle Routes** — In some instances, a portion of the community's existing street system may be fully adequate for efficient bicycle travel with conventional signing, making striping unnecessary. The most common example of these types of streets is in residential neighborhoods where low traffic volumes and low travel speeds allow bicyclists to comfortably mix with traffic. Typically, the posted speed limit on these streets should be 25 miles per hour or less for these unmarked facilities. Where appropriate, trail-blazing signage may be installed to designate 'bicycle routes' on some of these streets to alert bicyclists to certain advantages of the particular route over other routes.

The most appropriate bicycle network for the southwest Durham and southeast Chapel Hill area is a combination of the four design elements mentioned above. With an emphasis on the needs of the "basic user," certain design elements will be preferred to provide comfortable direct access to destinations. The preference among the four design treatments for any one street segment will be a function of traffic volumes, travel speeds, right-of-way constraints, adjacent land uses, and route directness.

Transit

As single-occupancy auto transportation is met with the challenges of rising fuel prices and heavy traffic congestion, attention is increasingly paid to various forms of transit. Transit is ideally situated along collector and arterial corridors with urban or higher density suburban. Transit benefits from a dense interconnected street pattern, preferably mixed in land use to support good ridership.

Areas targeted for enhanced transit service, such as the study area, should be supported through land use and zoning policies that support transit-oriented development and reflect the benefits of increased access to alternative modes of travel. Examples include appropriate densities and intensities for supporting transit use, parking ratios that reflect

reduced reliance on the automobile, and setback and design guidelines that result in pedestrian supportive urban design. In addition, potential transit service identified for transportation corridors within the community should take into consideration the land use, density/intensity, and urban design characteristics of the surrounding environment before selecting proposed technologies or finalizing services plans. A challenge for this study area is how to attract transit-supportive development densities before the higher frequency of transit service is actually provided. City and Town development policies should be oriented to encourage transit-supportive development near future transit stations and along high-frequency bus routes.

On-Street Parking

On-street parking is essential to support pedestrian-oriented retail. It is also beneficial to the comfort and safety of pedestrians. Although important, on-street parking reduces the capacity of a street by as much as 30%. When planning where on-street parking will be located, it is important to consider traffic and access as well as future land use potential. Future land use — rather than existing land use alone — should be considered to prevent future parking retrofits due to a lack of adequate planning.

Medians

Medians provide for pedestrian refuge, control access, reduce vehicular conflicts, increase safety, and enhance the street environment. As desired by the community, medians can be incorporated into collector street designs. When medians are landscaped, the preferred width is 10 feet. A minimum 6-foot width is acceptable at intersections. This is especially true of existing streets that will be connected to new development, e.g. Lancaster.

Lighting

Pedestrian-level lighting should be provided on collectors. At intersections and mid-block pedestrian crosswalks, conventional cobra-style street lights illuminate the roadway and increase motorist awareness of conflicts. On collector streets, street lights should illuminate the sidewalk and alert drivers to the presence of pedestrians in crosswalks. Pedestrian-scale street lights should be lower than conventional street lights and provide more illumination on the sidewalk. Typical light spacing is between 50 feet and 80 feet; this varies, however, depending on light type, illumination intensity, and fixture height.

Street Trees

Street trees should be provided along collector streets and spaced such that they create a continuous canopy. Small species of trees can be spaced as closely as 30 feet apart. Larger species will need to be placed 40 to 50 feet apart. A few examples of street trees recommended for use include: Red Maples, Allee Chinese Elm, Bosque Chinese Elms, and Ginkgo.

Pedestrian Crossings

Collector streets can be attractive places to walk. At intersections and mid-blocks where pedestrians frequently cross the street, crosswalks and appropriate refuges (minimum of 6 feet wide) should be provided. In all cases, ADA (Americans with Disabilities Act) accessible curb ramps should be provided at each crossing. At unsignalized intersections, AASHTO, state, and local guidelines should be consulted to determine sight distance triangles before striping a crosswalk. A curb extension at crosswalks helps pedestrians.

Stream Crossings

Street patterns are affected by natural features. Streams and other bodies of water present challenges to creating interconnected street networks. Without significantly compromising water quality, stream crossings should be pursued for vehicular connections every 2,500 feet to 3,000 feet. As a rule of thumb, the North Carolina Division of Water Quality discourages more than one street crossing a stream between branch locations (locations where the stream branches out into two or more waterways).

Traffic Calming

Unfortunately, there are instances when even the most well-designed collector streets experience prevailing travel speeds well in excess of posted speed limits. The inclusion of traffic calming measures in these affected areas may mitigate these issues.

Overview

Traffic calming is quickly becoming a common term for addressing citizen concerns of traffic speeds. The Institute of Transportation Engineers has identified and published 'best practices' for traffic calming. Individual communities, including Durham and Chapel Hill, typically develop policies and protocols specific to their local traffic conditions and citizen expectations. Specific policies and protocols generally include definitive 'warrants' and a 'toolbox' of preferred traffic calming solutions to assist local officials with the design and implementation flexibility to best represent the values and vision of the community.

The *City of Durham Speed Hump Policy* sets forth criteria for those citizens interested in requesting the construction of speed humps in their neighborhood. This policy requires the support "75% of the property owners within the affected block." The policy also requires that the street be functionally classified as a local street and that the street be "residential in nature with: a posted speed limit of 25 mph or less, a minimum ADT of 500 vehicles per day, and a maximum ADT of 2,500 vehicles per day." Within the study area, Pin Oaks Drive currently maintains speed humps. In addition, the City of Durham has proposed two roundabouts on Old Chapel Hill Road at Pope Road and Mt Moriah Road.

The *Town of Chapel Hill, Policy and Procedures for Traffic Calming Measures*, adopted June 30, 2004 currently offers guidance for the "appropriate and consistent application of traffic calming measures on Town-maintained streets in Chapel Hill." This policy primarily applies to residential streets and sets forth procedures for citizens to follow who are interested in applying traffic calming measures in their neighborhood. This policy also offers guidelines as to the recommended type of traffic calming based on street classification, traffic volumes, street width, street grades, lines of sight, adjacent on-street parking, speed limit, and minimum 85th percentile speed. The Town of Chapel Hill has implemented this policy and has developed a priority list for the following projects which have gained valid petitions:

- Pinehurst Drive (Oaks II)
- Cedar Hills Area
- Nottingham Drive
- Colony Woods Drive
- Silver Creek Trail

- Cypress Road
- Pinehurst Drive (Meadowmont)

Measures

Various traffic calming measures incorporated throughout the United States are grouped into three types of categories – passive, vertical deflection, and horizontal deflection. These general categories are summarized below.

Passive traffic calming measures continuously alter a driver's perception of the travel corridor and include gateway treatments, street trees, sidewalks, bicycle lanes, pavement marking/textures, and signage. Together, these design elements signify to the driver that they have entered into a 'livable' street in which all travel modes are afforded equal access to the travel corridor.

Passive —Use of contrasting materials to clearly define crosswalks

Vertical traffic calming measures represent features that drivers must navigate over to proceed on their desired travel path and may include treatments such as speed humps, speed tables, raised crosswalks, and raised intersections.

Vertical— Raised crosswalk using a contrasting paving pattern

Horizontal traffic calming measures represent features that drivers must navigate around to proceed on their desired travel path and, in some cases, may divert drivers to other travel routes altogether. Typical treatments include chokers, bulb-outs, medians, traffic circles, roundabouts, realigned intersections, and chicanes.

Horizontal—Bulb-out at an intersection

Toolbox

Traffic calming measures described below are commonly found in the traffic calming 'toolboxes' of communities all across the country. They are included for the City of Durham's and Town of Chapel Hill's consideration.

Speed Humps – Speed humps are commonly referred to as the 'sleeping policemen' in the roadway. These vertical devices typically measure between 3 and 4 inches in height at their center and extend the full width of the travel

lanes before tapering at the outside lane line to allow unimpeded bicycle travel. Speed humps should not be confused with speed bumps typically found in shopping mall parking lots. Spacing of successive speed humps along a roadway determines the speed at which motorists travel between devices.

Installation of speed humps typically costs between $2,000 and $5,000, depending on materials incorporated into the design.

Speed Table/Raised Pedestrian Crosswalk – A speed table is a very long, broad speed hump that can be either parabolic or trapezoidal in design. Trapezoidal speed tables could accommodate raised pedestrian crosswalks on the flat portion of the device for mid-block crossings when designed to a sufficient width — typically 10 feet or greater. These devices also are more appropriate for streets with larger vehicle traffic (i.e., bus and fire trucks).

Installation of a speed table is slightly more expensive than a speed hump with prices ranging between $2,000 and $15,000, depending on materials incorporated into the design.

Intersection Bulb-Out – Bulb-outs extend the sidewalk or curb line out into the parking lane of a street to effectively reduce the street width. These measures greatly improve pedestrian crossings by reducing the crossing distance and improving the ability for pedestrians and motorists to see each other. Curb extensions also can help reduce turning speeds at an intersection and provide additional space for curb ramps and/or level sidewalk landings where space is limited. Bulb-outs are only appropriate where on-street parking exists and curb extensions should never reach into travel lanes, bicycle lanes, or shoulders.

Installation of bulb-outs typically cost between $2,000 and $20,000 per corner; cost can greatly increase, however, when drainage improvements and/or utility pole relocation is necessary.

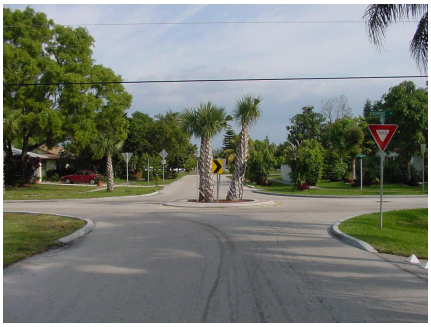
Choker – A choker intentionally extends the curb line along a street into the travel lanes, usually designed with a wide sidewalk or landscape area, to create a 'pinch point' for vehicle movement. Chokers can be created by extending both curbs into the travel lane, or they can be created more dramatically by widening only one side at a mid-block location. They can also be used at intersections to create a gateway effect when entering a street. These devices have a dramatic effect on travel speed by requiring motorists to yield to each other or slow down. This treatment is usually only appropriate for low-volume, low-speed streets.

Installation of a choker typically costs between $5,000 and $20,000, although major drainage improvements associated with implementation could significantly raise project costs.

Raised Center Median – Raised center medians are islands along the centerline of a street that narrow the real and perceived travel lane width. Raised medians help achieve speed reduction by creating a horizontal shift and blocking along view of the road ahead. A raised center median may be enhanced aesthetically and provide neighborhood identify by adding landscaping.

Installation of raised medians varies greatly among desired applications; however, short 'gateway' center medians typically cost between $10,000 and $20,000 depending on length, landscaping, and irrigation considerations.

Neighborhood Traffic Circle – A neighborhood traffic circle is a raised circular island constructed in the center of a local residential street intersection. These devices reduce vehicle speeds by forcing motorists to maneuver around them and are sometimes used instead of stop signs. Neighborhood traffic circles are commonly landscaped (i.e., bushes, flowers, or grass) to enhance aesthetics. Yield signs, not stops signs, should be used with neighborhood traffic circles.



The occasional larger vehicle passing through an intersection with a neighborhood traffic circle (i.e., fire truck or moving van) could be accommodated at the intersection by creating a mountable curb in the outer portion of the circle. Studies show no significant impact on left or right turns for these vehicles; left turns can be made across the front of the circle just as with standard intersections.

Installation of a neighborhood traffic circle typically costs between $15,000 and $20,000, including landscaping.

Raised Intersection – Raised intersections are flat, raised areas covering entire intersections with ramps on all approaches. These intersections may include brick or other textured materials on the flat sections to delineate pedestrian crosswalks. The longer flat fields plus ramps, which may be more gently sloped than speed humps, enable slightly higher design speeds that may be suitable for slowing speeds on higher volume streets. The brick or other textured materials improve the appearance of raised intersections, draw attention to these traffic calming devices, and may further enhance speed reduction.

Installation of a raised intersection typically costs between $50,000 and $150,000 with limited texture paving. This cost greatly increases for signalized intersections.

Chicane – Chicanes are curb extensions on otherwise straight streets that cause travel lanes to bend one way and then back the other way to the original alignment of travel. Chicanes achieve speed reductions for forcing a horizontal shift and blocking long views of the road ahead. Landscaping may be provided in the curbed island created by the chicane to enhance the aesthetics.

Installation of a chicane typically costs between $5,000 and $15,000, including landscaping.

Application of Measures

Several communities across the country have developed neighborhood traffic calming programs (NTCP) to implement traffic calming judicially and efficiently in order to meet citizen concerns. As Durham and Chapel Hill considers the installation of traffic calming measures on its streets, the evaluation process should reflect the following steps (Durham has formal application and evaluation process):

- **Problem Identification/Needs Assessment** – Most successful traffic calming programs include a petition process that allows neighborhoods to request an evaluation of traffic characteristics. The evaluation should be designed to assess the degree of complaint and may include license plate surveys, speed studies, field observations, and traffic volume counts. Thresholds or 'warrants' may be developed that would designate a street as eligible for traffic calming.

- **Establish Traffic Calming Toolbox** – Local officials should establish a set of preferred traffic calming measures that address cut-through or speeding problems; including pros/cons associated with each measure and a typical design for implementation.

- **Plan Selection/Course of Action** – The most important element for creating a successful traffic calming program is to involve impacted residents, the general public, and stakeholders such as city staff and emergency response agencies when developing a course of action. Some communities establish official traffic calming committees that review all citizen requests and studies to ensure consistency with decision-making. It is also recommended that a minimum approval rate for locally-affected residents be established before implementing any traffic calming improvements to ensure their acceptance.

- **Implementation/Installation** – Timely installation of warranted traffic calming measures is important for a traffic calming program to maintain integrity. Intended funding mechanisms should be clearly documented including the roles and responsibilities for the city or town and petitioning neighborhood residents. This may include options for neighborhood transportation assessments and participation requirements for construction and maintenance.

- **Monitoring/Evaluation** – Studies should be completed after implementation of traffic calming measures to evaluate the effectiveness of the solution. Based on the study, minor adjustments may be required for the traffic calming measure to achieve the desired outcome.

Land Use Coordination

Land use plans describe desired patterns of land use for the study area. For the most part, areas that are currently undeveloped will allow all types of land use in the future. **Figure 5.1** shows the future land use plan within the study area. **Table 5.1** provides a correlation between land use and collector street spacing.

Table 5.1—Land Use and Street Function

Land Use/Type of Collector Street	Mobility Function	Access Function	Approximate Street Spacing	Natural Feature Impacts
Residential	Medium	High	1,500-2,000 ft	Low
Commercial	High	High	1,500-2,000 ft	Low
Industrial	High	High	½-1 mile	High

Collector streets connect to one another, to local streets, and to arterials. They have the potential to offer multiple routes to citizens as neighborhood units are formed. Commercial and industrial collectors have the potential to form the outer or inner boundaries of these activity centers. They have higher capacities and provide for a higher level of mobility compared with residential collector streets. Residential collectors are likely to be key interior streets. They provide the same level of access and will be spaced at more frequent intervals depending on the density such that citizens are provided multiple routes to their destination.

Southwest Durham - Southeast Chapel Hill Collector Street Plan

Figure 5.1 - Future Land Use Plan

Kimley-Horn and Associates, Inc.

SW Durham County and SE Chapel Hill COLLECTOR STREET PLAN

County Boundary

Corps of Engineers Land

Study Area

Future Land Use

Low Density Residential (4 DU/Acre or less)

Low-Medium Density Residential (4-8 DU/Acre)

Medium Density Residential (6-12 DU/Acre)

Medium-High Density Residential (8-20 DU/Acre)

Recreation / Open Space

Commercial

Institutional

Office

0 0.125 0.25 0.5 Miles

Street Design

The illustrations that follow represent sample typical collector street cross sections that could be incorporated into the development review process. Their application to a specific development scenario will depend largely on the adjacent land use, access control, and the type of facility that it is connecting.

The typical cross sections and plan view illustrations capture a range of rights-of-way from 50 feet to 75 feet. The travel lane widths shown in these illustrations are sometimes narrower than the standard 12 feet now provided by the North Carolina Department of Transportation. It is important to note that proposed collector street standards incorporated into this report for roadways that are maintained by the North Carolina Department of Transportation must receive design approval prior to their implementation. NCDOT does allow narrower streets in "Traditional Neighborhood" developments.

The *Southwest Durham County and Southeast Chapel Hill Collector Street Plan* recommends three general categories for collector streets within the community: residential, commercial, and industrial. Each of these is discussed below.

Residential Collectors

Residential collector streets serve primarily residential land uses and associated traffic. These streets are potentially popular for functional and recreational walking and bicycling and could be incorporated into comprehensive community pedestrian and bicycle plans. Context sensitive street design is essential for residential collectors to prevent excessive travel speeds. Design elements recommended to reinforce the residential character of these streets include:

- Pedestrian facilities both sides of the street (i.e., sidewalk or multiuse path)
- Street trees
- Lighting (i.e., pedestrian scale)
- Left-turn lanes at major intersections
- Traffic calming (as necessary)
- Small curb radii at intersections (15 to 20 feet)
- Ten- or eleven-foot travel lanes
- Striped bicycle lanes

Although roadway capacity is not a primary focus for residential collector streets, appropriate intersection treatments are important to the overall functionality of the street. Exclusive left-turn lanes should be considered where residential collector streets intersect arterial roadways. Mini-roundabouts should be considered at collector-collector intersections. Intersections with local streets generally would not require exclusive left turn lanes. All decisions for

providing left turn lanes should be made on a case-by-case basis by the local Engineer.

It is recommended that a 60 to 70-foot right-of-way continue to be protected for future residential collector streets. Typical cross sections and plan view illustrations are provided in **Figure 5.2 Residential Collector – Type A**, **Figure 5.3 Residential Collector – Type B**, and **Figure 5.4 Residential Collector – Type C** at the end of this chapter.

Commercial Collectors

Commercial collector streets primarily serve commercial/office land uses; however, the recommended street design standards for commercial collector streets may be appropriate for areas transitioning between residential and non-residential land uses. It is recommended that the City of Durham incorporate commercial collector design standards into their Reference Guide for Developers standards. These streets have the potential to attract moderate traffic volumes and could experience excessive travel speeds. Context sensitive street design is essential for commercial collectors to prevent these streets from becoming popular cut-through traffic routes, resulting in an increase in concerns associated with excessive travel speeds. Design elements recommended to reinforce the commercial character of these streets include:

- Pedestrian facilities (i.e., sidewalk or multiuse path)
- Curb and gutter drainage system
- Street trees
- Street lighting (i.e., vehicle and pedestrian scale)
- On-street parking (where appropriate)
- Left-turn lanes at major intersections
- Traffic calming (as necessary)
- Small curb radii at intersections (15 to 25 feet)
- Intersection bulb-outs
- Centerline striping

It is recommended that a 70- to 75-foot right-of-way be protected for future commercial collector streets. Typical cross sections and plan view illustrations are provided in **Figure 5.5 Commercial Collector – Type A** and **Figure 5.6 Commercial Collector – Type B** at the end of this chapter.

Industrial Collectors

Industrial collector streets serve primarily light and heavy industrial land uses and uses that have a high potential for attracting high volumes of heavy vehicle traffic. Design elements recommended to reinforce the industrial character of these streets include:

- Pedestrian facilities (case-by-case basis)

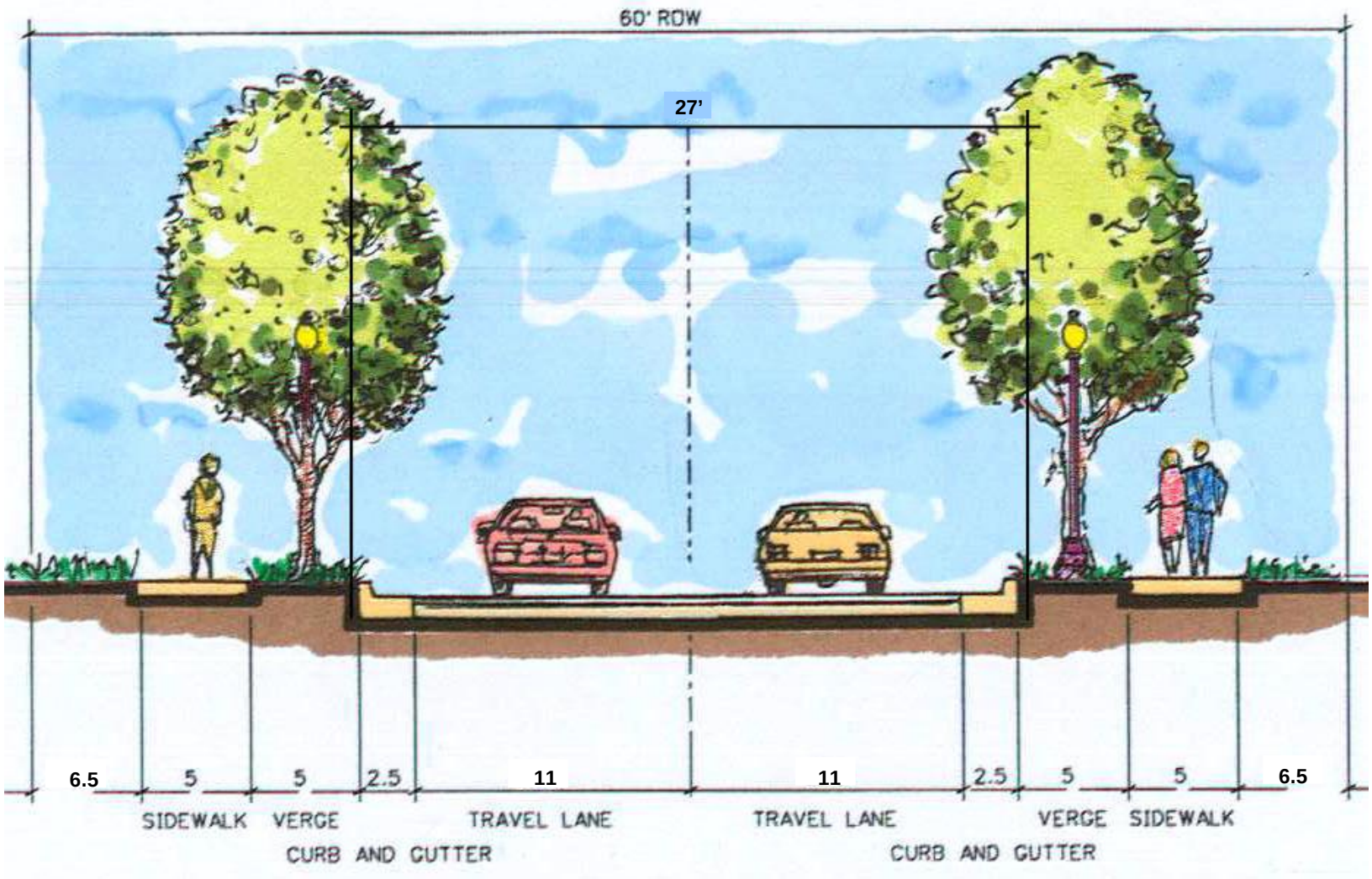
- Street trees
- Street lighting (case-by-case basis)
- Left-turn lanes at major intersections
- Large curb radii at intersections (>25 feet)
- Intersection bulb-outs
- Centerline striping

It is recommended that a 60-foot right-of-way be protected for future industrial collector streets. Although the study area does not include industrial uses, it is recommended that the City of Durham and Town of Chapel Hill include industrial collector street design standards in their regulations for other areas beyond the study area. Typical cross sections and plan view illustrations are provided in **Figure 5.7 Industrial Collector** at the end of this chapter.

In some cases, the application of classification criteria (i.e. residential, commercial, or industrial) will result in a street being included in more than one category. In these situations, consensus building may be necessary to appropriately classify the street.

Figure 4.6 in Chapter 4, illustrates the recommended collector street plan for the southwest Durham and southeast Chapel Hill area based on classification criteria, spacing and access guidelines, street connectivity guidelines, and quantitative/qualitative characteristics for the existing and proposed transportation system. The new facilities identified in the figure show general alignment and intersections; however, the ultimate placement of new collector streets depicted in this plan should be flexible enough to account for unique social, environmental, and constructability issues associated with these corridors.

Residential Collector – Type A

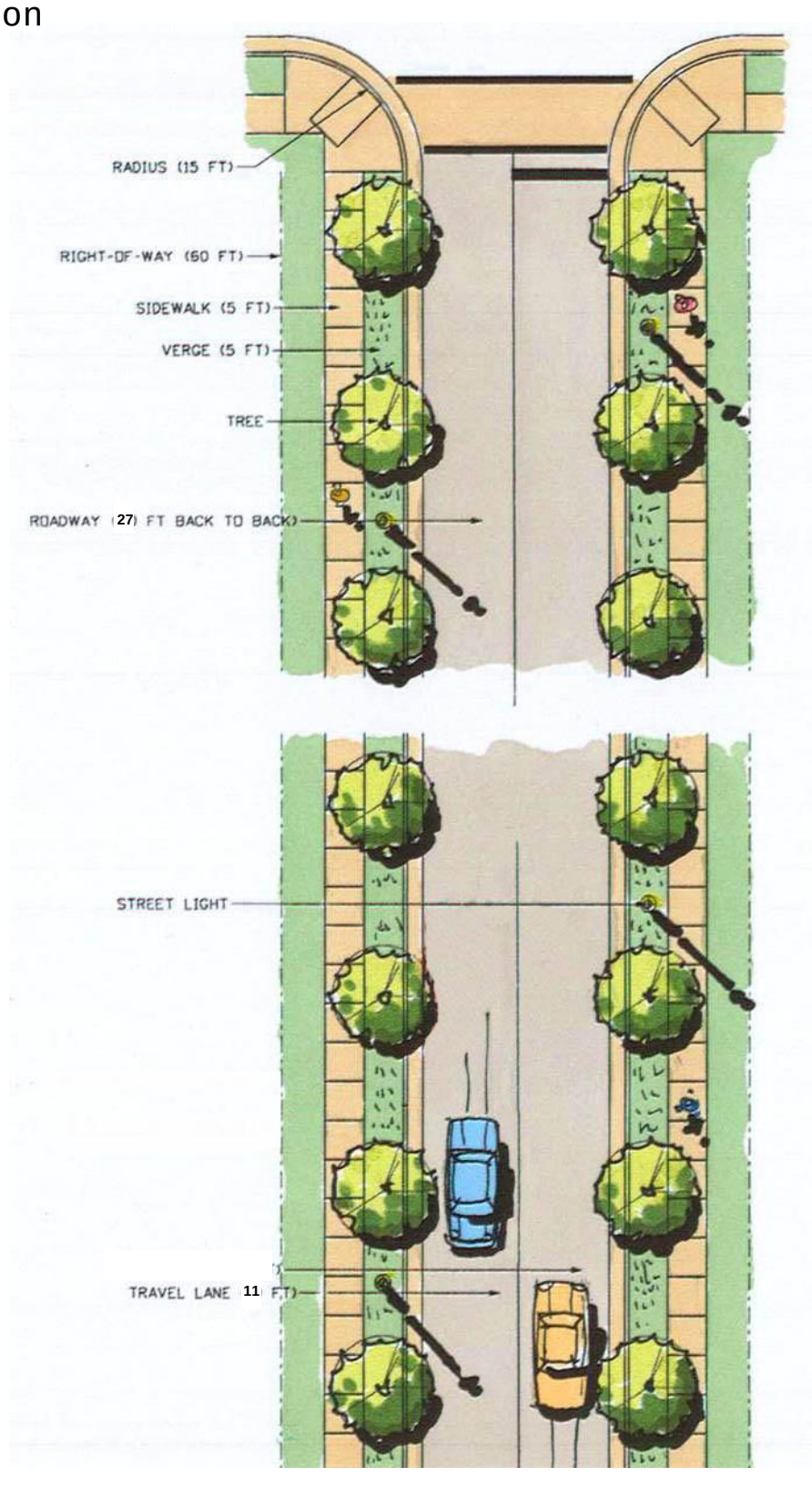


Typical Section

NOT TO SCALE

This residential collector is designed to limit automobile travel speeds to 25 miles per hour. It provides two travel lanes with street trees along both sides of the street. Sidewalks are preferred for both sides of the street in more urban areas; however, a ten-foot, multiuse path on one side of the street is acceptable in less dense areas. A natural buffer extends from the back of sidewalk to the private property line along the entire corridor. Context sensitive design considerations should include:

§Striped Crosswalks at intersections and mid-block crossings
§Drainage (curb and gutter)
§Street Trees (formal or random plantings)
§Pedestrian Circulation (sidewalk or multi-use path)
§Street Lighting (pedestrian scale)
§On-Street Parking (only where it will be used much of the time)
§No Right Turn Lanes

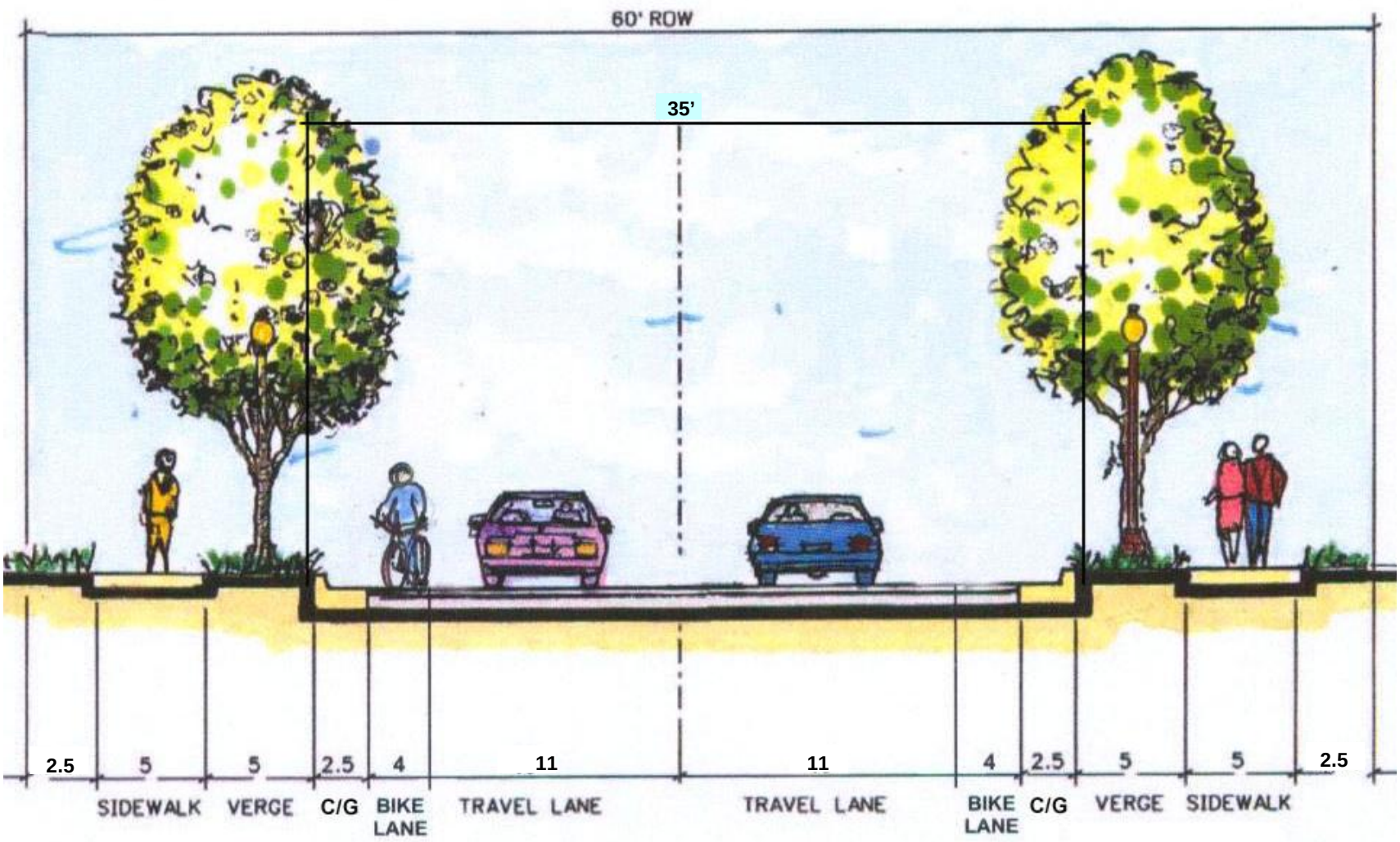


Plan View

NOT TO SCALE

Figure 5.2

Residential Collector – Type B

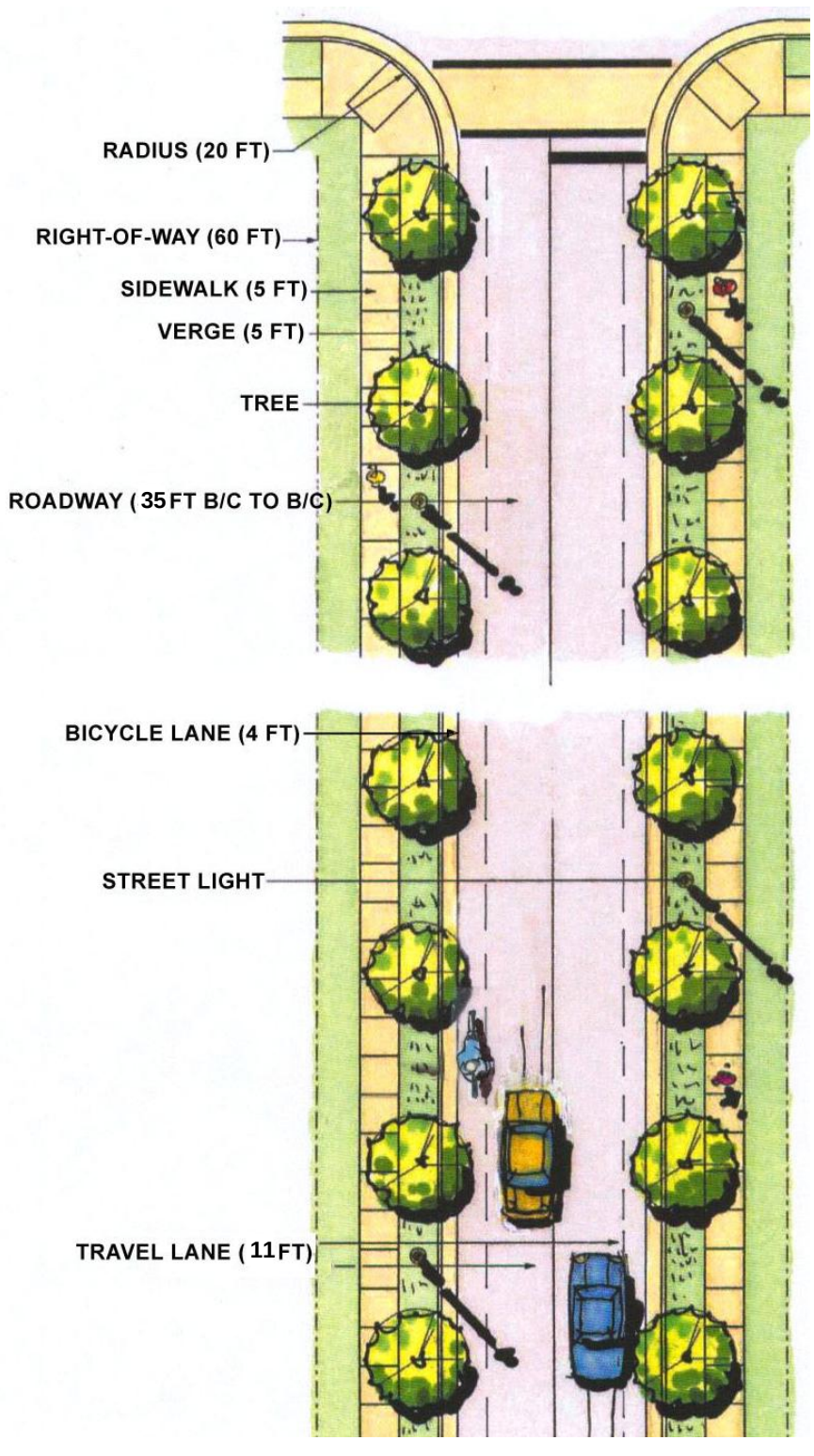


Typical Section

NOT TO SCALE

This residential collector is designed to limit automobile travel speeds to 25 miles per hour. It provides two travel lanes with on-street bicycle lanes and street trees along both sides of the street. Sidewalks are preferred for both sides of the street in more urban areas; however, a ten-foot, multiuse path on one side of the street is acceptable in less dense areas. A natural buffer extends from the back of sidewalk to the private property line along the entire corridor. Context sensitive design considerations should include:

§Striped Crosswalks
§Drainage (curb and gutter)
§Street Trees (formal or random plantings)
§Pedestrian Circulation (sidewalk or multi-use path)
§Street Lighting (pedestrian scale)
§No On-Street Parking

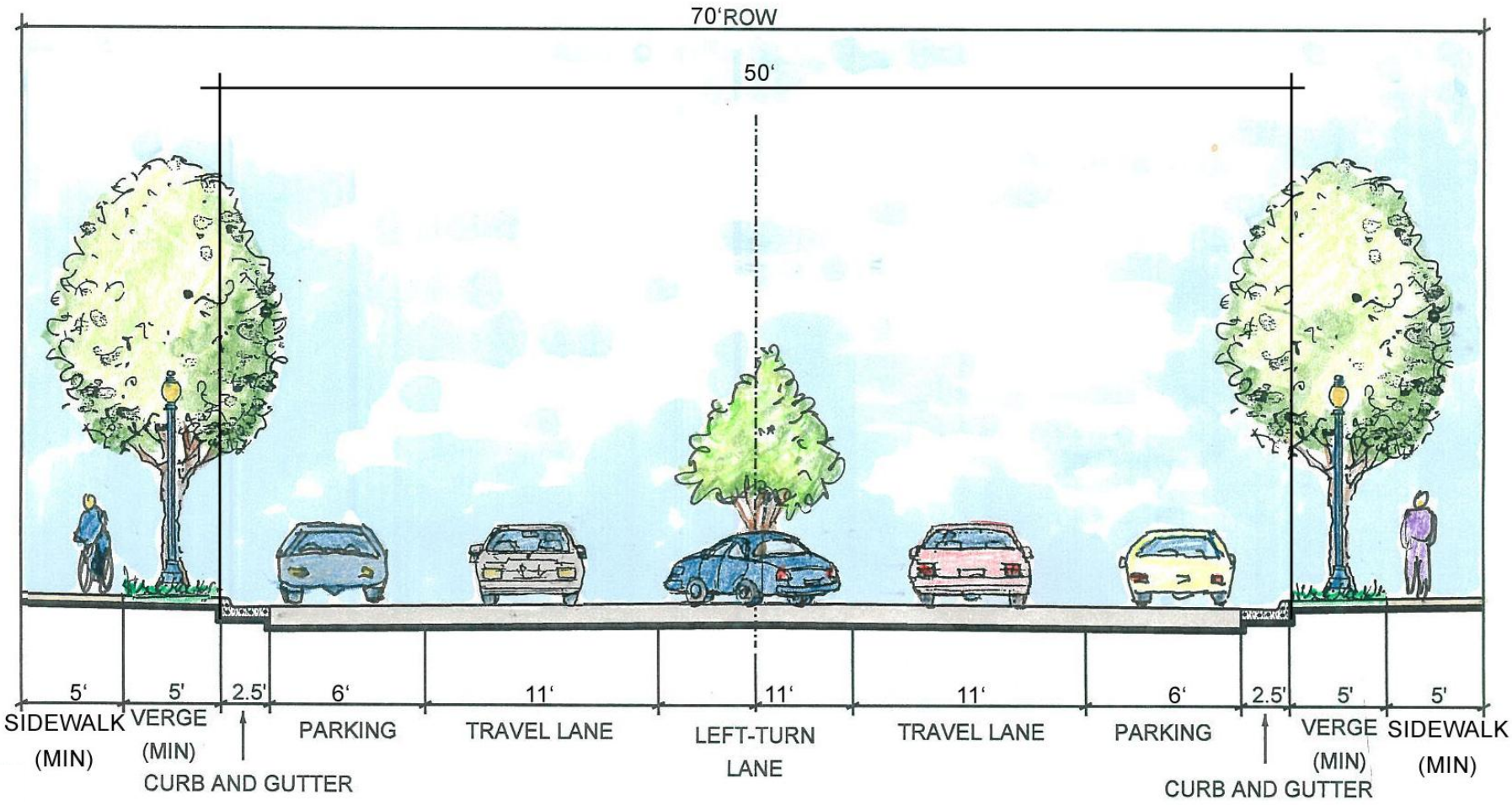


Plan View

NOT TO SCALE

Figure 5.3

Residential Collector – Type C

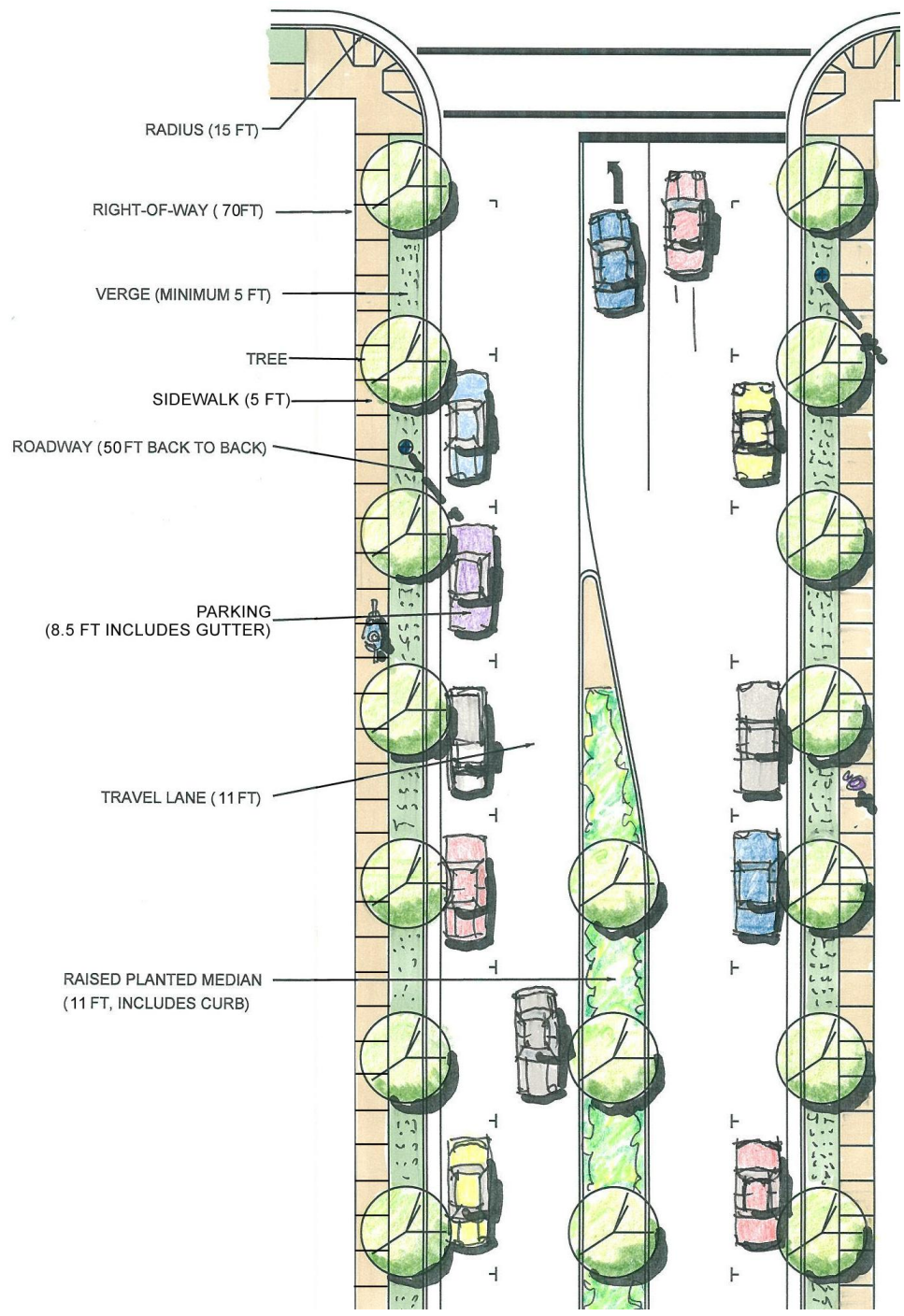


Typical Section

NOT TO SCALE

This residential collector provides two travel lanes with parallel parking and street trees along both sides of the street. A eleven-foot planted median separates the two travel lanes and provides opportunities for left-turn bays, where needed. In the event that a planted center median is not incorporated into the design for a specific collector street, the street should be narrowed by eleven feet. Sidewalks are preferred for both sides of the street in more urban areas; however, a ten-foot, multiuse path on one side of the street is acceptable in less dense areas. Context sensitive design considerations should include:

§Striped Crosswalks
§Mini Roundabouts at intersections (no more than ten per mile)
§Drainage (curb and gutter)
§Street Trees (formal or random plantings)
§Pedestrian Circulation (sidewalk or multi-use path)
§Street Lighting (pedestrian scale)
§On-Street Parking (only where it will be used much of the time)

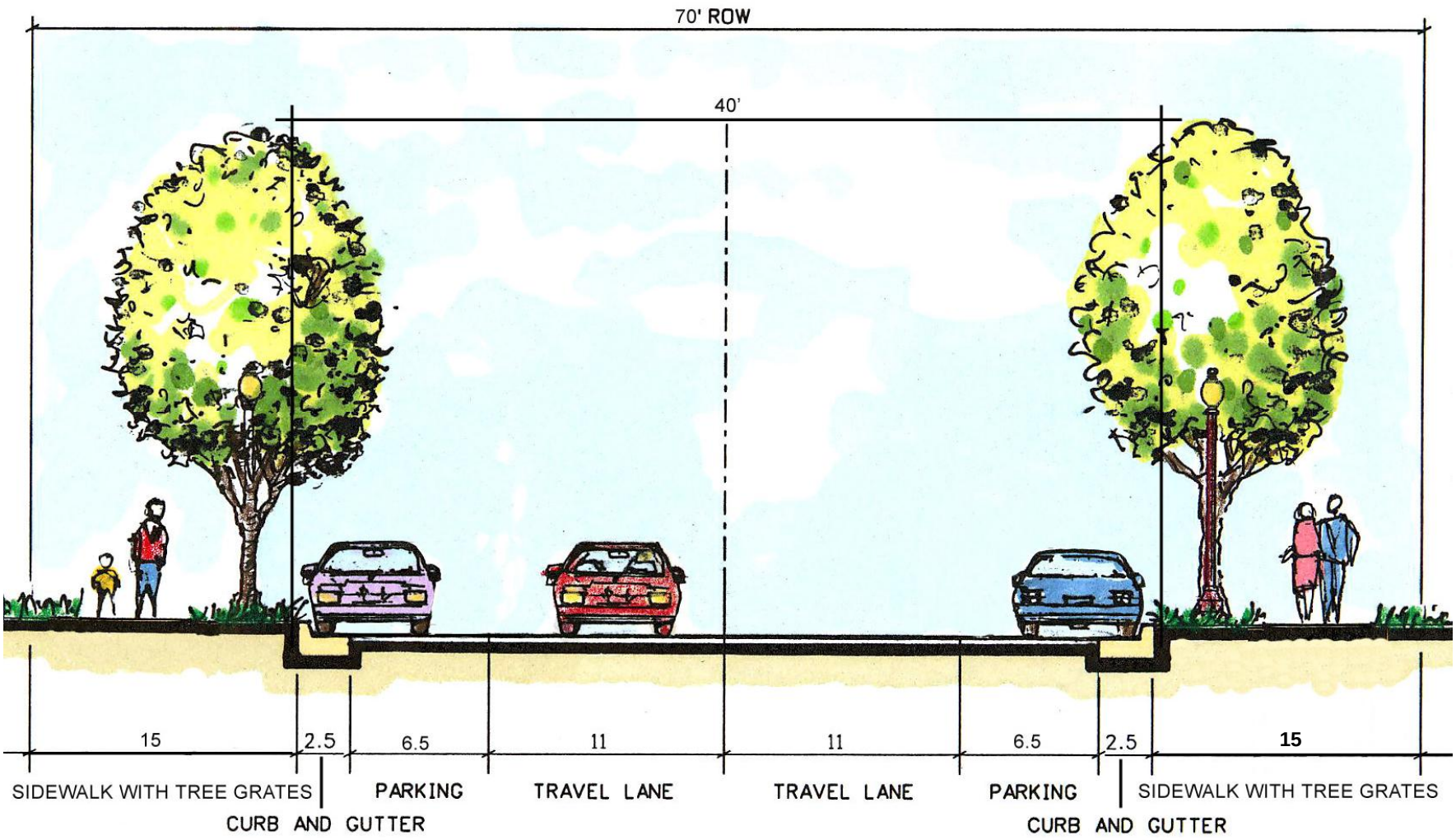


Plan View

NOT TO SCALE

Figure 5.4

Commercial Collector – Type A

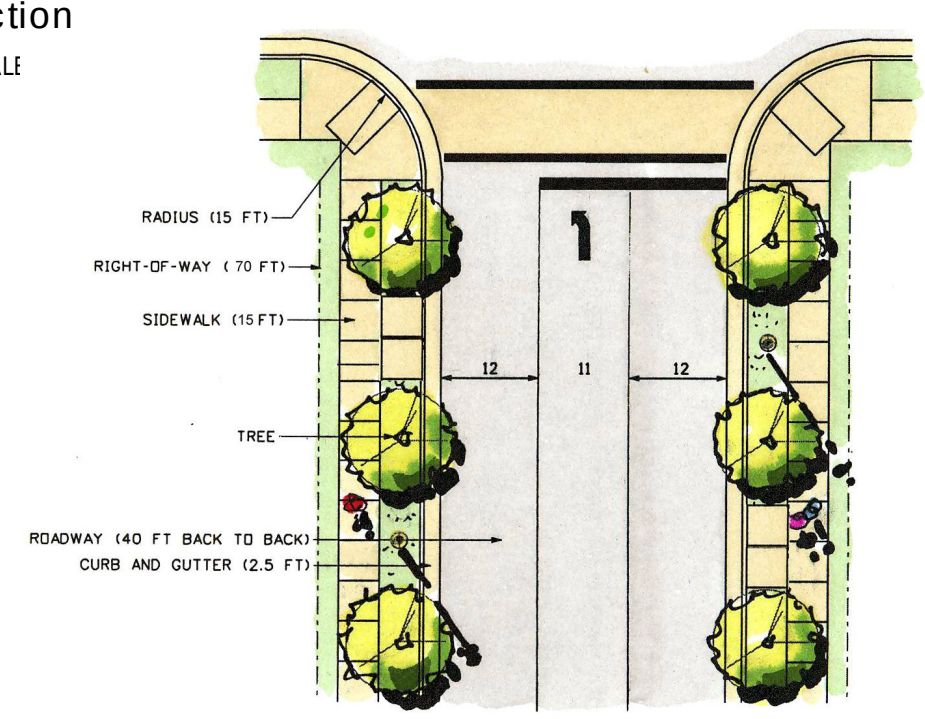


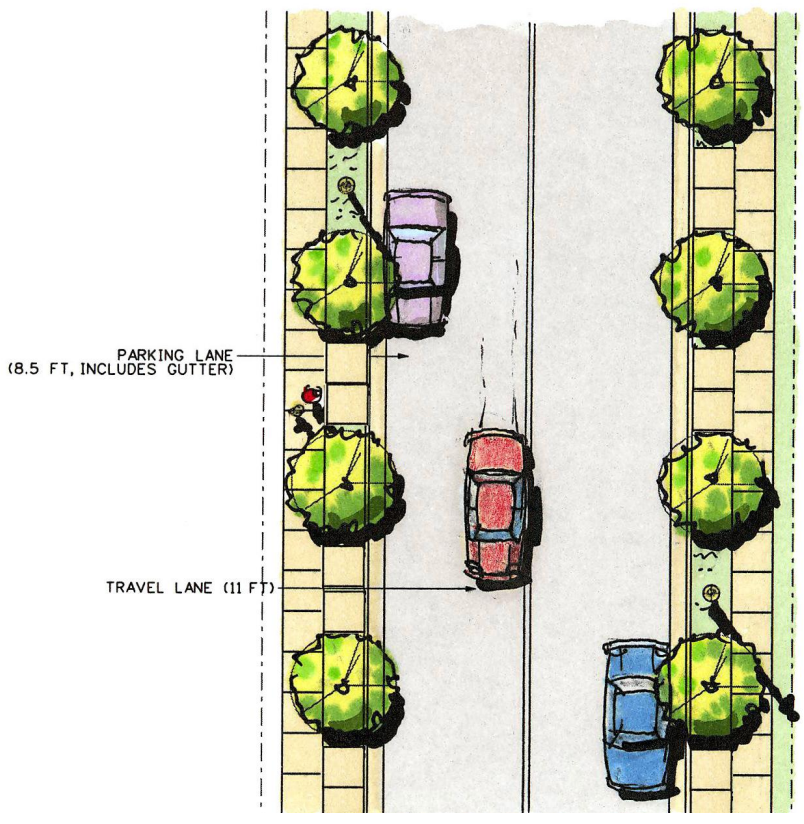
Typical Section

NOT TO SCALE

This street provides two travel lanes with parallel parking spaces along both sides of the street. In more urban areas, a fifteen-foot sidewalk with street trees placed in individual planters and pedestrian scale street lighting spaced comfortably apart to maximize the sidewalk width for commercial activity along both sides of the street. Context sensitive design considerations should include:

§Striped Crosswalks
§Drainage (curb and gutter)
§Street Trees (formal or random plantings)
§Pedestrian Circulation (wide sidewalks)
§Street Lighting (pedestrian scale)
§On-Street Parking
§Curb Extensions at Intersections
§Well Designed Far-Side Bus Stops (with appropriate passenger amenities)



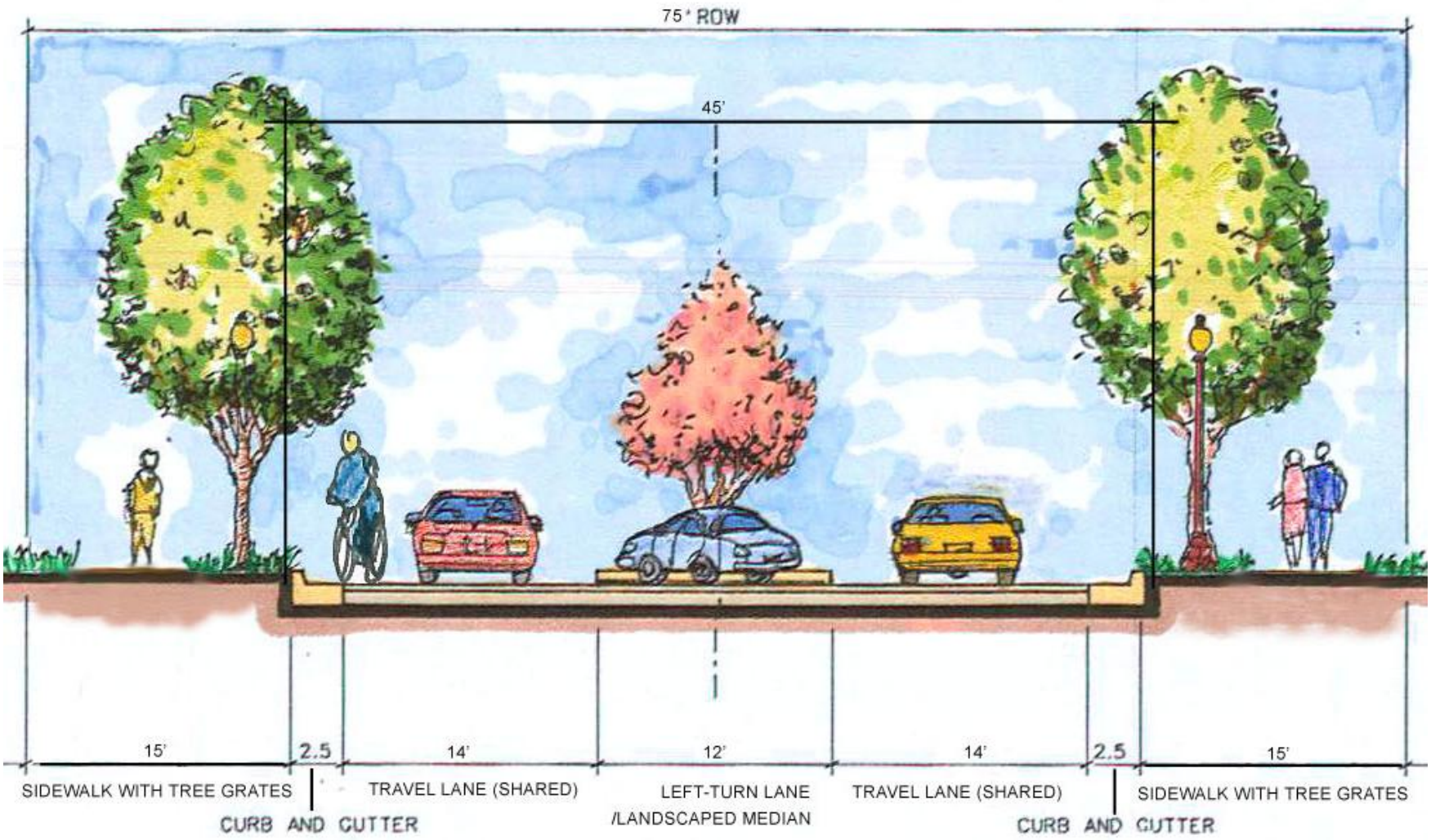


Plan View

NOT TO SCALE

Figure 5.5

Commercial Collector – Type B

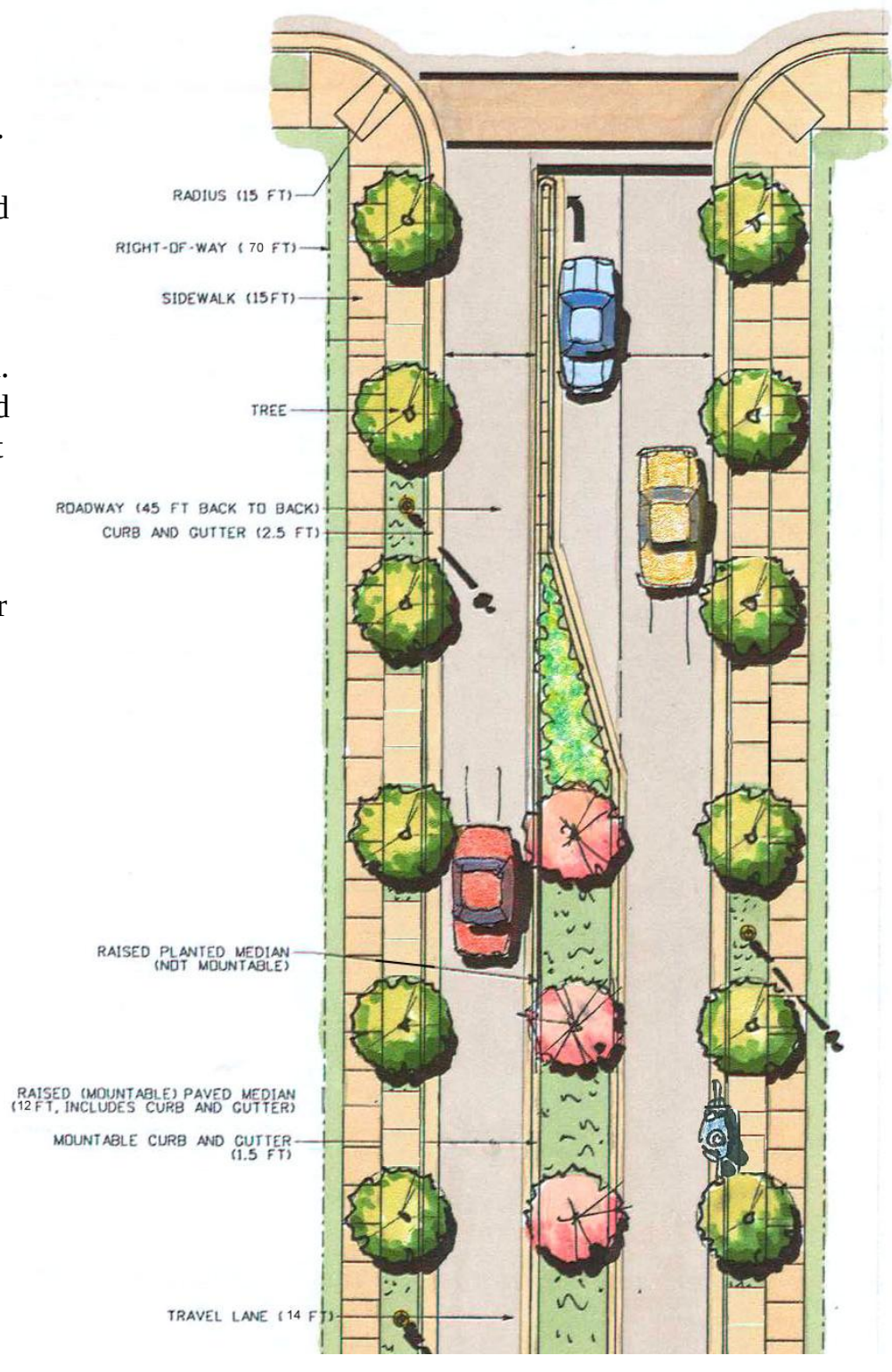


Typical Section

NOT TO SCALE

This commercial collector street is designed to limit automobile travel speeds to 30 miles per hour. It provides two fourteen-foot travel lanes along both sides of the street. The wide travel lanes provide opportunities for motor vehicles and bicycles to share the travel corridor and should be designated as official bicycle routes within the community supplemented by appropriate signage. A twelve-foot planted median separates the two travel lanes and provides opportunities for left-turn bays, where needed. In the event that a planted center median is not incorporated into the design for a specific collector street, an eleven-foot center left turn lane may be appropriate. In more urban areas, a fifteen-foot sidewalk with street trees placed in individual planters and pedestrian scale street lighting spaced comfortably apart maximizes the sidewalk width for commercial activity along both sides of the street. Context sensitive design considerations should include:

- Striped Crosswalks
- Drainage (curb and gutter)
- Street Trees (formal or random plantings)
- Pedestrian Circulation (wide sidewalks)
- Street Lighting (pedestrian scale)
- On-Street Parking
- Curb Extensions at Intersections

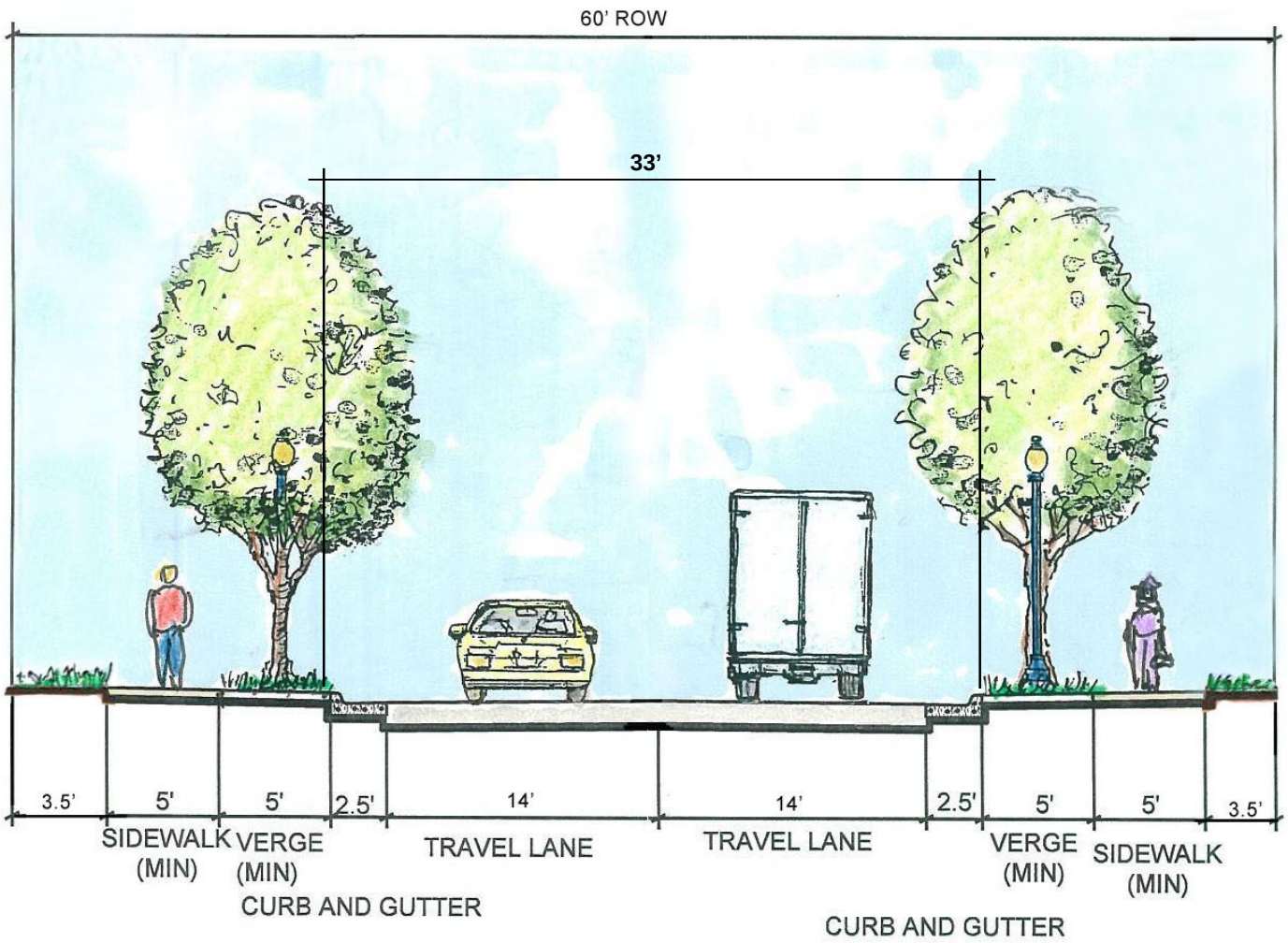


Plan View

NOT TO SCALE

Figure 5.6

Industrial Collector

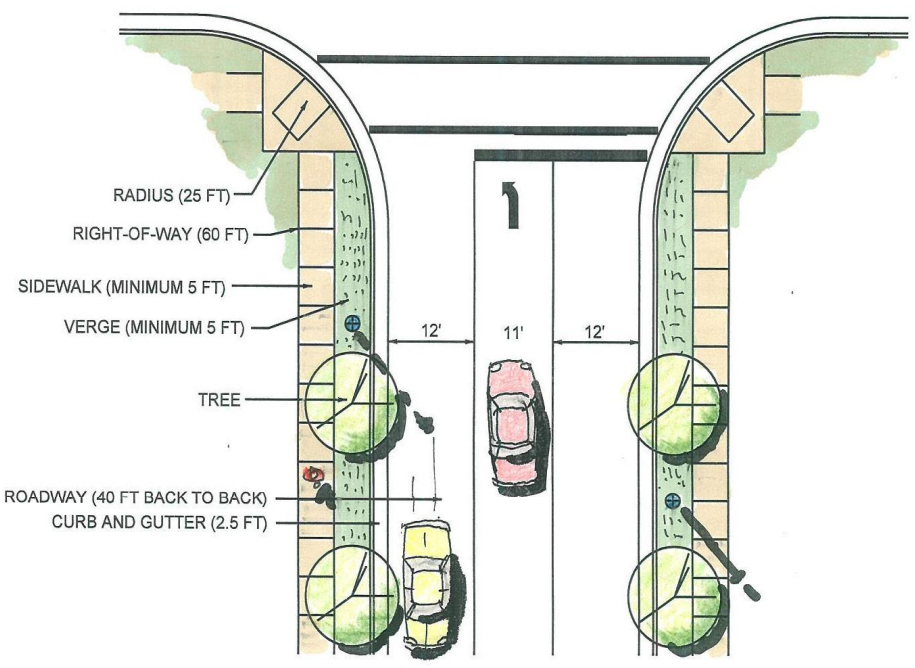


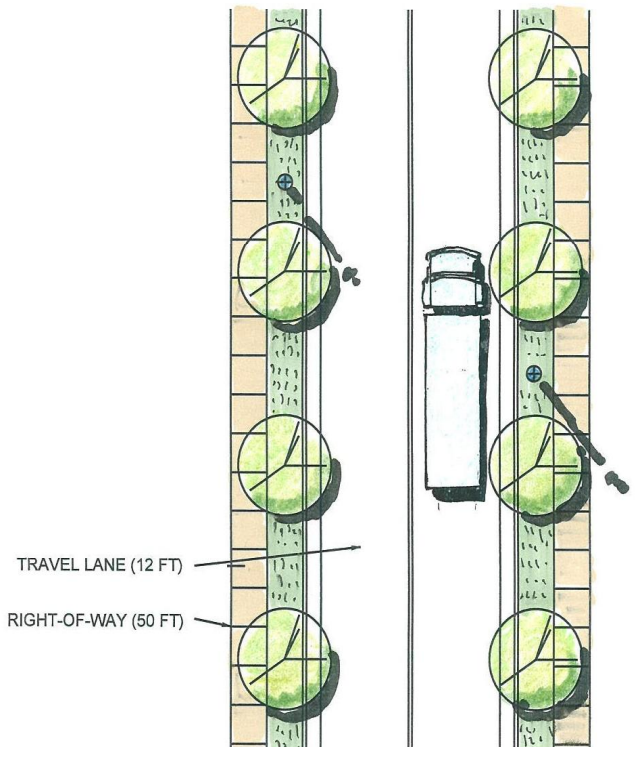
Typical Section

NOT TO SCALE

This industrial collector is designed to limit travel speeds to 30 miles per hour. It provides two travel lanes with opportunities for left turn bays at intersections. The wide travel lanes better accommodate larger vehicle traffic and provide opportunity for motor vehicles and bicycles to share the travel corridor. These facilities should not be designated as official bicycle routes but the wider lanes will accommodate cyclists who want to use these streets. Street trees should be limbed-up to allow safe truck passage. Sidewalks are preferred for both sides of the street to connect complementary land uses. Context sensitive design considerations should include:

§Striped Crosswalks
§Drainage (swale or curb and gutter)
§Street Trees (formal or random plantings)
§Pedestrian Circulation (sidewalk)
§Street Lighting (vehicle oriented)
§On-Street Parking
§No Curb Extensions

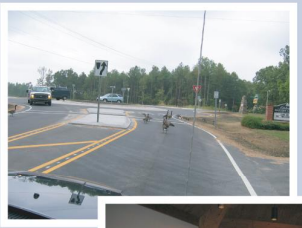




Plan View

NOT TO SCALE

Figure 5.7



Chapter 6 – Implementation

Introduction

Transportation plans are successful only if they are implemented. Likewise, funding and consistent policies are required to fully realize the benefits of a collector street plan. When public funding is the sole source of financing used to build a system of streets, the result tends to be a fragmented and extremely slow execution of much needed infrastructure. The competition for public funds continues to escalate with each passing year and the planning, design, and construction of publicly-funded transportation projects typically take 10 years (sometimes even longer in environmentally-sensitive areas). One of the advantages of a collector street plan that is reinforced by supporting local policies is that most of these roads can be built by developers. The majority of collector streets should be no more than two-lane roads that can easily be incorporated into the development plans of the private sector. With this in mind, the City of Durham and Town of Chapel Hill have proactively conducted this study to demonstrate the benefits of an interconnected system of collector streets as well as a strategy to see them built incrementally as development occurs. This strategy has the added advantage of ensuring the timing of transportation infrastructure so that is coincides with the creation of transportation demand.

This chapter provides general policy recommendations and an action plan to assist local decision makers and planning staff in the implementation of the *Southwest Durham County and Southeast Chapel Hill Collector Street Plan*. As shown in the collector street plan, an interconnected network of well designed collector streets can help develop safe, attractive, pedestrian-friendly neighborhoods.

General Recommendations

Although specific recommendations are discussed in Chapters 4 and 5, the following general policy recommendations are offered for consideration:

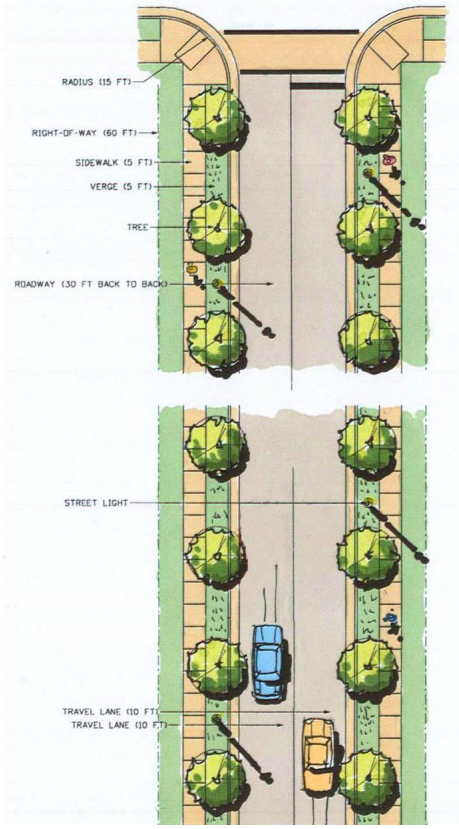
General Policy

- Update modal plans for bikeways, greenways, and transit networks with the *Collector Street Plan* to create overlapping and internally consistent plans for an interconnected multimodal network
- Avoid and/or minimize impacts to environmentally sensitive areas to preserve the natural environment. Proactively pursue permits from the U.S. Army Corps of Engineers to build both the Southwest Durham Drive and the short extension of George King Drive. The alignments

have been shown to skirt the edges or barely penetrate environmentally sensitive areas.

Collectors

- Increase the number of collector streets to better facilitate travel between local streets and arterials
- Use the plan as a tool to review proposed development projects and plans as they locate and design future collector streets
- Integrate design standards (starting page 5-2) and provisions for residential and commercial collector streets through the development process
- Amend the *Collector Street Plan* as necessary to include new streets as they are identified during the development review process
- Work with the development and real estate community to increase public awareness of future collector street connections through enhanced signage
- Provide <u>temporary</u> turnaround accommodations for collector street stub-outs to allow access by maintenance and emergency vehicles; right-of-way needed for turnaround would revert back to property owners once connection is made
- Local jurisdictions should consider dedicating collector streets as public right-of-way to allow proper design and maintenance of facility
- Require that new developments reserve right-of-way for, and in some cases construct, future collector streets
- Local jurisdictions should consider adopting policies and dedicating funding to help construct traffic calming measures on existing collector streets that become connected to new collector streets.



Action Plan

To firmly establish *Collector Street Plan* principles into the normal course of business, several amendments to current policies are recommended, including the following:

1. **Collector Street Plan** — The Durham – Chapel Hill – Carrboro – Metropolitan Planning Organization (DCHC MPO) should adopt the *Collector Street Plan* (map) as a part of the state-mandated Comprehensive Transportation Plan (CTP). The City of Durham and the Town of Chapel Hill should consider adopting the Collector Street Plan as an element of their respective Comprehensive Plans, the *Durham Comprehensive Plan* and *Planning for Chapel Hill's Future: The Comprehensive Plan*. The City and Town should consider all available strategies to obtain rights-of-way, ensure connectivity, review requested variations, and secure funding agreements.

   "Work toward a balanced transportation system" – *Planning for Chapel Hill's Future: The Comprehensive Plan*

   "Promote the creation and enhancement of a livable, safe and beautiful community for all Durham citizens." – *Durham Comprehensive Plan*

2. **Revise local ordinance** – Both Durham and Chapel Hill should evaluate their current ordinance for any inconsistencies and develop code that accurately communicates the collector street design and construction requirements of their respective jurisdictions.

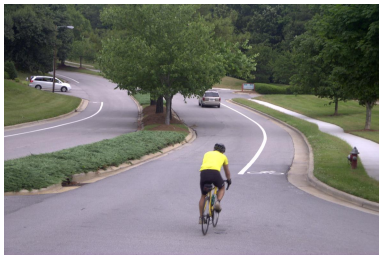
3. **Street Spacing and Access** — Consider adopting the street spacing guidelines (page 5-1) to promote efficient development of an expanding transportation system. These street spacing guidelines could be used as "rules of thumb" during the development review process.

4. **Street Standards** — The City and County of Durham should consider revisions to the street standards for public and private streets described in the table of Minimum Design Requirements for Public and Private Residential Streets. The current standards lead to speeding issues in residential neighborhoods. Neighborhood quality of life may be improved by narrowing the total pavement width of collector streets to match illustrations contained in the Collector Street Plan. Other street design requirements in the above referenced table should be reviewed and updated as well.

5. **Sidewalks** — The City of Durham and Town of Chapel Hill should continue subdivision ordinances to require that sidewalks be built on both sides of all new residential and commercial collector streets. Sidewalks should be a

minimum of 5 feet wide along residential, commercial, and industrial collectors. A verge width of at least 4.5 feet (wider verge is preferred) should separate the edge of pavement from the edge of sidewalk. The City of Durham and Town of Chapel Hill should also require that their pedestrian plans be consulted to provide the correct facility type (i.e. sidewalk or shared-use path).

6. **Bicycle Plan** — The Town of Chapel Hill currently has a bicycle plan and the City of Durham is developing a bicycle plan which will identify an interconnected system of signed bicycle routes, striped bike lanes, and off-street bike paths that serve popular bicycling destinations such as schools, parks, libraries, community centers, shopping areas, and downtown areas. The plan should take advantage of low-volume, low-speed residential local and collector streets to the extent possible. It is recommended that Durham's street design standards be modified to require that bike lanes be built on those collectors that are specified by the plan. Chapel Hill's design manual already requires this.



7. **Streetscape** — To induce self-enforcing speed limits on residential and commercial collector streets, the Town, City, and counties should develop streetscape guidelines for application by the Town or City (on publicly-funded projects) and developers (on privately-funded street projects). Streetscapes can narrow the visual field perceived by motorists without compromising safety. For example, on streets with posted speed limits of 35 mph or less, street trees that create a canopy effect will naturally cause most drivers to travel slower than on streets with wide open vistas. Streetscape enhancements include landscaped medians or median islands for pedestrian refuge at intersections, pedestrian-scale street lighting, street trees, benches and other street furniture, bus shelters, and highly visible crosswalks.

8. **Traffic Calming** — The local jurisdictions should consider enhancements to existing traffic calming programs to offer more than speed humps. An update of the policy may be warranted to ensure that it relates to developer requirements as new residential streets are built. The intent of the policy should be to

eliminate the need for retrofits on future streets as the area continues to grow and build new residential neighborhoods.

9. **Southwest Durham Drive Study** — Based on public input, it is recommended that further study be conducted pertaining to the alignment of Southwest Durham Drive. The public response indicated a strong opposition to the current alignment of this facility. *It is agreed that the connection is needed; however it is recommended that the alignment of Southwest Durham Drive be revisited.*

10. **Farrington Road Interchange Study** — Based on public input, both for and in opposition, it is recommended that further study be conducted on a potential interchange on Interstate 40 at the existing Farrington Road bridge over I-40.

11. **NC 54 Corridor Study** — NCDOT has begun studying the NC 54 corridor. It is recommended that further study be conducted to assess the safety, traffic congestion, and access management issues along this corridor.

12. **Consolidated Transportation Study** — Based on the interdependence of the major transportation facilities in this area; it is recommended that these studies identified above (i.e., #9, #10, and #11) be consolidated into a single study. The study can be funded by consolidating several funding sources including the DCHC MPO, NCDOT, local governments and relevant property owners and developers.

Funding and Phasing Concepts

One of the primary purposes of the ***Southwest Durham County and Southeast Chapel Hill Collector Street Plan*** is to consider recent trends, anticipated growth, and the relationship between growth and the street network. The Plan communicates the framework for the future street network. It should be noted that the future collector streets proposed as part of the Plan do not depict specific alignments, instead they communicated desired connections. This practice ensures flexibility and allows local developers to adapt their development plans in a manner that is homogenous with their desired development vision. Simply stated, the exact alignment is not nearly as important as ensuring that the connection is made. The Plan conveys a concept of a system of collector streets that work together to provide interconnectivity. Only through the adoption of local policies and procedures can the incremental construction of the collector street network effectively occur. With this in mind, it is recommended that the development review process include consideration of the future collector street network. Just as with the Comprehensive Transportation Plan (CTP), development should be required to proceed in such a way that it is responsive to and consistent with the proposed future year street network. Identification of the future street connections should also be given consideration during the zoning and review process.

Because collector streets generally are maintained by the City/Town and not by NCDOT, the implementation of this plan can be achieved either by private development through the plan approval process or through public/private partnerships. The collector streets proposed as part of the ***Southwest Durham County and Southeast Chapel Hill Collector Street Plan*** generally fall into one of three categories: (1) new collector streets to be constructed as land is developed, (2) proposed connections to eliminate a discontinuity along another existing collector street, or (3) the extension of an existing collector street to another existing collector street or an existing arterial. For the most part, the responsibility for funding and constructing a collector street will depend on its category.

Routine Development

Under current practice, new collector streets that are constructed as land is developed will remain the responsibility of the developer. Newly proposed cross-sections for residential collector streets include additional landscaping, street level lighting, and sidewalk.

In certain situations it may be beneficial for the City/Town to partner with a developer to extend a collector street beyond his/her project or phase line. This may prove advantageous where an extension is necessary to improve access and emergency response services within a given area or to avoid further burdening the existing local street network due to the lack of a reasonable and

convenient outlet to the arterial system. In these situations, the City/Town may consider participating in the cost of constructing the collector street and extending it to a logical or more desirable terminus. In general, such an investment by the City/Town would not exceed the cost of extending the collector street at some future date once the developer has completed his/her project.

Elimination of Existing Discontinuities or Dead Ends

In situations where a collector street is needed either as an extension that would connect to an arterial or as a missing link, the City/Town may initiate the improvement by funding it in the Capital Improvement Program and then building the street subject to assessment of the cost to the abutting properties.

Randall Road Stub-out

Economic Development Projects

The construction of collector streets may also be used as a tool to promote economic development. While this concept could apply in residential, commercial, or industrial zones, it is most likely to be used to promote either commercial or industrial development.

In terms of funding, such projects would typically be incorporated into the City/Town's Capital Improvement Program and funded with Powell Bill or general fund revenues.

Alternative Funding Measures

It is evident that Powell Bill and general fund revenues alone will not be sufficient to fund a systematic program of constructing collector streets within the City/Town. Alternate funding measures that other jurisdictions have used for street system improvements include:

- Transportation Bonds
- Impact Fees
- Enhancement Grants

Transportation Bonds

Transportation bonds have been instrumental in the strategic implementation of local roadways throughout North Carolina. Voters in communities both large and small regularly approve the use of bonds in order to improve their transportation system. Projects that have historically been funded include sidewalk projects, roadway extensions, new road construction, and streetscape enhancements.

Impact Fees

Developer impact fees and system development charges are another funding option for communities looking for ways to pay for collector streets and associated infrastructure. They are most commonly used for water and wastewater system connections or police and fire protection services but they have recently been used to fund school systems and pay for the impacts of increased traffic on existing roads. Impact fees place the costs of new development directly on developers and indirectly on those who buy property in the new developments. Impact fees free other taxpayers from the obligation to fund costly new public services that do not directly benefit them. Only a handful of communities in North Carolina have approved the use of impact fees (e.g. Cary). The use of impact fees requires special authorization by the North Carolina General Assembly.

Enhancement Grants

State and Federal Grants can play an important role in implementing strategic elements of the transportation network. A number of grants have multiple applications including, Transportation Enhancement Grants as well as State and Federal Transit Grants. The Enhancement Grant program was established by Congress in 1991 through the Intermodal Surface Transportation Efficiency Act (ISTEA) as a means of ensuring that a variety of projects — most not typically associated with the road-building mindset — were implemented. While the construction of roads is not the intent of the grant, the construction of bicycle, pedestrian, and streetscape improvements are a few of many enhancements that the grant targets and could play an important role in enhancing the pedestrian safety and connectivity in the City of Durham and

Town of Chapel Hill. For more information on the Enhancement Grant Program see the following web page link: www.ncdot.org/planning/development/Enhancement/enhancement/enhancement.htm