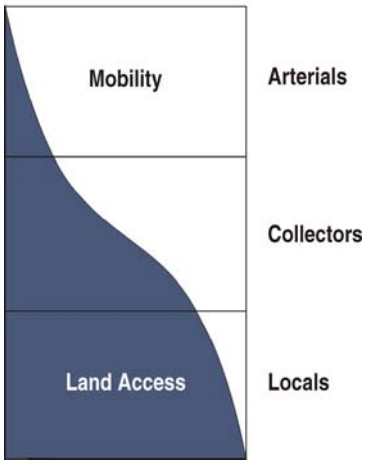
Chapter 4 – Recommended Network

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.



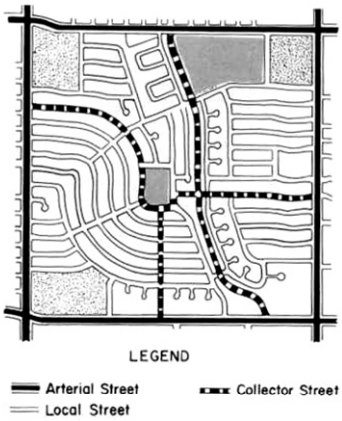
Relationship of Classification to Service

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 subordinate to

Highway 54

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

Examples of principal arterials within the project study area include Highway 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 and Old Durham/Chapel Hill Road.

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. 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.

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 through traffic is often discouraged on local streets. Local streets usually have

Celeste Circle

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.

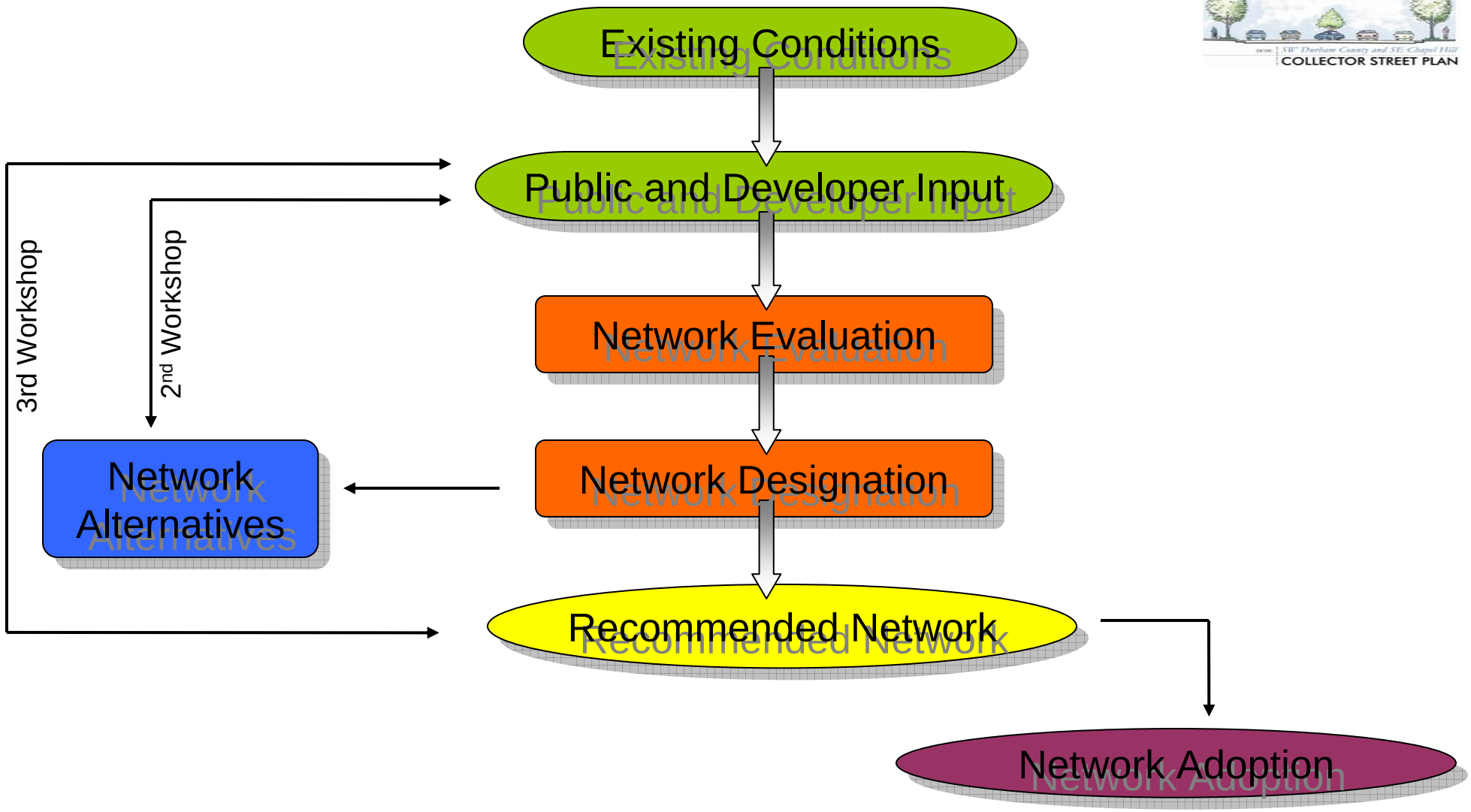


Figure 4.1 – Collector Street Planning Process

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. NCDOT has recently initiated a Highway 54 corridor study; however, conclusions will not be available prior to the completion of this project.

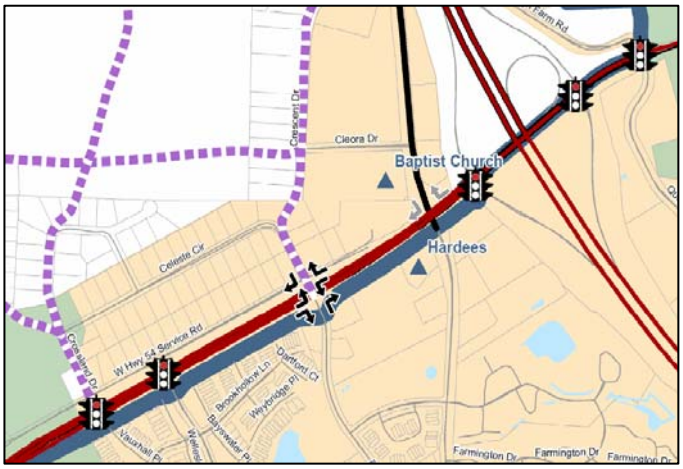
Proposed Network Alternative "A"

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

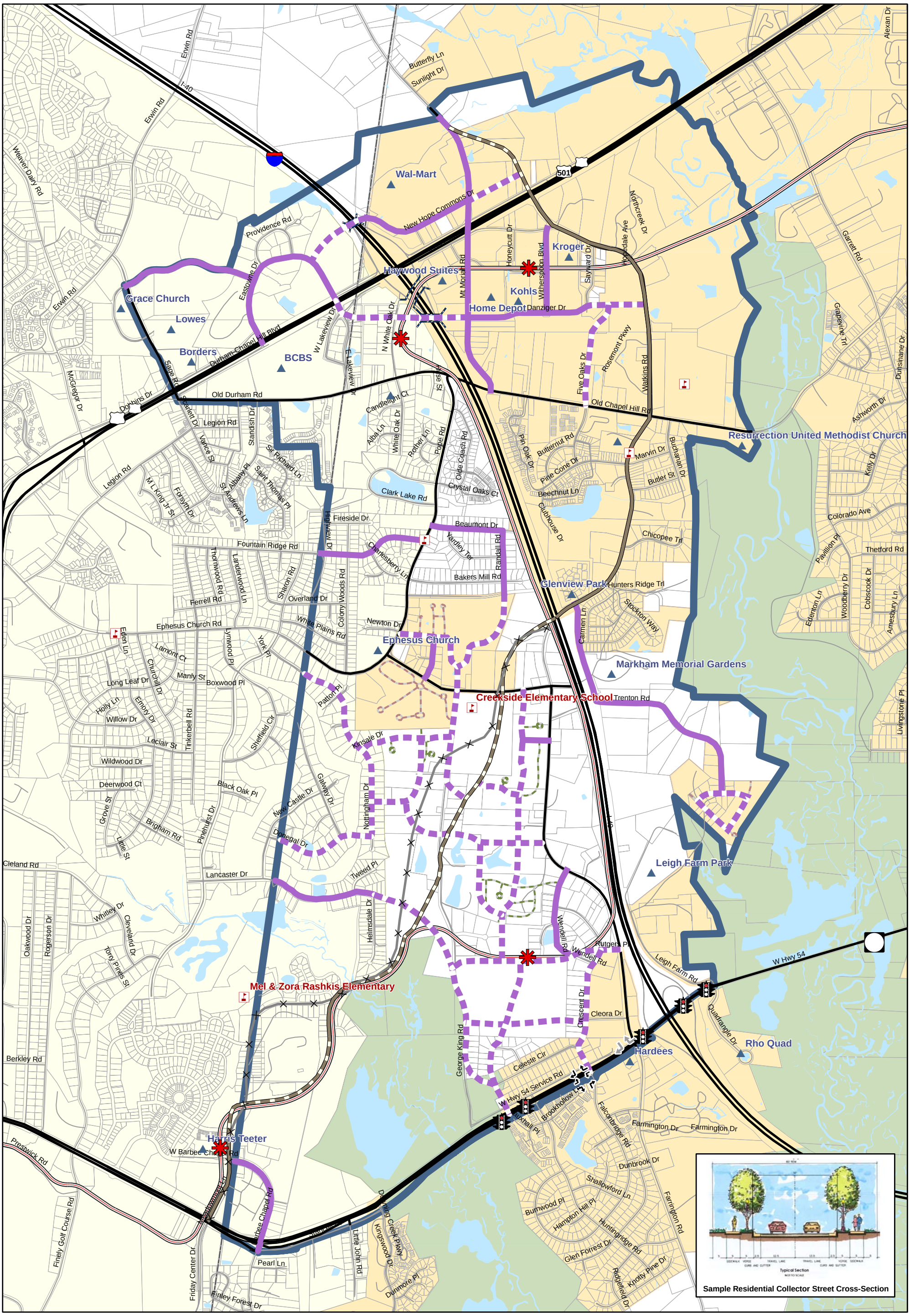
This alternative recognizes the future fixed-guideway alignment and supports the proposed transit station by providing an east/west parallel collector street. This would provide convenient access to those citizens using the proposed transit station.

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)



Southwest Durham - Southeast Chapel Hill Collector Street Plan

Figure 4.2 - Alternative "A"

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 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
- Proposed 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).

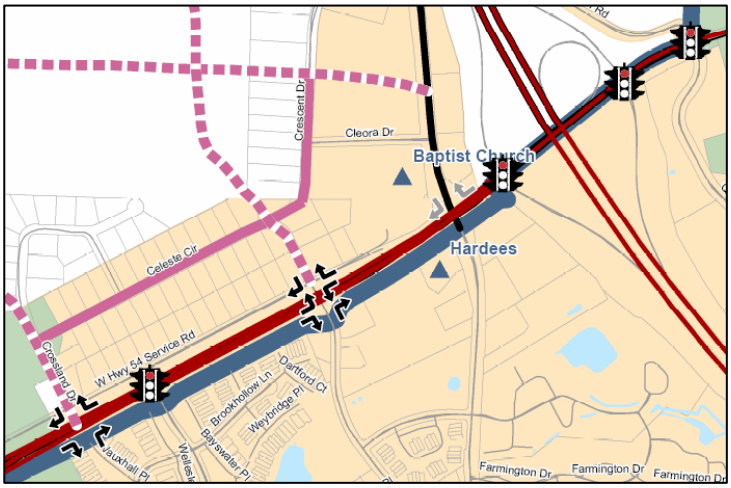
Proposed Network Alternative "B"

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)

Wal-Mart
Kroger
Haywood Suites
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
Sample Residential Collector Street Cross-Section

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
Proposed 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

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Proposed Network Alternative "C"

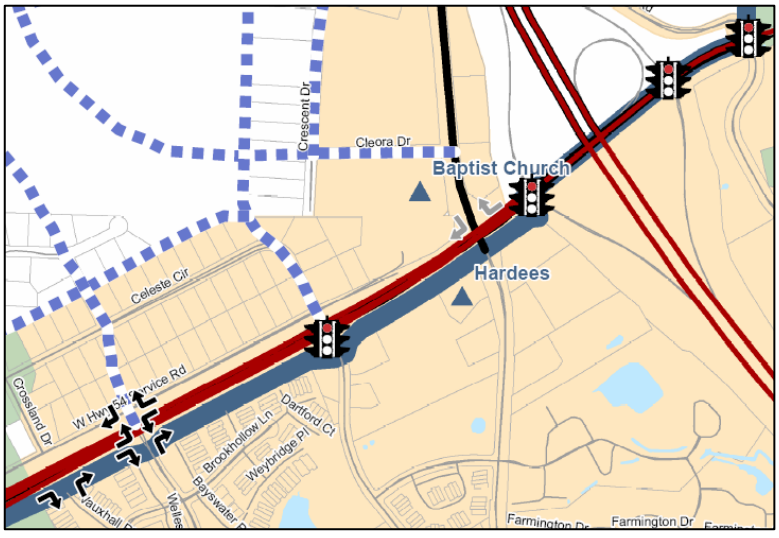
Alternative "C" shows the currently approved Southwest Durham Drive alignment and was developed considering a denser development pattern in the southern portion of the study area in anticipation of a future transit station in this area.

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"

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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
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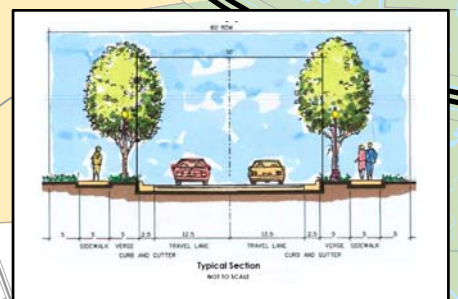
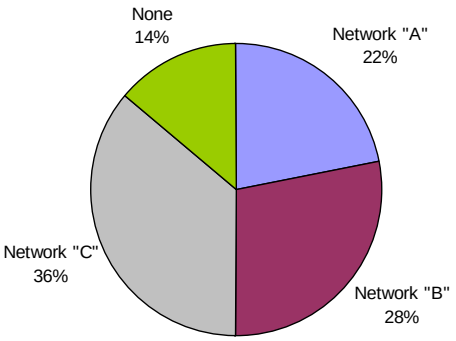


Sample Residential Collector Street Cross-Section

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. 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.

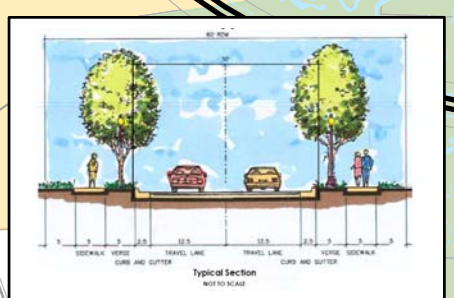
Transit Circulation

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 2-mile radius from the location of the proposed transit stations. This is the distance found to be most reasonable by those willing to walk or bike, respectively, to access transit facilities. **[TO BE UPDATED FOR FINAL REPORT]**

Southwest Durham - Southeast Chapel Hill Collector Street Plan

Figure 4.5 - Recommended CSP Network



Sample Residential Collector Street Cross-Section

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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
- Two Mile Buffer
- Proposed Transit Stations
- Proposed Transit Alignment
- Interstates
- Existing TTA
- Existing Transit Network

N W E S

0 0.125 0.25 0.5 Miles

INSERT FIGURE 4.7 – RECOMMENDED CSP AND FUTURE TRANSIT FACILITIES
[TO BE UPDATED FOR FINAL REPORT]