Chapter 2: Recommendations

This chapter presents recommendations for each mode of transportation in the *2017 Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO) CTP* as shown in Figure 1. More detailed information on each recommendation is tabulated in Appendix C. For information on recommendations from existing transportation plans in rural Orange and Chatham Counties that were not incorporated as parts of this CTP, refer to Appendix I.

NCDOT adopted a *Complete Streets* policy in July 2009. The policy directs the Department to consider and incorporate several modes of transportation when building new projects or making improvements to existing infrastructure. Under this policy, the Department will collaborate with cities, towns and communities during the planning and design phases of projects. Together, they will decide how to provide the transportation options needed to serve the community and complement the context of the area. There are several benefits to this approach:

- making it easier for travelers to get where they need to go;
- encouraging the use of alternative forms of transportation;
- building more sustainable communities;
- increasing connectivity between neighborhoods, streets, and transit systems; and
- improving safety for pedestrians, cyclists, and motorists.

Complete streets are streets designed to be safe and comfortable for all users, including pedestrians, bicyclists, transit riders, motorists and individuals of all ages and capabilities. These streets generally include sidewalks, appropriate bicycle facilities, transit stops, right-sized street widths, context-based traffic speeds, and are well-integrated with surrounding land uses.

The DCHC MPO relies on NCDOT's *2012 Complete Streets Planning and Design Guidelines* and other guidelines to identify appropriate facility types that consider and safely accommodate transportation modes for all users.

The complete street policy and concepts were utilized in the development of the CTP. The CTP proposes projects that include multimodal project recommendations as documented in the problem statements within this chapter. Refer to Appendix C for recommended cross sections for all project proposals and Appendix D for more detailed information on the typical cross sections.

For more information on Complete Streets, go to: http://www.completestreetsnc.org/.

2.1 Unaddressed Deficiencies

Background

In some cases, the projected 2040 volume of a roadway study segment will exceed the existing roadway capacity but no improvements are recommended for that study segment. These study segments are said to have an unaddressed deficiency. This document identifies all the study segments with an unaddressed deficiency in the draft highway CTP and the reason that no capacity improvements are recommended. The reasons are described in the following text and indicated in the appropriate column in Table 9, which follows this section.

Limited Need (Need)

Some roadways have a 2040 volume projected to exceed the current capacity by a small amount. The addition of relatively low-cost improvements, such as turn lanes and medians, can add storage capacity for vehicle turn movements to reduce congestion delay and improve mobility. Another option is that no improvements are recommended at this time and traffic volumes are monitored for congestion. Low-cost or no improvements could be better roadway investments than adding through lanes which costs more and will result in excess projected capacity. To avoid excess future capacity for roadways that are projected to barely exceed existing capacity, no improvements are recommended for the roadway segments that have "**Need**" in the appropriate column of the table below.

Community Impacts (Comm)

With most widenings, additional rights-of-way (ROW) need to be acquired. In some cases, the acquisition of ROW would require an excessive number of properties, which may include physical structures such as houses and commercial buildings, and infrastructure to be negatively impacted. To avoid significant negative impacts to the community or historic district properties, improvements are not recommended.

In addition, some communities wish to preserve and maintain the character of roadways or corridors within certain areas, such as downtowns and historic districts. To avoid changing the character of certain roadways and corridors for all modal users in a community, improvements are not recommended.

To avoid the overly negative community impacts, no improvements are recommended for the roadway segments that have "**Comm**" in the appropriate column of the table below.

Parallel Roadways (Par)

Some study segments will not be improved because there are parallel roadways in the same area that have excess capacity or that are expected to have excess capacity due to recommended improvements. These parallel roads will likely attract and shift trips from the study segment road and subsequently reduce

projected travel delays on those segments. In many cases, these parallel roadways are identified because there are additional reasons for not adding capacity to the study segments such as avoiding significant negative property impacts or to preserve the character of a community, and the parallel route offers a solution. The parallel route is identified with "**Par**" in the table column.

Notes

The Notes section adds details related to "Need," "Comm," and "Par" designations. For example, if the designation is "Par," the Notes will read "Parallel: South Roxboro Street Extension," to indicate that South Roxboro Street Extension will attract traffic away from the study segment. In addition, the Notes section will also identify miscellaneous reasons for not adding capacity, such as environmental concerns.

Table

The Unaddressed Deficiencies in Table 9 presents interstates, US highways and NC routes, and then secondary and local roads. Within these sections, the roadways are sorted alphabetically and then presented by geography, i.e., west to east and north to south.

Unaddressed Deficiencies

Table 9

Roadway Name	Location			Reasons for No Recommended Improvements				Existing			2040	
	From	To	Jurisdic-tion	Need	Comm	Paral-lel	Notes	Current Count	No. of Lanes	Capacity (Cap.)	Volume (Vol.)	Vol./Cap. (V/C)
Interstates												
I-40 /I-85	I-85/US 70 Connector	Mt. Willing Rd	OR	--	--	--	Other:Monitor congestion.	94,000	8	125,800	183,600	1.5
I-40 /I-85	I-40	I-85/US 70 Connector	OR	--	--	--	Other:Monitor congestion.	92,000	8	125,800	184,000	1.5
US Highways												
US 15-501	Culbreth Rd.	Fordham Blvd	CH	--	--	--	Other: Interchange requires improvements, not the roadway.	32,000	4	26,000	41,700	1.6
US 15-501 BUS (Lakewood Ave)	S Roxboro St	Vickers Ave	DurCity	--	Comm	--	Additional lanes would impact many buildings.	13,000	3	13,800	17,200	1.2
US 15-501 BUS (Roxboro St - North)	Markham Ave	I-85	DurCity	--	Comm	Par	Parallel: East End Connector/Avondale/Alston Av Ext. Other: Grading challenges	15,000	2	12,900	19,600	1.5
US 15-501 BUS (University Dr)	Durham Chapel Hill Blvd	Vickers Ave	DurCity	--	Comm	Par	Parallel: S Roxboro St Ext	16,000	2	12,900	19,000	1.5
US 501 BUS (Roxboro St - North)	I-85	E Club Blvd	DurCity	--	Comm	Par	Parallel: N Duke St. Other: Complexity of adding lanes would result in very high cost.	31,000	5	23,500	42,500	1.8
US 501 BUS (Roxboro St - North)	Old Oxford Rd	E Carver St	DurCity	Need	--	Par	Parallel: N Duke St. Other: Complexity of adding lanes would result in very high cost.	23,000	5	28,100	30,700	1.1
US 70 BUS (Hillsborough Rd)	Neal Rd	Operations Dr	DurCity	Need	--	--	V/C ~1; continue monitoring roadway congestion	9,600	2	14,000	16,300	1.2
US 70 BUS (Hillsborough Rd)	Cole Mill Rd	US 15-501	DurCity	Need	Comm	--	V/C ~1; continue monitoring roadway congestion	24,000	4	28,100	31,600	1.1
US 70 BUS (W Main St)	Broad St	N Buchanan Blvd	DurCity	--	Comm	--	Other: Monitor congestion. Intersection or other improvements if warranted.	11,000	2	11,600	19,000	1.6
US 70 BUS (W Main St)	N Buchanan Blvd	Great Jones St	DurCity	--	Comm	--	Other: Monitor congestion. Intersection or other improvements if warranted.	8,000	3	12,500	17,800	1.4
US 70 BUS/NC 98 (Holloway St)	N. Miami Blvd	N Roxboro St	DurCity	--	Comm	--	Additional lanes would impact many buildings.	12,000	2	11,600	15,000	1.3
US 70/NC86 (Churton St - North)	Cornelius St	W King St	Hboro	--	Comm	--	Additional lanes impact historic structures.	13,000	2	11,000	16,200	1.5
US 70/NC86 (Churton St - North)	Cornelius St	W Corbin	Hboro	--	Comm	--	Additional lanes impact historic structures.	13,000	2	12,700	16,200	1.3
US 70/NC86 (Churton St - South)	W King St	US 70A	Hboro	--	Comm	--	Additional lanes impact historic structures.	20,000	2	11,600	24,500	2.1
US 70A	Lawrence Rd	Elizabeth Brady Rd	OR, Hboro	Need	--	--	Other: Continue monitoring road for congestion.	6,700	2	12,400	13,800	1.1
NC Routes												
NC 157 (Guess Rd)	Horton Rd	Prison Camp	DurCity	Need	--	--	V/C ~1; continue monitoring roadway congestion	20,000	5	28,100	28,600	1.0
NC 157 (Guess Rd)	Milton Rd	Umstead Rd	DurCity, Dur	--	--	--	Monitor congestion.	11,000	2	14,600	15,100	1.0
NC 54	S Alston Ave	NC 55	DurCity	--	Comm	Par	Parallel: I-40	21,000	4	31,600	44,300	1.4
NC 54	Davis Dr	S Alston Ave	DurCity, Dur	Need	--	Par	Parallel: I-40. Other: Continue monitoring for congestion.	16,000	5	36,600	39,800	1.1

Unaddressed Deficiencies

Roadway Name	Location			Reasons for No Recommended Improvements				Existing			2040	
	From	To	Jurisdic-tion	Need	Comm	Paral-lel	Notes	Current Count	No. of Lanes	Capacity (Cap.)	Volume (Vol.)	Vol./Cap. (V/C)
NC 54 (Miami Blvd - South)	Hopson Rd.	Slater Rd	DurCity	--	--	Par	Parallel: NC 55 and Triangle Expressway.	21,000	4	45,200	52,700	1.2
NC 54 (Miami Blvd - South)	Wake County Line	Page Rd	DurCity	--	--	Par	Parallel: NC 55 and Triangle Expressway.	21,000	4	45,200	55,600	1.2
NC 55	I-40	E NC 54 Hwy	DurCity	Need	--	--	Other: Continue monitoring for congestion.	35,000	4	43,600	49,800	1.1
NC 55	I-40	MLK Pkwy	DurCity	Need	--	Par	V/C ~1; continue monitoring roadway congestion	25,000	4	36,600	40,700	1.1
NC 55 (S Alston Ave.)	E Lawson St	Cecil St	DurCity	--	Comm	Par	Parallel: Durham Freeway (NC 147)	26,000	4	23,500	36,000	1.5
NC 55 (S Alston Ave.)	E Lawson St	NC 147	DurCity	--	Comm	Par	Parallel: Durham Freeway (NC 147)	27,000	4	23,500	35,800	1.5
NC 55 (N Alston Ave)	Avondale Dr	Holloway St	DurCity	--	Comm	Par	Parallel: East End Connector/Alston Av Ext	14,000	2	12,900	16,000	1.2
NC 751 (Hope Valley Rd)	MLK Parkway	S Roxboro St	DurCity	--	Comm	Par	Parallel: 4-lane S Roxboro has plenty of excess capacity.	9,300	2	11,600	15,400	1.3
NC 751 (Hope Valley Rd)	University Dr	MLK Parkway	DurCity	Need	Comm	Par	Parallel: 4-lane S Roxboro has plenty of excess capacity.	9,500	2	11,600	12,100	1.0
NC 751 (University Dr)	Hope Valley Rd	Academy Rd	DurCity	--	Comm	Par	Parallel: S Roxboro Ext. US 15-501 has excess capacity.	13,000	3	11,600	16,000	1.4
NC 751 (Academy Rd)	Duke University Rd	Durham Chapel Hill B	DurCity	--	--	--	Monitor congestion. Add turn lanes, when needed.	9,900	2	11,600	16,400	1.4
NC 86 (S Columbia St)	Manning Dr	US 15-501	CH	--	Comm	Par	Parallel: BRT. Other: Bicycle, pedestrian and transit high priority given students and centers.	13,000	2	14,000	17,500	1.3
NC 86 (W Cameron Av)	NC 86 (S Columbia St)	Nc 86 (Pittsboro St)	CH	--	Comm	--	Too many structures close to road; existing bike lanes are preferred.	16,000	2	11,600	17,000	1.5
NC 86 (MLK Jr Blvd)	Estes Dr	Homestead Rd	CH	--	Comm	--	Other: Transit facilities are preferred; Bus Rapid Transit will increase corridor capacity.	28,000	4	31,600	40,200	1.3
NC 86 (MLK Jr Blvd)	Homestead Rd	Weaver Dairy Rd Ext	CH	Need	Comm	--	Other: Transit facilities are preferred; Bus Rapid Transit will increase corridor capacity.	24,000	4	31,600	33,300	1.1
NC 86 (MLK Jr Blvd)	Weaver Dairy Rd Ext	I-40	CH	--	Comm	--	Other: Transit facilities are preferred; Bus Rapid Transit will increase corridor capacity.	28,000	4	31,600	41,200	1.3
NC 86.	Whitfield Rd	New Hope Church Rd.	OR	--	--	Par	Parallel: S Churton/I-40	6,400	2	14,600	17,700	1.2
NC 86.	New Hope Church Rd	OLD NC 10	OR	--	--	Par	Parallel: S Churton/I-40	10,000	3	12,400	29,700	2.4
Secondary and Local Roads												
Angier Ave	Ellis Rd	S Miami Blvd	DurCity	Need	--	Par	Parallel: New collector roads	7,700	2	12,400	13,400	1.1
Broad St	W Main St (US 70 Bus)	W Markham Ave	DurCity	--	Comm	--	Other:2040 volume = no significant delay	13,000	2	11,000	14,200	1.3
Broad St	W Club Blvd	W Markham Ave	DurCity	--	Comm	--	Other: Current parking lane can be travel lane if future congestion	13,000	2	11,000	15,500	1.4
Broad St	Guess Rd	W Club Blvd	DurCity	--	Comm	--	Other: Current parking lane can be travel lane if future congestion	12,000	2	11,000	13,700	1.3
Broad St	Leon St	W Murray Ave	DurCity	Need	--	--	V/C ~1; continue monitoring roadway congestion	12,000	2	12,900	13,500	1.0
Buchanan Blvd (North)	W Main St	W Markham Ave	DurCity	Need	Comm	--	V/C ~1; continue monitoring roadway congestion; most structures very close to roadway	9,400	2	11,600	13,200	1.1
Carpenter Fletcher Rd	E Woodcroft Pkwy	NC 55	DurCity	--	--	--	Monitor congestion. Bike/Ped improvements preferred.	-	2	11,600	13,700	1.2

Unaddressed Deficiencies

Roadway Name	Location			Reasons for No Recommended Improvements				Existing			2040	
	From	To	Jurisdic-tion	Need	Comm	Paral-lel	Notes	Current Count	No. of Lanes	Capacity (Cap.)	Volume (Vol.)	Vol./Cap. (V/C)
Chapel Hill Rd	W Cornwallis Rd	W Chapel Hill St	DurCity	Need	Comm	--	V/C ~1; continue monitoring roadway congestion	9,300	2	12,900	13,800	1.1
Chapel Hill St (West)	Kent St	S Durham Freeway	DurCity	--	--	--	Monitor congestion. Restripe additional lanes if needed.	12,000	3	12,900	16,000	1.2
Chapel Hill St (West)	S Durham Freeway	W Ramseur St	DurCity	--	--	--	Monitor congestion. Restripe additional lanes if needed.	14,000	2	11,600	19,300	1.7
Cheek Rd	E Geer St	US 70 E	DurCity	--	Comm	Par	Parallel: Northern Durham Parkway/Alston Av Ext	8,600	2	11,600	15,200	1.3
Club Blvd (West)	N Duke St	N Roxboro St	DurCity	--	Comm	--	Other: Continue to monitor for congestion.	8,600	2	11,600	13,900	1.2
Club Blvd. (East)	Midland Ter	N Roxboro St	DurCity	Need	Comm	--	Other: Delays are expected to be isolated to the N Roxboro intersection. Continue to monitor for congestion.	9,100	2	11,600	12,400	1.1
Club Blvd. (East)	I-85	Midland Ter	DurCity	--	--	Par	Parallel: Northern Durham Pkwy attracts trips.	8,700	2	11,600	15,800	1.4
Club Blvd. (East)	I-85	E Geer St	Dur	--	Comm	--	Additional lanes would impact many residences.	-	2	11,600	15,800	1.4
Cole Mill Rd	Sparger Rd	Umstead Rd	DurCity	Need	--	--	V/C ~1; continue monitoring roadway congestion. Environment: river crossing.	8,900	2	12,400	13,500	1.1
Cornwallis Rd (West)	Erwin Rd	US 15-501	DurCity	--	--	--	Monitor congestion.	3,300	2	15,000	18,600	1.2
Cornwallis Rd (West)	Chapel Hill Rd	US 15-501	DurCity	--	--	--	Monitor congestion. Add turn lanes if needed.	8,800	2	11,600	14,800	1.3
Cornwallis Rd.	University Dr	S Roxboro St	DurCity	--	Comm	--	Additional lanes would impact many residences.	8,600	2	11,600	15,800	1.4
Cornwallis Rd. (East)	NC 55	Future MLK Pkwy	DurCity	Need	--	Par	Parallel: MLK Pkwy Ext	11,000	2	12,700	14,400	1.1
Country Club Rd.	Raleigh St	South Rd	CH	--	Comm	--	Additional lanes would impact many residences.	12,000	2	11,000	17,000	1.6
Dearborn Dr	E Club Blvd	Old Oxford Rd	DurCity	--	Comm	Par	Parallel: Old Oxford Connector/Northern Durham Pkwy	9,400	2	11,600	17,500	1.5
Duke University Rd	Anderson St	Kent St	DurCity	--	--	--	Monitor congestion. Restripe additional lanes if needed.	-	2	11,600	15,300	1.3
Ellis Rd	Moore Dr	NC 147 (Durham Freeway)	Dur	Need	--	--	V/C ~1; continue monitoring roadway congestion	9,000	5	27,800	27,600	1.0
Ellis Rd	Glover Rd	Riddle Rd	DurCity	Need	--	--	V/C ~1; continue monitoring roadway congestion	7,100	2	14,600	16,200	1.1
Ephesus Church Rd	Fordham Blvd	Pope Rd	Dur, CH	--	Comm	Par	Parallel: US 15-501 (Fordham Blvd)	9,200	2	11,600	20,600	1.8
Ephesus Church Rd	Farrington Rd	Pope Rd	DurCity	Need	--	Par	Parallel: US 15-501 (Fordham Blvd)	5,900	3	14,000	15,600	1.1
Estes Dr.	MLK Jr Blvd	E Franklin St	CH	--	Comm	--	Lane additions negatively impact residential community. Other: Sidewalks and bike lanes are preferred	15,000	2	11,600	22,600	2.0
Eubanks Rd	Rogers Rd	Mill House Rd	Carr	Need	--	--	Monitor congestion.	6,200	2	12,400	12,700	1.0
Farrington Rd	Farrington Mill Rd	Stagecoach Rd	Dur	--	--	--	Other (Environment): Wetlands and ACOE property.	12,000	2	11,600	18,500	1.6
Farrington Rd	NC 54	Falconbridge Ext	DurCity, Dur	--	--	Par	Parallel: Falconbridge Ext/Southwest Durham Dr	11,000	2	12,700	23,200	1.8
Fayetteville St	E Cornwallis Rd	Riddle Rd	DurCity	--	--	Par	Parallel: S Roxboro Extension	19,000	4	25,500	29,000	1.1
Fayetteville St	Nelson St	E Lawson St	DurCity	--	Comm	Par	Parallel: S Roxboro St Ext	13,000	2	11,600	18,500	1.6
Fayetteville St	Umstead St	E Lawson St	DurCity	--	Comm	Par	Parallel: S Roxboro Extension	17,000	2	11,600	24,500	2.1

Unaddressed Deficiencies

Roadway Name	Location			Reasons for No Recommended Improvements				Existing			2040	
	From	To	Jurisdiction	Need	Comm	Parallel	Notes	Current Count	No. of Lanes	Capacity (Cap.)	Volume (Vol.)	Vol./Cap. (V/C)
Fletchers Ch Rd/Burton Rd	Patterson Rd	E Geer St	DurCity, Dur	Need	--	Par	Parallel: Northern Durham Parkway	6,200	2	12,400	13,900	1.1
Franklin St (East)	N Columbia St	Raleigh St	CH	Need	Comm	--	V/C ~1; continue monitoring roadway congestion	14,000	4	22,100	22,500	1.0
Franklin St (East)	Deming	Raleigh St	CH	Need	Comm	--	V/C ~1; continue monitoring roadway congestion	16,000	4	22,200	23,700	1.1
Globe Rd	Wake County Line	Page Rd	Dur	Need	--	Par	Parallel: Aviation Parkway	8,900	2	14,000	15,400	1.1
Herndon Rd	Barbee Road	Rossford Ln	DurCity	Need	Comm	--	V/C ~1; continue monitoring roadway congestion	6,300	2	11,600	11,700	1.0
Hillandale Rd	W Carver St	I-85	DurCity	--	Comm	--	Additional lanes would impact many buildings.	23,000	4	31,600	42,900	1.4
Hillsborough St	MLK Jr Blvd	E Franklin St	CH	Need	Comm	Par	Parallel: Transit investments on MLK Blvd	6,800	2	10,000	11,100	1.1
Horton Rd	Guess Rd	N Roxboro St	DurCity	--	--	--	Monitor congestion. Flows well w/o signals.	13,000	2	14,000	18,800	1.3
Infinity Rd	N Roxboro Road (US 501 N)	Snow Hill Rd	DurCity, Dur	--	--	--	Monitor congestion.	7,800	2	11,600	13,400	1.2
Jones Ferry Rd.	NC 54	Old Greensboro Rd	OR, Carr	--	--	--	Other: Continue to monitor for congestion; Environment: watershed area.	11,000	2	12,400	15,300	1.2
Jones Ferry Rd.	W Main St	NC 54	Carr	Need	Comm	--	Other: Biking and walking have high priority given apartments and students.	8,600	2	11,600	12,100	1.0
Lawson St (East)	Fayetteville St	S Alston Ave (NC 55)	DurCity	--	--	--	Monitor congestion. Prefer bike and ped improvements.	7,908	2	11,000	16,100	1.5
Leesville Rd	US 70	Shady Grove Rd	DurCity, Dur	--	--	Par	Parallel: NDP/Brier Cr Ext/T.W. Alexander Ext	4,100	2	12,400	15,900	1.3
Legion Rd	Ephesus Church Rd	US 15-501	CH	Need	--	Par	Parallel: US 15-501 (Fordham Blvd.)	5,200	CH	11,600	11,800	1.0
Main St (West)	S Greensboro St	Jones Ferry Rd	Carr	--	Comm	--	Additional lanes would impact old commercial buildings.	14,000	2	11,300	18,900	1.7
Main St (East)	S Greensboro St	Weaver St	Carr	Need	Comm	--	V/C ~1; continue monitoring roadway congestion	8,600	2	11,300	11,700	1.0
Main St (East)	Weaver St	W Rosemary St	Carr	0	0	0		17,000	4	22,100	23,200	1.1
Main St (East)	W Rosemary St	Merritt Mill Rd.	CH, Carr	Need	Comm	--	V/C ~1; continue monitoring roadway congestion	10,500	2	11,300	13,300	1.2
Miami Blvd (South)	E Cornwallis Rd	I-40	DurCity	--	--	Par	Parallel: NC 147 improvements.	27,000	4	43,600	51,000	1.2
Mineral Springs Rd (South)	Northern Durham Pkwy	Pleasant Dr	DurCity, Dur	--	--	Par	Parallel: Northern Durham Parkway	10,000	2	11,600	14,000	1.2
MLK Parkway	Archdale	Hope Valley Rd	DurCity	--	--	Par	Parallel: S Roxboro St Ext	-	4	36,600	52,600	1.4
Morreene Rd	US 15-501	Neal Rd	DurCity	Need	--	--	Other: Continue to monitor for congestion.	9,400	2	11,600	12,700	1.1
Morreene Rd	Campus Walk	US 15-501	DurCity	Need	--	--	Other: Development at interchange might need to provided improvements.	10,200	2	12,900	14,000	1.1
Mt. Moriah Rd	Old Chapel Hill Rd	US 15-501	DurCity	--	--	Par	Parallel: Southwest Durham Drive	5,400	2	11,600	14,100	1.2
Mt. Moriah Rd	Erwin Rd	US 15-501	OR	Need	--	Par	Parallel: Southwest Durham Drive	5,100	2	11,600	13,400	1.2
Old Chapel Hill Rd.	Garrett Rd	SW Durham Pkwy	DurCity	--	--	Par	Parallel: US 15-501 attract trips.	16,000	2	11,600	31,600	2.7
Old Fayetteville Rd	Hillsborough Road	NC 54	Carr	--	Comm	--	Other: Biking and pedestrian is high priority given 2 schools and library.	8,700	2	12,900	18,000	1.4
Old Oxford Rd	Hamlin Rd	Snow Hill Rd	DurCity, Dur	--	--	--	Monitor congestion.	7,800	2	12,400	16,400	1.3
Page Rd	S Miami Blvd	Emperor Blvd	DurCity	--	--	Par	Parallel: Triangle Pkwy	16,000	4	36,600	42,400	1.2

Unaddressed Deficiencies

Roadway Name	Location			Reasons for No Recommended Improvements				Existing			2040	
	From	To	Jurisdic-tion	Need	Comm	Paral-lel	Notes	Current Count	No. of Lanes	Capacity (Cap.)	Volume (Vol.)	Vol./Cap. (V/C)
Page Rd	Emperor Blvd	I-40	DurCity	--	--	--	Monitor congestion.	-	4	29,300	42,600	1.5
Raleigh St.	Cameron Ave	Franklin St	CH	--	Comm	Par	Parallel: Transit investments on MLK Blvd/Columbia St	-	2	10,000	17,200	1.7
Red Mill Rd	Old Oxford Hwy	Red Mill Rd realignment	Dur	--	--	Par	Parallel: Northern Durham Parkway	8,900	2	12,400	16,900	1.4
Red Mill Rd	Teknika Pkwy	I-85	Dur	--	--	Par	Parallel: Northern Durham Parkway	8,900	2	12,400	16,900	1.4
Rosemary St (West)	N Columbia St	E Main St	CH, Carr	--	--	--	Additional lanes would take to many structures.	8,700	2	10,000	17,400	1.7
Roxboro St. (South)	E Lawson St	Summit St	DurCity	--	--	--	Monitor congestion. Add turn lanes if needed.	8,300	2	11,600	14,400	1.3
Sherron Rd	S Mineral Springs Rd	US 70	Dur	--	--	--	Other: Continue to monitor for congestion.	18,000	5	31,600	35,000	1.1
Smith Level Rd	Rock Haven Rd	NC 54	Carr	--	--	--	Other: Continue to monitor for congestion.	16,000	3	15,600	22,900	1.5
T. W. Alexander Dr	Presidential Dr	S Miami Blvd	DurCity	Need	--	Par	Parallel: East End Connector/US 70	-	4	36,600	39,200	1.1
Umstead Rd	Bivins Rd	Guess Rd	DurCity	Need	--	--	Other: Continue to monitor for congestion.	8,200	2	12,400	13,100	1.1
University Dr	Garrett Rd	MLK Jr Pkwy	DurCity	--	--	Par	Parallel: US 15-501 freeway conversion.	19,000	2	26,000	29,300	1.1
University Dr	W Cornwallis Rd	Hope Valley Rd	DurCity	--	Comm	Par	Parallel: S Roxboro Ext. US 15-501 Business has excess capacity.	9,700	2	11,600	15,700	1.4
Weaver Dairy Rd.	Kingston Dr	Sunrise Rd	CH	--	Comm	--	Other: Continue to monitor for congestion.	12,000	3	15,600	26,300	1.7
Weaver Dairy Rd.	Sage Rd	Sunrise Rd	CH	--	Comm	--	Other: Continue to monitor for congestion.	11,000	3	15,600	28,700	1.8
Weaver St. (East)	N Greensboro St	E Main St	Carr	Need	Comm	--	V/C ~1; continue monitoring roadway congestion	9,300	2	11,600	12,100	1.1
Whitfield Rd	Erwin Rd	Sunrise Rd	OR	--	--	Par	Parallel: US 15-501.	4,700	2	12,400	16,000	1.3

2.2 2040 MTP Projects not Included in the CTP

Background

In April 2013, the DCHC MPO adopted the 2040 Metropolitan Transportation Plan (MTP) that listed the highway, public transportation, bicycle and pedestrian projects expected to become operational through the year 2040. This federally-mandated, 23 U.S. Code § 134, plan is fiscally-constrained, which means that only projects that can be funded using the expected transportation revenues during that time period can be include in the MTP. The NC General Statute §136-66.2 requires each MPO with the cooperation of the NCDOT to develop a Comprehensive Transportation plan in accordance with 23 U.S. Code § 134 and it may include non-fiscally constrained projects and projects needed beyond the horizon year of the MTP. Thus the MTP is understood as being a subset of the CTP.

The DCHC MPO and NCDOT will update the CTP as needed following the adoption of the next MTP, which will be the 2045 MTP. The CTP would be updated to ensure that the 2045 MTP is a true subset of the CTP.

Purpose

Currently, there are several 2040 MTP projects that are not included in the CTP. Table 10 lists the 2040 MTP highway projects that are not included in the CTP and provides the reasons for not being included.

Table 10: 2040 MTP Highway Projects not included in the CTP

MTP ID	Roadway	From	To	Reasons for not being included in CTP
1	T W Alexander Drive	Cornwallis Road	NC 147	These lane additions were completed after the 2040 MTP was adopted. No further improvements are needed.
12	Cornwallis Road	NC 55	Alexander Drive	The 2040 MTP and CTP agree (i.e., lane additions) except the short segment from NC 55 to the new MLK Parkway extension is not in the CTP. That segment will not be congested when the MLK Parkway extension is operational.
40	Carolina North network	Internal to Carolina North Campus		The plans to develop the Carolina North campus became indefinite in the time period after the 2040 MTP was adopted.
59	Miami Boulevard	Methodist Drive	Angier Ave	These lane additions were completed after the 2040 MTP was adopted. No further improvements are needed.
85	Northern Durham Parkway	Old Oxford Hwy	Roxboro Road	This is a modernization improvement in the 2040 MTP (there are no lane additions) and was designated in the now defunct urban loop legislation. The CTP process did not reveal any future congestion.
77.1	NC 751	S Roxboro Street	NC 54	The 2040 MTP and CTP agree (i.e., lane additions) except the short segment from NC 54 to Woodcroft Parkway. That segment already has a five-lane cross-section and thus the CTP did not indicate there would be future congestion.
77.2	NC 751	NC 54	Renaissance Parkway	The 2040 MTP and CTP agree (i.e., lane additions) except the short segment from SouthPointe Autopark Blvd to Renaissance Pkwy, which crossed I-40. That segment already has four to seven lanes and thus the CTP did not indicate future congestion there.
97	Smith Level Road	Rock Haven Road	NC 54 bypass	The lane addition and improvements were completed after the 2040 MTP was adopted. No further improvements are desired by the Town of Carrboro.
119	Weaver Dairy Road	NC 86	Erwin Road	The lane addition and improvements were completed after the 2040 MTP was adopted. No further improvements are desired by the Town of Chapel Hill.

MTP ID	Roadway	From	To	Reasons for not being included in CTP
200	Eubanks Road	Old NC 86	Millhouse Road	The 2040 MTP and CTP agree (i.e., lane additions) except the segment from Old NC 86 to Rogers Rd. The CTP process did not project congestion on that segment.
231	N Mangum Street (grade separation)	N.C. Railroad tracks		Project does not have local support because of the incompatibility with the planned Durham-Orange Light Rail Transit system, negative impacts to the downtown community, and high projected costs.
232	Corcoran Street (grade separation)	N.C. Railroad tracks		Project does not have local support because of the incompatibility with the planned Durham-Orange Light Rail Transit system, negative impacts to the downtown community, and high projected costs.
241	Estes Drive	MLK Boulevard	E Franklin Street	The 2040 MTP has modernization improvements. These improvements are depicted in the bicycle and pedestrian part of the CTP. The Town of Chapel Hill does not support lane additions in this segment.
243	Old Lystra Road	Mt Carmel Ch Road	Sun Forest Way	This low-density residential street will not experience future development that would cause congestion. This roadway is not in the Triangle Regional Model (TRM) and therefore no traffic projections are available.

2.3 Implementation

The CTP is based on the projected growth for the planning area. It is possible that actual growth patterns will differ from those logically anticipated. As a result, it may be necessary to accelerate or delay the implementation of some recommendations found within this plan. Some portions of the plan may require revisions in order to accommodate unexpected changes in development. Therefore, any changes made to one element of the CTP should be consistent with the other elements.

Initiative for implementing the CTP rests predominately with the policy boards of the Durham-Chapel Hill-Carrboro Metropolitan Transportation Organization (DCHC MPO) and the counties and municipalities within the MPO's planning area, and the citizens within that area, as well. The transportation needs throughout the state exceed available funding, and thus it is imperative that the MPO and local governments aggressively pursue funding for priority projects. The local governments, the MPO and NCDOT should continue to collaborate on the prioritization processes of the MPO and NCDOT to identify funding in the Transportation Improvement Program (TIP) for the projects in this CTP. Refer to Appendix A – Resources and Contacts -- for contact information on NCDOT's Strategic Prioritization Office (SPOT) for prioritization assistance, and on NCDOT's Project Development and Environmental Analysis (PDEA) unit for assistance on funding sources.

Local governments may use the CTP to guide development and protect corridors for the recommended projects. It is critical that NCDOT and local governments coordinate on relevant land development reviews and all transportation projects to ensure proper implementation of the CTP. Local governments and NCDOT share the responsibility for access management and the planning, design and construction of the recommended projects.

Recommended improvements shown on the CTP map represents an agreement of identified transportation deficiencies and potential solutions to address the deficiencies. While the CTP does propose recommended solutions, it may not represent the final location or cross section associated with the improvement. All CTP recommendations are based on high level systems analyses that seek to minimize impacts to the natural and human environment. Prior to implementing projects from the CTP, additional analysis will be necessary to meet the National Environmental Policy Act (NEPA) or the North Carolina (or State) Environmental Policy Act (SEPA) (for more information, see http://www.doa.nc.gov/clearing/faq.aspx). During the NEPA/SEPA process, the specific project location and cross section will be determined based on environmental analysis and public input. This CTP may be used to support transportation decision making and provide transportation planning data in the NEPA/SEPA process.

The MPO updates their Metropolitan Transportation Plan (MTP) every four to five years. This long-range, multimodal plan is a federal requirement and it must be fiscally constrained, which means the expected transportation revenues must cover the

expected transportation expenses. As a result, the MTP is only a subset of the CTP projects. The CTP is not fiscally constrained and after projects progress from the CTP to the MTP, funding is sought for these projects with submittal of the projects to the STIP prioritization process.

2.4 Problem Statements

The following pages contain problem statements for each recommendation, organized by CTP modal element. The information provided in the problem statement is intended to help support decisions made in the NEPA/SEPA process.

See the beginning of Chapter 2 Recommendations for more detail on the DCHC's support of NCDOT's *Complete Streets* policy and concepts, and the use of *Complete Streets* in developing the CTP.

A complete inventory of CTP studied facilities and recommendations for all modes are provided in Appendix C. Many facilities contain recommendations for multiple modes of transportation. These additional modes are referenced in the final column entitled "Other Modes" in the Public Transportation and Rail inventory tables in Appendix C.

The STIP ID numbers and segmentation for projects shown in the following problem statements and in the inventory in Appendix C come from the draft STIP FY 2017-2027, unless otherwise noted. The status of projects in the draft STIP FY 2017-2027 could have changed with State approval, and could still change before Federal approval. The current STIP FY 2016-2025 project status should be used until the STIP FY 2017-2027 is federally approved. Contact the STIP Unit for verification of current project status in the STIP.

a) HIGHWAY

For highway recommendations, refer to Figure 1, Sheets 1 and 2 for the Highway CTP maps. Refer to Appendix C for cross-section recommendations for each project. Refer to Appendix D for typical details of each cross-section, including lane widths and shoulder widths.

A full, minimum or reference problem statement is presented for highway recommendations that are significant projects that are also near term, complex, or a new location project, with full problem statements occurring first. The CTP committee determined which significant projects in their respected areas needed full and minimum problem statements. Near term projects were projects in the first two horizon years for the DCHC MPO 2040 Metropolitan Transportation Plan (2040 MTP) or projects in the current State Transportation Improvement Program (STIP) FY 2016-2025. Complex projects contain managed lane recommendations, synchronized street

recommendations, or complex issues in the corridor requiring a corridor study for development of recommendations. A new location project is a recommended new facility on new alignment.

Full problem statements are denoted by a gray shaded box containing project information. Minimum problem statements are more concise and less detailed than full problem statements, but include all known or readily available information. Reference problem statements are developed for TIP projects where the purpose and need for the project has already been established. Within each problem statement section, the problem statements are ordered starting with the primary routes of Interstates, US routes, NC routes and then other secondary and local roads. Each section is in alphabetical order.

i. HIGHWAY – Full Problem Statements

Note -- The order of listing is: Interstates, US highways, NC routes and then other roadways. Each section is in alphabetical order.

I-40 – Proposed Improvements from I-85 to Wake County **Last updated: 09/20/17**

Local ID: [Draft STIP FY 2017-2027]

- TIP# I-5702 A (US 15-501 to NC 147), managed lanes
- TIP# I-5702 B (NC 147 to Wade Avenue (SR 1728) (Wake County)), managed lanes
- TIP# I-3306 AA (I-85 to NC 86), widening
- TIP# I-3306 AB (NC 86 to Durham/Orange County line), widening
- TIP# I-3306 AC (NC 86 Interchange), improvement
- TIP# I-3306 B (Durham/Orange County line to NC 147), widening – COMPLETE

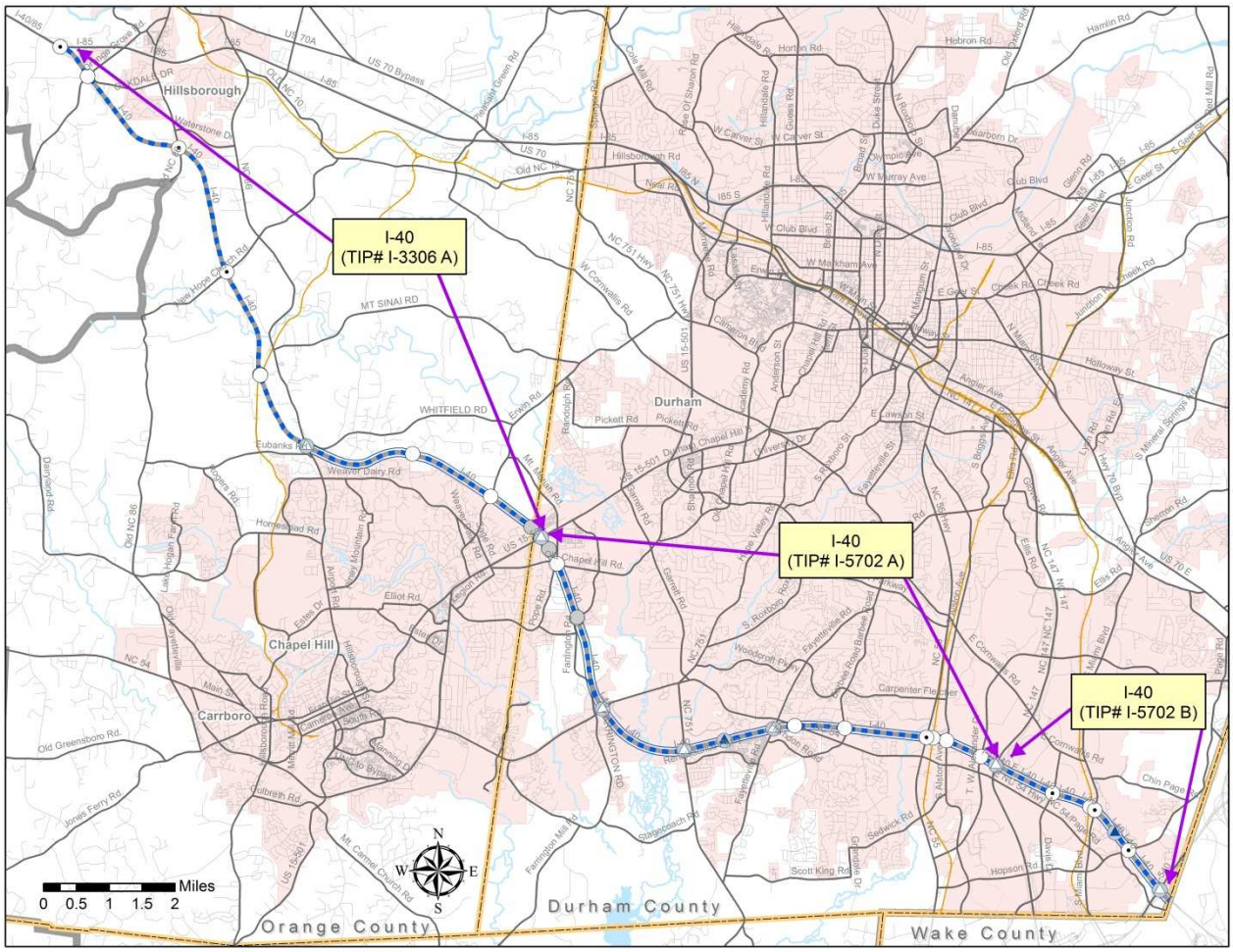

Figure 20

Identified Problem

I-40 in the DCHC MPO area is expected to exceed LOS D capacity by 2040.

Justification of Need

I-40 is the major interstate through the Triangle and is critical for regional mobility. It is utilized for a variety of traffic including national, statewide, regional, and local needs. It also has a great deal of influence on regional traffic patterns, connectivity, land use, economic development, and local streets. Commuters and freight operators depend on reliable travel times on I-40. As the State and the region continue to grow, I-40 is expected to have increased traffic demand and slower travel times.

The right-of-way width and current lane configurations vary along this segment. I-40 in Orange County is currently four lanes, while in the Research Triangle Park there are eight lanes with two auxiliary lanes. The spacing of interchanges also varies considerably along the segment. There are several tightly spaced interchanges in the Research Triangle Park. Transit buses utilize the entire corridor, primarily for express routes between cities. Currently transit buses are able to operate on the shoulder during congested periods when the speeds are below designated thresholds. The future Durham-Orange Light Rail Transit (D-O LRT) is proposed to run parallel to part of I-40 between US 15-501 and NC 54 with three D-O LRT stations located near I-40 at Leigh Village, Gateway Center, and Patterson Place.

In addition, there are bicycle, pedestrian and transit safety and access concerns in this area. There are many housing and employment centers nearby this corridor and I-40 should not be a barrier for bicycle and pedestrian access across the corridor, and for transit service.

The following table shows that I-40 is projected to exceed a LOS D capacity.

Table 11

From	To	Lanes	2015 AADT	Existing Capacity	2040 Volume	2040 V/C	2040 Cross - Section
I-85	Old NC 86 (SR 1009, Hillsborough exit)	4D	58,000	59,900	71,000	1.2	6B
Old NC 86 (SR 1009, Hillsborough exit)	New Hope Church Road (SR 1723)	4D	65,000	59,900	73,000	1.2	6B
New Hope Church Road (SR 1723)	NC 86 (Chapel Hill exit)	4D	68,000	59,900	82,000	1.4	6B
NC 86 (Chapel Hill exit)	US 15-501	4D	73,000	59,900	94,000	1.6	6D
US 15-501	NC 54	6D	90,000	90,700	118,000	1.3	8D
NC 54	NC 751	6D	116,000	90,700	135,000	1.5	10B
NC 751	Fayetteville Road (SR 1118)	6D	115,000	90,700	135,000	1.5	10B

From	To	Lanes	2015 AADT	Existing Capacity	2040 Volume	2040 V/C	2040 Cross - Section
Fayetteville Road (SR 1118)	NC 55	6D	124,000	90,700	141,000	1.6	10B
NC 55	NC 147	6D	128,000	90,700	146,000	1.6	10B
NC 147	Davis Drive (SR 1999)	8D	154,000	121,900	196,300	1.6	12A
Davis Drive (SR 1999)	Miami Boulevard (SR 1959)	8D	161,000	121,900	199,000	1.6	12A
Miami Boulevard (SR 1959)	Page Road (SR 1973)	8D	174,000	121,900	212,000	1.7	12A
Page Road (SR 1973)	I/NC 540 (Wake County)	8D	181,000	121,900	211,000	1.7	12A

Note: In the "Lanes" column, "D" means the facility is "divided" (has a median). In the "2040 Cross-Section" column, the number-letter pair indicates the recommended typical cross-section. See Appendix D for typical cross-section details.

I-40 is a major interstate through the Triangle area. Through traffic as well as inter-regional and inter-city traffic will continue to increase volumes on I-40. The overall increase in population and employment in Orange, Durham, and Wake counties will result in increased demand for travel on I-40. Furthermore, there are many I-40 interchanges that have significant development or redevelopment potential. Old NC 86 (Hillsborough exit), NC 86 (Chapel Hill exit), US 15-501, NC 54, and Fayetteville Road will have nearby population growth. Old NC 86 (Hillsborough exit), NC 86 (Chapel Hill exit), US 15-501, NC 54, Fayetteville Road, NC 55, and all interchanges in the Research Triangle Park are expected to have nearby employment growth.

There are functionally obsolete bridges at Sunrise Lane (SR 1732), Erwin Road (SR 1734), US 15-501, Barbee Road, and I-540.

Community Vision and Problem History

I-40 is envisioned to continue to be the major interstate corridor through the Triangle area. It primarily serves national, statewide, and regional traffic demand. As the region grows, travel times on I-40 are anticipated to increase. In order to maintain economic growth and quality of life in the Triangle, capacity improvements are needed as well as a way to maintain travel times.

The recommendation is envisioned to include: two additional general purpose lanes in Orange County from I-85 to NC 86 (Chapel Hill exit), two to four additional managed lanes from NC 86 (Chapel Hill exit) to Wake County. It is recommended that the proposed managed lanes include direct access ramps at existing or new interchanges depending on conditions. These managed lanes should be constructed to accommodate and facilitate use by transit buses, especially to access the nearby D-O LRT stations and any transfer centers. Overall, the community vision for I-40 is to use a combination of general purpose widening as well as managed lanes and complementary transit improvements to ensure that commuters and freight operators have more reliable travel times as well as alternatives to driving through the I-40

corridor. The envisioned improvements should help address many transportation needs along I-40, even if LOS D is not achievable in the future for all users at all times.

The recommendation is envisioned to include safety improvements, especially at interchanges and merge locations. All interchanges, intersections and bridges should consider bicycle and pedestrian facilities consistent with adopted plans or current safety standards.

CTP Project Proposal

Project Description and Overview

The project recommendation is to widen I-40 from I-85 to NC 86 (Chapel Hill exit) to six general purpose lanes. From NC 86 (Chapel Hill exit) to US 15-501, the project recommends widening I-40 by adding two managed lanes. From US 15-501 to NC 54, I-40 is recommended to be widened to include two managed lanes in addition to the existing six general purpose lanes. From NC 54 to NC 147, I-40 is recommended to be widened to include two to four managed lanes and zero to two general purpose lanes in addition to the existing six general purpose lanes. From NC 147 into Wake County, the project is recommended to include four managed lanes and eight general purpose lanes. The project also recommends some interchange ramp reconfigurations to improve safety, capacity, and access. Interchange improvements identified in the CTP include: NC 86 (Chapel Hill exit); US 15-501; NC 54; Fayetteville Road; NC 147, and I/NC540. The segments with managed lanes should consider new access ramps for these facilities. Access ramps for managed lanes are most critical at the highest demand interchanges such as US 15-501, NC 54, Fayetteville Road, NC 147, Miami Boulevard, and I/NC 540. Bridges, overpasses, underpasses, and interchanges should consider bicycle and pedestrian facilities to safely cross I-40.

Natural and Human Environment Context

I-40 is a major transportation corridor with a wide footprint that is proposed to get even larger with the proposed improvements. Run-off from the roadway is a major environmental concern. In addition, the required grading and hydrological structures with any widening improvements would be significant.

I-40 crosses numerous creeks and streams from I-85 to Wake County. The most significant watersheds that are affected are the Eno River, New Hope Creek, Northeast Creek, and Stirrup Iron Creek watersheds. I-40 is within the protected watershed for Jordan Lake. There is a major stream crossing of New Hope Creek between the NC 54 and NC 751 interchanges that includes land owned by the U.S. Army Corps of Engineers.

The development context of I-40 includes rural and suburban areas. Orange County has a rural buffer in between Hillsborough and Chapel Hill along I-40. From NC 86

(Chapel Hill exit) to the east, I-40 has mostly suburban type development with major commercial areas, residential, and the Research Triangle Park. Durham maintains a Major Transportation Corridor buffer which prohibits development around I-40. This should limit the amount of impacts to the human environment for the proposed improvements.

Schools directly adjacent to the I-40 corridor include Cedar Ridge High School, Grady Brown Elementary School, and Lowe's Grove Middle School. Recreational facilities adjacent to the I-40 corridor include Leigh Farm Park in Durham County (located north of NC 54 and east of I-40) and Orange County's Blackwood Farm Park (located north of New Hope Church Road between I-40 and NC 86. The Blackwood Farm Park is a historic farm purchased by Orange County for use as a low impact park. The park has an adopted master plan.

Relationship to Land Use

This is a very long segment that has a variety of land uses along the length. This includes the suburban type development in the town of Hillsborough, the rural buffer in Orange County, more suburban development in Chapel Hill and Durham, and the Research Triangle Park.

Population growth is expected in Hillsborough, NC 86, from US 15-501 to NC 54, and in the areas west and east of the Research Triangle Park. Employment growth is focused near the Old NC 86 (Hillsborough exit) interchange near Hillsborough, NC 86 (Chapel Hill exit) interchange, US 15-501 interchange, NC 54 interchange, Fayetteville Road interchange, and all of the area in the Research Triangle Park from NC 55 into Wake County.

Regional population and employment growth will affect congestion on I-40. Both population and employment are forecasted to grow at about a 1.5% annual rate.

Linkages to Other Plans and Proposed Project History

Development of this project should be coordinated with the following plans:

- The DCHC MPO, CAMPO and NCDOT began the Triangle Tolling Study in late 2016. The study is scheduled to be complete in 2018.
- Durham-Orange Light Rail Transit (D-O LRT) *Final Environmental Impact Statement/Record of Decision*, 2016
- *Durham Trails and Greenways Master Plan*, 2011
- *Durham Comprehensive Bicycle Transportation Plan*, 2006
- *DurhamWalks! Pedestrian Plan*, 2006
- DCHC MPO *2040 Metropolitan Transportation Plan*, 2013
- *DCHC MPO Mobility Report Card*, 2015

Managed lanes, other than the NC 147/540 (Triangle Expressway) toll facility, are not currently utilized in the Triangle area. NCDOT completed a feasibility study, TIP# FS-

1205 A, for the construction of managed lanes on I-40 in 2016. Future revenue and financing studies as well as more detailed design, construction, and the NEPA analyses are necessary to fully understand this type of project.

NCDOT conducted a NEPA study for the widening of I-40 from I-85 to US 15-501, TIP# I-3306 A, in Orange County. However, due to lack of funding in the TIP, further development of this project has stalled.

NCDOT is currently constructing a bicycle and pedestrian project, TIP# EB-4707, on Old Durham-Chapel Hill Road (SR 2220/SR 1838) across I-40.

Multimodal Considerations

According to the *2013 American Community Survey*, Orange County has a Commute to Work share by public transportation rate of 7.5%, the highest in the State, and Durham County's share is 3.6%, the second highest in the State. Public Transportation is important for the two counties, and I-40 improvements, as the regional spine, should also consider public transit accommodations. Several bus routes use I-40 for regional service. I-40 in Durham County currently is part of the Bus on Shoulder System (BOSS). The I-40 project should to accommodate and improve bus transit service using the corridor. If transit buses were able to use the recommended managed lanes at no cost, the on-time reliability of these routes could improve.

The D-O LRT project is immediately adjacent to the I-40 corridor in between US 15-501 and NC 54. There are three nearby stations: Patterson Place, Gateway, and Leigh Village. All of these stations are anticipated to have park-and-ride lots and bus transfers. The I-40 project could accommodate a quick and convenient access to these transit stations. The managed lanes access points should be convenient to these stations.

Bicycle and pedestrian access across I-40 is imperative. I-40 is a major barrier for bicycle and pedestrian traffic. I-40 interchanges and intersections are often some of the busiest, high volume, and inhospitable roads for bicyclists and pedestrians. For example, NC 86 (Chapel Hill exit), US 15-501, NC 54, NC 751, Fayetteville Road, NC 55, Miami Boulevard, etc. are all multi-lane, high traffic streets that are very dangerous for bicyclists and pedestrians. Separated bicycle facilities should be considered on these routes similar to the American Tobacco Trail bridge in addition to the recommended Multi-use Path Grade Separations crossing I-40 listed in Appendix C. The generally lower volume grade separations along I-40 such as Sunrise Road, Erwin Road, Old Durham-Chapel Hill Road, Farrington Road, Barbee Road, Alston Avenue (SR 1945), etc. may be suitable for on-road bicycle facilities and sidewalks. Adequate space should be provided to allow for these facilities.

The *2006 DurhamWalks! Pedestrian Plan* recommends priority sidewalks on US 15-501, Old Durham-Chapel Hill Road, NC 751, Fayetteville Road, NC 54, Barbee Road, NC 55, and Alston Avenue. See Appendix I for local sidewalk policies.

The *2006 Durham Comprehensive Bicycle Transportation Plan* recommends a sidepath on US 15-501. The plan recommends bike lanes on Old Durham-Chapel Hill Road, Farrington Road, NC 54 (interchange), NC 751, Fayetteville Road, NC 54 (underpass), Barbee Road, NC 55, South Alston Avenue, T W Alexander Drive (SR 2028), Davis Drive, Miami Boulevard, and Page Road. The plan recommends a greenway parallel to the D-O LRT project as it crosses over I-40 and runs parallel to I-40, a greenway parallel to I-40 on both the north and south sides between NC 751 and Crooked Creek, a greenway along Crooked Creek, a greenway along Northeast Creek between Barbee Road and NC 55, and a greenway between NC 147 and Davis Drive. Space to accommodate these recommended greenways should be considered with the I-40 project.

The *2011 Durham Trails and Greenways Master Plan* recommends a street trail on Farrington Road over I-40, Crooked Creek Trail under I-40, trail along T W Alexander Drive, and a trail along Davis Drive. Space to accommodate these recommended trails should be considered with the I-40 project.

Public/Stakeholder Involvement

During the public comment period, city of Durham staff expressed the desire for a side path along I-40 from US 15-501 to Page Road. A multi-use path separate from I-40 has been added to the corridor recommendation. The added multi-use path does not duplicate the D-O LRT and SouthPointe proposed paths that are already in the CTP recommendations.

Also during the public comment period, the North Carolina Wildlife Resources Commission (NCWRC) commented on the impacts of road widening projects on the fragmentation of wildlife habitats. The recommended I-40 road widening project between New Hope Church Road and US 15-501 will likely impact Natural Heritage Natural Areas and the NCWRC recommends avoiding the widening where it intersects these important natural areas. Additionally, when widening cannot be avoided, the NCWRC requires NCDOT to consider building wildlife crossing structures where land is permanently conserved on either side of the road widening to reduce habitat fragmentation. See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

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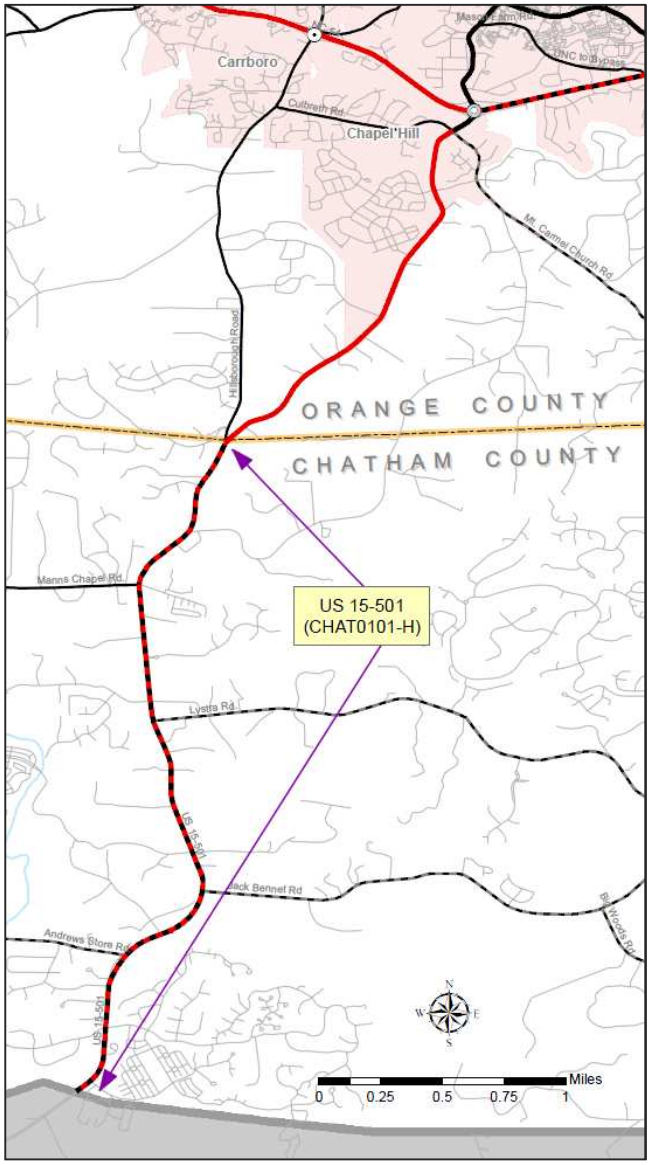
US 15-501 – Proposed Improvements from US 64 Bypass to Smith Level Road (SR 1919) **Last Updated: 09/20/17**

Local ID: CHAT0101-H (Weathersfield Road to Smith Level Road (SR 1919))

Figure 21



Identified Problem

The US 15-501 highway corridor is expected to exceed LOS D capacity by 2040.

The corridor's Average Annual Daily Traffic (AADT) count for 2015 ranges from 15,000 to 30,000 vpd and is expected to increase with future approved developments along the corridor.

This corridor, from the NC 54 ramp in Chapel Hill to the US 64 Bypass in Pittsboro, is functionally classified as a north-south principal arterial. The corridor serves as the primary corridor for inter-county travel demands between Chatham and Orange Counties on the west side of Jordan Lake and has recently seen an increase in retail and residential development serving individuals working in nearby commercial, high-tech, medical, and research centers.

CTP Project Proposal

Access management and synchronized street improvements would help maintain an acceptable level of service along the high volume corridor as detailed in the *US 15-501 Corridor Study Traffic Analysis Report* completed in 2014. The intersections with Andrew's Store Road (SR 1528) and Taylor Road (SR 1529) are already undergoing conversion to synchronized streets as a part of the driveway permit requirement for the Briar Chapel development. The work is being constructed by Briar Chapel to State standards, but the records and reports are being reviewed by the Chatham Planning Department to ensure quality.

Continued evaluation of this corridor is needed in future years as the Town of Pittsboro grows and approved developments are constructed.

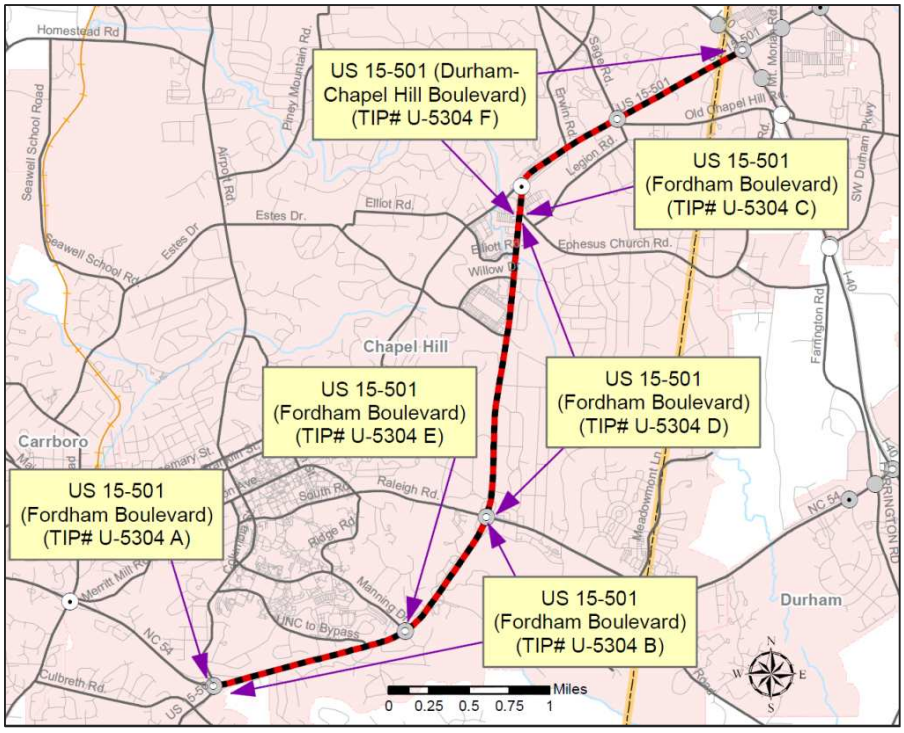
For more information regarding the *2014 US 15-501 Corridor Study* or current projects ongoing in the corridor contact the NCDOT Highway Division 8 office.

US 15-501 (Fordham Boulevard) – Proposed Improvements from NC 86 (South Columbia Street) to I-40 **Last Updated: 09/20/17**

Local ID: [Draft STIP FY 2017-2027]

- TIP# U-5304 A (NC 86 (South Columbia Street) Interchange), improvements
- TIP# U-5304 B (NC 86 (South Columbia Street) to NC 54 (Raleigh Road)), upgrade corridor
- TIP# U-5304 C (Ephesus Church Road (SR 1742) Intersection), improvements (work completed under TIP# U-5550)
- TIP# U-5304 D (NC 54 (Raleigh Road) to Ephesus Church Road (SR 1742)), upgrade corridor
- TIP# U-5304 E (Manning Drive (SR 1902) Intersection), convert to interchange
- TIP# U-5304 F (Ephesus Church Road (SR 1742) to I-40), upgrade corridor

Figure 22



Identified Problem

US 15-501 is projected to exceed LOS D capacity by the year 2040. In addition, it does not provide adequate pedestrian, bicycle, and transit facilities, and has an interchange that does not meet design standards.

US 15-501 (Fordham Boulevard), from NC 86 (South Columbia Street) to Ephesus Church Road (SR 1742), is currently a four lane divided statewide boulevard.

Justification of Need

This section of US 15-501 currently has a 200-foot right-of-way and a raised grassy median. The section has a LOS “D” capacity of 36,600 vehicles per day (vpd) for the existing right-of-way, and is broken down into four smaller segments, each with a separate calculated traffic impact.

Table 12

From	To	Lanes	2015 AADT	Existing Capacity	2040 Volume	2040 V/C	2040 Cross-Section
NC 86 (South Columbia Street)	Manning Drive	4D	45,000	36,600	43,500	1.2	6F
Manning Drive	Raleigh Road (SR 2048)	4D	54,000	36,600	57,800	1.6	6F
Raleigh Road (SR 2048)	East Franklin Street (SR 1010)	4D	30,000 – 37,000	36,600	37,100	1.0	6F
East Franklin Street (SR 1010)	I-40	4D	42,000 – 48,000	36,600	46,700	1.3	4G

Note: In the "Lanes" column, "D" means the facility is "divided" (has a median). In the "2040 Cross-Section" column, the number-letter pair indicates the recommended typical cross-section. See Appendix D for typical cross-section details.

There are many residential units, shops, offices, University Mall, Eastgate Shopping Center, and the University of North Carolina near to this stretch of US 15-501. The traffic volumes on US 15-501 will continue to increase, not only because of the trips generated by the neighboring developments, but because US 15-501 serves as a critical connector between Chapel Hill, Durham, and the rest of the Triangle via I-40.

The current and future development around the US 15-501/NC 54 interchange will likely generate increased bicycle, pedestrian, and transit traffic. There are some paved shoulders and segments of sidewalks on this segment of US 15-501. However, the shoulders and sidewalks are not continuous and additional improvements are needed to provide adequate facilities for bicyclists and pedestrians. The nearby bus stops do not have any amenities nor any bus pull-outs resulting in blocked traffic. The need for pedestrian, bicycle, and transit facilities increases with additional development around US 15-501.

The greatest delays and safety concerns are concentrated among several intersections and interchanges that are identified in the CTP for improvements, including those with: South Columbia Street; Mason Farm Road, Manning Drive, NC 54 (Raleigh Road); Ephesus Church Road and, Sage Road. The DCHC MPO 2014 Mobility Report Card shows that the Manning Drive and Mason Farm Road intersections function at a Level of Service (LOS) F and the Ephesus Church Road intersection at a LOS E during peak times. The functioning level of these intersections should decrease as traffic increases.

CTP Project Proposal

Project Description and Overview

This U-5304 US 15-501 Fordham Boulevard project is scheduled in the draft State Transportation Improvement Program (STIP) FY 2017-2027 for construction as follows:

- Segment A, NC 86 (South Columbia Street): Interchange improvements, future years (Beyond 2027);

- Segment B, NC 86 (South Columbia Street) to NC 54 (Raleigh Rd): Capacity improvements, years 2024-2026;
- Segment C, Ephesus Church Road (SR 1742): Intersection improvements, TIP# U-5550, year 2018;
- Segment D, NC 54 (Raleigh Road) to Ephesus Church Road: Capacity improvements, years 2024-2026;
- Segment E, Manning Drive: Convert at-grade intersection to interchange, years 2024-2026; and
- Segment F, Ephesus Church Road to I-40: Corridor capacity improvements, years 2024-2026.

It is described as being a corridor upgrade with intersection improvements and capacity improvements with sidewalks, wide outside lanes and transit accommodations. The capacity improvements and multimodal accommodations are planned for Segments B and D. Capacity improvements for this project may consider additional travel lanes or synchronized street treatment. Right-of-way and utility funding begins in 2024 in the draft STIP.

Linkages to Other Plans and Proposed Project History

In the Chapel Hill Bike Plan, there are many multi-use paths, sidewalks and bicycle facilities that are on or connected to the US 15-501 corridor. There are proposed wide shoulders from NC 86 to Ephesus Church Road. In the Chapel Hill Pedestrian Facilities Plan, there are proposed off road bicycle/pedestrian paths from around Mason Farm Road to near Old Mason Farm Road, more proposed off road bicycle/pedestrian paths from around Estes Drive to Willow Drive, proposed sidewalks from Ephesus Church Road to Booker Creek, and proposed greenway paths that are planned to cross US 15-501 at Booker Creek, Bolin Creek and the creek near Manning Drive. There are also proposed crossing improvements at US 15-501 and the intersections of Oteys Road, Kings Mill Road, Manning Drive, Old Mason Farm Road (SR 1900), Brandon Road, Cleland Road, Estes Drive (SR 1750), Willow Drive, and Ephesus Church Road.

Public/Stakeholder Involvement

No comments were received specific to this recommended project.

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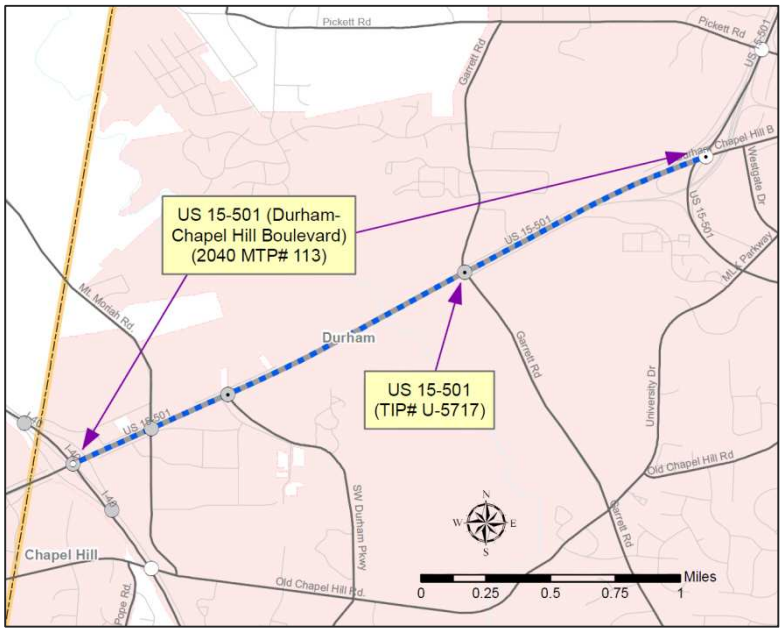
US 15-501 – Proposed Improvements from I-40 to US 15-501 Bypass **Last Updated: 09/20/17**

Local ID: [Draft STIP FY 2017-2027]

- 2040 MTP# 113 (I-40 to US 15-501 Bypass), convert to freeway
- TIP# U-5717 (Garrett Road (SR 1116) intersection), convert to interchange

Figure 23



Identified Problem

The 2040 projected volume on US 15-501 is expected to exceed LOS D capacity. Although this roadway segment was widened from four to six lanes in the last ten years, capacity improvements are needed to ensure that a LOS D or better is maintained in this important corridor in the future.

US 15-501 is the most direct major roadway between the city of Durham and the town of Chapel Hill. Federally Classified as Other Freeway, it provides access between I-40 and Duke University and Medical Center and between I-40 and I-85. Currently, several GoTriangle and GoDurham express and regional bus routes use the roadway and the future Durham-Orange Light Rail Transit (D-O LRT) alignment is proposed parallel to this roadway. A D-O LRT station is recommended near the US 15-501/ Southwest Durham Drive (SR 1110) intersection.

Justification of Need

The US 15-501 corridor is among the most important travel corridors in the Triangle and likely the most important corridor in Durham after the interstates and Durham Freeway. The corridor experiences significant delays at the I-40 interchange, where the 2014 Mobility Report Card shows that interchange operating at LOS E. The three intersections at Mt. Moriah Road, Southwest Durham Drive and Garrett Road operate at LOS C and LOS D currently. Traffic volume is forecasted to steadily increase in this corridor as indicated in the table below. Thus the corridor is projected to experience travel delays without significant capacity improvements.

Table 13

From	To	Lanes	2015 AADT	Existing Capacity	2040 Volume	2040 V/C	2040 Cross-Section
I-40	Garrett Road (SR 1116)	6D	49,000	55,000	67,000	1.2	6A
Garrett Road (SR 1116)	US 15-501 Bypass	6D	52,000	55,000	63,000	1.1	6A

Note: In the "Lanes" column, "D" means the facility is "divided" (has a median). In the "2040 Cross-Section" column, the number-letter pair indicates the recommended typical cross-section. See Appendix D for typical cross-section details.

Safety is a concern in this corridor. The Mobility Report Card indicates that there was a fatality at the US 15-501/Mt. Moriah Road intersection in the last several years and there were several bicycle and pedestrian collisions as well. Given the proximity of residential development, retail centers and employment centers, there is a high demand for pedestrian and bicycle activity. The CTP Deficiency Analysis showed that 2040 forecasted population and employment densities near Garrett Road and along Southwest Durham Drive could generate significant bicycle and pedestrian trips, ranging from 750 to 3,000 trips per day in these areas. The I-40 interchange has a bridge classified as deficient because it is functionally obsolete – this means that the bridge does not meet current standards.

The entire corridor currently has a moderate bus transit frequency, 16 to 30 minute headways, during the peak periods. Go Triangle has an express route on US 15-501 and both Go Durham and Go Triangle have service along a parallel route, Old Durham/Chapel Hill Road (SR 1838/2220), that serves the Patterson Place retail center and the US 15-501/Garrett Road retail area. The CTP Deficiency Analysis showed that the expected demand for transit, based on the projected population and employment density in the adjacent areas, could benefit from 15-minute bus headways in the Mt. Moriah Road (SR 2294) and Southwest Durham Drive area.

Go Triangle is in the process of planning the Durham-Orange Light Rail Transit (D-O LRT) that will parallel the US 15-501 corridor from I-40 to the US 15-501 Bypass. The D-O LRT is intended to carry passengers traveling between Durham and Chapel Hill and provide a transit link to the park-and-ride facilities used by regional commuters. The D-O LRT Alternatives Analysis estimates approximately 23,000 passengers using the system each day. Although the D-O LRT will attract commuters who might have otherwise operated a vehicle on US 15-501, the light rail facility will attract commuter vehicles to the roadway to access the park-and-ride facilities at the light rail stations.

Community Vision and Problem History

The capacity deficiencies and safety problems have been well vetted with the community through several long-range plans, a corridor study, a major investment study and a collector street plan. The DCHC MPO has planned for capacity, safety, bicycle and pedestrian and transit improvements in the long-range plans completed over the last few decades and worked to get those projects in the Transportation Improvement Program (TIP). In a previous prioritization process, i.e., SPOT 3.0, the MPO submitted the freeway upgrade of this corridor and the interchange projects at I-40, Southwest

Durham Drive and Garrett Road – these projects proved to be fairly competitive. Go Triangle has conducted workshops to gather citizen comments on the proposed D-O LRT. There were four alignment alternatives along this section of US 15-501 that attracted considerable input from business owners near the Garrett Road intersection and environmental interests associated with New Hope Creek. All of these processes included public hearings, as well. The community wants to address the automobile and transit capacity problems of the corridor, but they also want to improve the bicycle and pedestrian facilities in the corridor. The inclusion of alternative transportation modes is an important goal of the DCHC MPO.

CTP Project Proposal

Project Description and Overview

The project proposes to make this section of US 15-501 into a controlled access freeway to increase the roadway capacity. Given the existing median and relatively few access points, the freeway conversion mostly requires an improvement of the I-40 interchange and the conversion of the Southwest Durham Drive and Garrett Road intersections into interchanges. Also, the Mt. Moriah Road intersection is recommended to be converted to a grade separated overpass. Facilities are recommended to allow pedestrians to safely cross US 15-501 and the intersecting roadways, e.g., Southwest Durham Drive, and bus stop accommodations such as shelters and bus pullouts might be needed nearby on the intersecting roadways. Planned pedestrian and bicycle facilities along Old Chapel Hill Road offer alternative transportation modes along a parallel roadway that has lower vehicle travel speeds and volume.

The draft STIP FY 2017-2027 has identified the right-of-way and construction of the Garrett Road/US 15-501 interchange to begin in FY 2019 and FY 2020, respectively. Considering the NCDOT prioritization process and the 2015 changes to transportation funding by the North Carolina General Assembly (i.e., funding increase), the build date for this interchange could move forward or backwards.

Natural and Human Environment Context

New Hope Creek crosses the section between Southwest Durham Drive and Garrett Road and Sandy Creek crosses the section immediately west of the US 15-501 Bypass interchange. There are wetlands and floodplains on both sides of these creeks, however, Army Corps of Engineering (ACOE) lands are not present (ACOE land reaches from the south but stops about 2,500 feet south of US 15-501).

During the design phase of the previous US 15-501 widening (from four to six lanes), environmental and recreational interests demanded, and eventually received, an extended bridge span on the US 15-501 to make animal and human movement easier along a trail on New Hope Creek. The New Hope Preserve is on both the north and south side of US 15-501 and the creek trail connects these sections. There is a

maintained trail loop in the so-called bottomlands that are immediately south of this section of US 15-501. Sandy Creek Park, which is north the of the roadway section that is immediately west of the US 15-501 Bypass interchange, has a trail and multi-use path.

Possible impacts and mitigation measures related to these wetlands and creeks will be addressed at the environmental impact analysis stage of project development.

Relationship to Land Use

Currently, the land use in the vicinity of this corridor is suburban. There are regional retail centers in the northeast and southeast quadrants of the I-40 interchange, including some medical office and hotel development and several large apartment complexes in the southeast quadrant. The Garrett Road intersection area has medium-scaled retail, including at least two new car dealers, and some apartment development. The 2040 socioeconomic (SE Data) projection indicates that a large amount of employment and residential growth will likely occur at both ends of this roadway segment, i.e., adjacent to the I-40 interchange and in the east side of the US 15-501 Bypass interchange. This projected growth is related to the planned light rail transit stations and other transit oriented development in those areas. This growth will add to the many trips that already traverse the corridor between Durham and Chapel Hill, and between I-40 and I-85.

Linkages to Other Plans and Proposed Project History

Many studies have been focused in whole, or part, on the US 15-501 corridor. The following studies have important deficiency and project proposal information:

- *US 15-501 Corridor Master Plan*, 1994, designates intersections at Southwest Durham Drive and Garrett Road, and two east/west collector roads that cross I-40 north and south of the interchange.
- *Southwest Durham/Southeast Chapel Hill Collector Street Plan*, 2008, includes the collector roads from the 1994 Master Plan.
- *Major Investment Study* (MIS), Phase I in 1998 and Phase II in 2001, evaluates several potential transit technologies and alignments.
- *DCHC MPOs 2014 Mobility Report Card*, 2015, addresses roadway, intersections and non-auto travel.
- *Final Environmental Impact Statement* (FEIS) for the Durham-Orange Light Rail Transit, 2016, addresses rail alignment and station location.
- *2040 Metropolitan Transportation Plan* (MTP) for the DCHC MPO, 2013, has the freeway conversion, light rail and related projects.

The 2040 MTP has the following proposed projects and policies that impact the US 15-501 corridor. Projects funded in the Draft State Transportation Improvement Program (STIP) FY 2017-2027 are shown in **bold font**.

- I-40, from I-440 (Wake County) to NC 86 (Orange County), 2040 MTP# 43, 45, 45.2, capacity improvements which might be managed lanes

- **Garrett Road/US 15-501 interchange, TIP# U-5717**, funding begins in FY 2019 for right-of-way and 2020 for construction in the Draft FY 2017-2027 STIP
- **US 15-501, from South Columbia Street (NC 86) to I-40, TIP# U-5304**, capacity improvements that might consider additional travel lanes or synchronized streets – Right-of-way and utilities funding begins in 2024 in the draft FY 2017-2027 STIP
- US 15-501 Bypass, from US 15-501 interchange (former South Square area) to NC 751 (Cameron Boulevard), 2040 MTP# 114, widened from four to six lanes
- Southwest Durham Drive, 2040 MTP# 104, 106, 106.1, new alignment from US 15-501 to Mt. Moriah Road, and widened to four lanes from Witherspoon Boulevard to Old Chapel Hill Road
- **Durham-Orange Light Rail Transit (D-O LRT) , TIP# TE-5205**, note that the preferred rail alignment changed in 2015 from the original alignment that created a new crossing of New Hope Creek to one that parallels US 15-501 between Southwest Durham Drive and Garrett Road
- **Old Chapel Hill-Durham Road, from US 15-501 to Garrett Road, TIP# EB-4707,** bicycle, pedestrian and transit facility improvements, and a proposed roundabout – funded in the FY 2017-2027 STIP as EB-4707A and EB-4707B
- See policy disclaimers in Chapter 2, page 2-1.

Multimodal Considerations

There are bicycle and pedestrian accommodation needs in this area. There are apartments and houses near the Garrett Road (SR 1116) intersection and along Southwest Durham Drive. The residential development is generating bicycle and walking trips to the nearby retail centers, and people can be seen walking immediately adjacent to US 15-501 as vehicle travel 50 mph or higher, and trying to cross wide, multi-phased intersections and roadway.

This section of US 15-501 currently has a 260-foot right-of-way, two interchanges with ramps, and three signalized intersections. The residential and commercial development around US 15-501 will generate increased bicycle, pedestrian, and transit traffic. New bicycle, pedestrian, and transit facilities should be considered to accommodate the increase. In the Durham *Comprehensive Bicycle Transportation Plan*, side paths have been proposed along this route, in addition to some greenway paths that are near the route and cross US 15-501 in a couple of places.

The CTP transit, bicycle and pedestrian plans have identified several alternative mode projects in, and adjacent to, the US 15-501 corridor. The most important are:

- bicycle and pedestrian access to the D-O LRT stations at Gateway, Patterson Place and MLK Parkway (SR 2733)
- park-and-ride facilities at the stations
- a multi-use path that follows the D-O LRT alignment and US 15-501
- a trail that follows New Hope Creek
- bicycle lanes on Mt Moriah Road, Southwest Durham Drive and Garrett Road

Public/Stakeholder Involvement

With the upgrade of US 15-501 to a freeway facility, there is a desire to separate weaving movements by adequate spacing of the interchanges. The distance between the I-40 interchange and the proposed interchange at Southwest Durham Drive is approximately 0.5 miles. Whereas NCDOT's standard urban freeway interchange minimum spacing is 1 mile. Other proposed interchange separations along this corridor are less than 1 mile: from existing US 15-501 Business interchange to proposed Garrett Road interchange, and from proposed Garrett Road interchange to proposed Southwest Durham Drive interchange.

During the public comment period, adequate access to the proposed Durham-Orange Light Rail station at Patterson Place and preservation of right-of-way for frontage/backage roads for the Patterson Place existing and future development was recommended. Also preservation of the footprint for a grade separation was recommended for a new road crossing of US 15-501. To create adequate access and connectivity Danziger Drive was added with a connection to Sayward Drive with recommended improvements. Also, to improve connectivity of existing and future development Sayward Drive was extended on new location and extended across US 15-501 as a grade separation. New Hope Commons was extended east of Mt Moriah Road with a new location extension to the added grade separation of US 15-501.

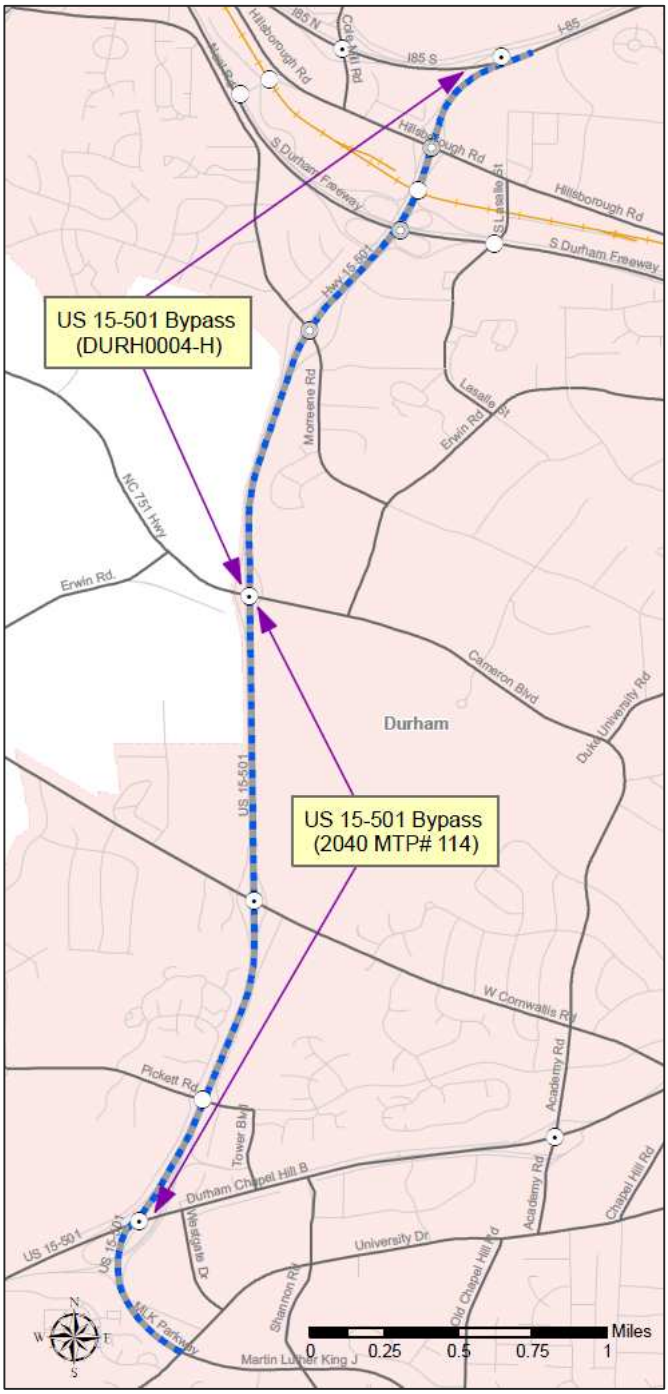
The DCHC MPO in coordination with the local governments and NCDOT plan to conduct a upcoming corridor study for the US 15-501 corridor between I-40 and US 15-501 Business to evaluate the upgrade of US 15-501 to a freeway, including access, connectivity and spacing of interchanges.

US 15-501 Bypass – Proposed Improvements from US 15-501 Business to I-85 **Last Updated: 09/20/17**

Local ID:

- 2040 MTP# 114 (Pickett Road (SR 1303) to NC 751 (Cameron Boulevard)), widening
- DURH0004-H (NC 751 (Cameron Boulevard) to I-85)

Figure 24



Identified Problem

The 2040 forecasted volumes for US 15-501 Bypass are projected to exceed LOS D capacity.

US 15-501 Bypass is a controlled access freeway between US 15-501 Business (Durham-Chapel Hill Boulevard) and I-85. This is a segment of US 15-501 which is the major roadway connection between Durham and Chapel Hill and between I-40 and I-85 in southwest Durham. Federally Classified as Other Freeway, it provides access between I-40, the retail areas along US 15-501, and Duke University and Medical Center. Currently, several Go Triangle and Go Durham express and regional bus routes use the roadway and the future Durham-Orange Light Rail Transit (D-O LRT) alignment is proposed to run parallel to this roadway. Two D-O LRT stations are proposed near the US 15-501 Business (Durham-Chapel Hill Boulevard) and Martin Luther King Jr. Parkway interchanges (MLK and South Square Stations), and two D-O LRT stations are proposed near the Morreene Road and NC 147 interchanges (LaSalle and Duke/VA Hospitals Stations).

This section of US 15-501 currently has a 260-foot right-of-way, four traffic lanes, and six interchanges with ramps.

Significant future employment and population growth is forecasted for the Duke University area and the South Square area. The increased residential, institutional, and commercial development around US 15-501 will generate increased trips.

In addition, there are bicycle and pedestrian cross street needs in this area. There are many housing and employment centers nearby this corridor and US 15-501 bypass should not be a barrier for access across the corridor. There are few parallel roadways that provide alternative bicycle and pedestrian access in the north-south direction along this corridor.

Capacity improvements are needed to ensure this segment operates at an acceptable level of service in the future. Safety improvements are needed to improve high crash locations. Bicycle, pedestrian, and transit improvements parallel to the corridor and at interchanges are needed to serve all of the travel demand in the corridor.

Justification of Need

The next table shows the 2040 forecasted volumes for US 15-501 Bypass to exceed existing LOS D capacities.

Table 14

From	To	Lanes	2015 AADT	Existing Capacity	2040 Volume	2040 V/C	2040 Cross-Section
US 15-501 Business	Cornwallis Road (SR 1308)	4D	58,000	61,700	72,000	1.2	6B
Cornwallis Road (SR 1308)	NC 751 (Cameron Boulevard)	4D	58,000	61,700	82,000	1.3	6B
NC 751 (Cameron Boulevard)	Morreene Road (SR 1317)	4D	59,000	61,700	80,000	1.3	6B
Morreene Road (SR 1317)	US 70 Business (Hillsborough Road)	4D	58,000	61,700	85,000	1.4	6B
US 70 Business (Hillsborough Road)	I-85	4D	53,000	61,700	83,000	1.3	6B

Note: In the "Lanes" column, "D" means the facility is "divided" (has a median). In the "2040 Cross-Section" column, the number-letter pair indicates the recommended typical cross-section. See Appendix D for typical cross-section details.

US 15-501 is a regional connector route between I-85 and I-40. As such, the growth projected for northern and southern Durham County could further the need for increased capacity on US 15-501. In addition, significant employment growth is projected for Duke University which could attract commute trips particularly to the NC 751 and Morreene Road (SR 1317) interchanges. The South Square area is also expected to grow as an employment center.

There is a complex series of interchanges from Morreene Road (SR 1317) to I-85. These interchanges include many very tight loops and curves that require speeds as low as 15 miles per hour. Damaged guardrails and tire ruts are a constant sight on these ramps.

The Mobility Report Card reveals that there are crashes on this corridor including one recent fatality. The US 15-501 and US 15-501 Business interchange has been noted as a Potentially Hazardous Section Location due to night crashes.

There are five functionally obsolete bridges along this corridor.

Community Vision and Problem History

US 15-501 is envisioned to continue to be a major transportation corridor in Durham providing access to the employment centers at Duke University, the Duke/VA Hospitals area, and the retail areas near South Square. It will also serve as the freeway linkage between I-40 and I-85 and NC 147 on the west side of the city of Durham. The D-O LRT is proposed to parallel this corridor and serve the employment centers. It is envisioned that the D-O LRT is completed first and diverts some of the current and near-term traffic growth off the roadway, but ultimately the US 15-501 Bypass is projected to need widening to accommodate further growth in vehicle traffic and growth in traffic to destinations not accessible by transit. The conversion of US 15-501 to a freeway between the bypass and I-40 could also contribute to increased growth in traffic and the need for capacity improvements on the bypass.

CTP Project Proposal

Project Description and Overview

The project proposes to widen US 15-501 bypass to six lanes, three in each direction. The widening is mostly envisioned to occur in the median, but some additional auxiliary lanes or widening to the outside may be needed. The interchanges may also require improvements to improve safety and mobility. In particular the collector-distributor system from Morreene Road (SR 1317) to I-85 should be studied for potential safety and mobility improvements. There are many closely spaced ramps and tight curvature ramps along this section, and as a result the CTP has identified the Morreene Road (SR 1317), NC 147 and US 70 Business (Hillsborough Road) interchanges for improvements. Bicycle and pedestrian movements across the corridor and parallel to the corridor need to be improved. Transit accommodations need to be considered as well as potential accessibility improvements for motorists, buses, pedestrians, and bicyclists to the nearby D-O LRT stations.

Natural and Human Environment Context

Sandy Creek runs parallel to US 15-501. South of Cornwallis Road (SR 1308) it runs on the west side, it crosses under US 15-501 just south of Cornwallis Road, then runs on the east side north of Cornwallis Road. The city of Durham's greenway plan includes a trail along Sandy Creek in this area. The city of Durham also operates Sandy Creek Park and Morreene Road Park adjacent to the corridor.

The Durham Housing Authority operates a low-income housing project on Morreene Road adjacent to US 15-501. There are also other residential developments nearby including American Village, Colony Hill, Morreene West Apartments, etc. The project should be sensitive to the impact to environmental justice communities. Noise walls and visual screening need to be evaluated.

Duke University owns a large amount of land on both sides of US 15-501. The Duke University golf course is adjacent to US 15-501 from Cornwallis Road to Cameron Boulevard. In addition, a natural surface greenway trail encircles the golf course. Sensitivity to these popular recreational uses is needed for the proposed project. Duke University uses the land on the west side of US 15-501 for the Duke Lemur Center and as part of Duke Forest, a natural area that is used for both recreational uses and environmental research. Mitigation for impacts to natural areas needs to be evaluated.

Relationship to Land Use

This corridor contains a variety of land uses. There is a suburban commercial center at the southern end, a high rise office building near Pickett Road, conservation/ recreational land at the Duke golf course and Lemur Center, dense multi-family development near Erwin Road/Morreene Road, and strip commercial development near Hillsborough Road.

The future lane use similarly anticipates a variety of uses into the future. Growth is expected to be concentrated near the future Durham-Orange Light Rail Transit stations in the Compact Neighborhood District boundaries. This includes the area along Erwin Road (SR 1320) near Duke Hospitals and the area near South Square. Significant population and employment growth is projected in these areas.

Linkages to Other Plans and Proposed Project History

Development of this project should be coordinated with the following plans:

- Durham-Orange Light Rail Transit (D-O LRT) *Final Environmental Impact Statement/Record of Decision*, 2016
- *Durham Trails and Greenways Master Plan*, 2011
- *Durham Comprehensive Bicycle Transportation Plan*, 2006
- *DurhamWalks! Pedestrian Plan*, 2006
- *DCHC MPO 2040 Metropolitan Transportation Plan*, 2013
- *DCHC MPO Mobility Report Card*, 2015

The city of Durham is developing a bicycle and pedestrian project on Morreene Road from Neal Road (SR 1314) to Erwin Road.

Multimodal Considerations

According to the 2013 American Community Survey, Census Tracts abutting US 15-501 have Commute to Work shares of up to 9.1% for public transportation, 3.5% for bicycle, and 26.1% for walking. The nearby concentration of employment at Duke University and Duke University Medical Center makes these neighborhoods more conducive for non-vehicular commuting.

Buses traveling between Durham and Chapel Hill currently use US 15-501 Bypass. The D-O LRT is proposed to travel parallel to this route which could replace the need for some of the bus service between Durham and Chapel Hill. However, the bypass corridor may be used more in the future for feeder bus service to the nearby D-O LRT stations.

As a controlled access freeway facility, pedestrian and bicycle travel is prohibited on the bypass. However, there is a need for pedestrian and bicycle travel on routes across the bypass. There is also a need for pedestrian and bicycle travel parallel to the freeway on a separated facility. Future development in the South Square and Duke University areas could generate high rates of bicycle and pedestrian trips.

The DurhamWalks! Pedestrian Plan recommends sidewalks on Morreene Road, Cameron Boulevard (NC 751), Cornwallis Road, Pickett Road (SR 1303), and US 15-501 Business.

In the Durham Comprehensive Bicycle Transportation Plan, greenways are proposed parallel to US 15-501 from US 15-501 Business to Hillsborough Road. Bike lanes are proposed for Hillsborough Road, Morreene Road, Cameron Boulevard, Cornwallis Road, and Pickett Road (SR 1303). A sidepath is proposed for US 15-501 Business.

The Trails and Greenways Master Plan recommends an extension of the Sandy Creek Trail from Pickett Road (1303) to Cornwallis Road and a connection along Cornwallis Road under US 15-501 to the Al Buehler Trail.

Public/Stakeholder Involvement

No comments were received specific to this recommended project.

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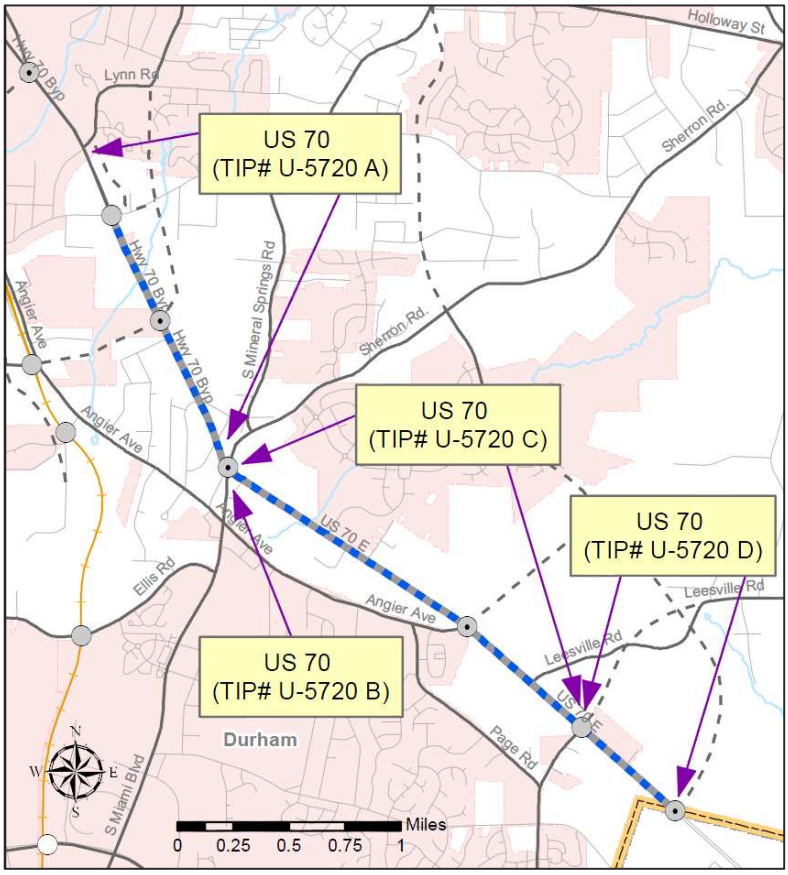
US 70 – Proposed Improvements from Pleasant Drive (SR 1815) to Wake County Line **Last Updated: 09/20/17**

Local ID: [Draft STIP FY 2017-2027]

- TIP# U-5720 A (Lynn Road to Sherron Road (SR 1811)/South Miami Boulevard (SR 1959)), convert to freeway
- TIP# U-5720 B (South Miami Boulevard intersection), convert to interchange
- TIP# U-5720 C (Sherron Road (SR 1811)/South Miami Boulevard (SR 1959) to Page Road Extension (SR 2095)), convert to freeway
- TIP# U-5720 D (Page Road Extension (SR 2095) to west of T.W. Alexander Drive (Wake County)), convert to freeway

Figure 25



Identified Problem

US 70 volumes are projected to exceed a LOS D capacity by 2040.

US 70 is a major route connecting Durham and Raleigh and runs parallel to I-40. The segment of US 70 north of NC 98 is a controlled access freeway and the East End Connector is re-constructing part of US 70 from NC 98 to Pleasant Drive (SR 1815) as a controlled access freeway. With the construction of the East End Connector and growth in eastern Durham County and northern Wake County, traffic demand on US 70 is expected to grow and improvements are needed. In addition, US 70 serves as an alternative for congestion on I-40 for traffic between Durham and Raleigh.

The right-of-way varies from about 100 to 180 feet along the segment. There are many signalized and unsignalized intersections and driveways on the route. From Pleasant Drive to Miami Boulevard, the road is generally a four lane section with a two-way left turn lane, and from Miami Boulevard to the Wake County Line the road is generally a four lane section with a wide center median.

US 70 is used for both inter-regional traffic, as an alternative to I-540, I-40, and NC 147, and to serve local traffic and local businesses. There are many driveways to businesses and residences which are safety concerns. There are very few sidewalks or bike accommodations on US 70. There is some transit bus service but conditions are very poor and unsafe for bus riders accessing stops on foot.

Improvements are recommended to increase capacity, improve safety for motorists, pedestrians, and bicyclists, and to provide better freeway connectivity through the Triangle region.

Justification of Need

The table below shows 2040 projected US 70 volumes exceeding current capacity.

Table 15

From	To	Lanes	2015 AADT	Existing Capacity	2040 Volume	2040 V/C	2040 Cross-Section
Pleasant Drive (SR 1815)	South Miami Boulevard (SR 1959)	5	40,000	36,600	64,000	2.2	6B
South Miami Boulevard (SR 1959)	Wake County	4D	32,000 – 37,000	36,600	49,000	1.3	6B

Note: In the "Lanes" column, "D" means the facility is "divided" (has a median). In the "2040 Cross-Section" column, the number-letter pair indicates the recommended typical cross-section. See Appendix D for typical cross-section details.

The US 70 corridor through eastern Durham County is forecasted to have significant population growth and moderate employment growth. The population growth will increase the demand for US 70 as a transportation corridor to jobs in downtown Durham and the Duke University area. Growth in northern Wake County could also contribute to the travel demand on US 70.

The intersections at Pleasant Drive, Miami Boulevard and Page Road Extension (SR 2095) cause lengthy backups during peak commuting hours, which is expected to grow with increased development.

The intersections of US 70 and Marly Drive (SR 1957) and Peyton Avenue (SR 1957), both near Miami Boulevard have been noted as Potentially Hazardous Intersection Locations due to frontal impact crashes. See the Crashes section of the CTP Deficiency Analysis.

There are functionally obsolete bridges at NC 98 and Norfolk and Western Railroad.

Community Vision and Problem History

US 70 is envisioned to become a six lane access controlled freeway from I-85 in Durham to I-540 Raleigh. This conversion to a freeway facility will increase the roadway

capacity and improve mobility and regional freeway connectivity. Several interchanges are recommended to be constructed along this route to maintain access to major local roadways such as Glover Road Extension (SR 1940), Miami Boulevard, Angier Avenue Extension (SR 1926), and Northern Durham Parkway. Several grade separations are recommended as well to maintain connectivity.

Frontage roads or other access roads will be needed to maintain access to properties and businesses along the corridor with the freeway conversion. In addition, bicycle and pedestrian facilities need to be considered with the project, which may include facilities on these access roads, sidepaths, or greenways in the corridor. As the area grows and more transit-supportive land uses and densities are built, transit accommodations should also be evaluated with the project.

The DCHC MPO, Capital Area MPO and NCDOT began the Triangle Tolling Study in late 2016 and are scheduled to complete the study by 2018. US 70 will be part of the tolling study to ascertain whether or not managed lanes are feasible and logical.

CTP Project Proposal

Project Description and Overview

The proposed project recommends converting and widening US 70 to a six lane freeway with controlled access. Interchanges are recommended at Glover Road Extension, Miami Boulevard, Angier Avenue Extension, and Northern Durham Parkway. Grade separations are recommended at Lynn Road (SR 1921), Pleasant Drive, and Page Road (SR 2095)/Leesville Road Extension (SR 1906). Additional grade separations may be necessary as the area around US 70 continues to grow and develop. Bicycle and pedestrian facilities should be considered on all interchanges and there may be need for a parallel multi-use path along US 70 in segments. Access roads should be considered to ensure access to properties and connectivity between the grade separations and interchanges.

Natural and Human Environment Context

Nearly all of the US 70 corridor in Durham County is within the Falls Lake protected watershed. There are multiple small stream crossings. Much of the corridor is near the ridge line between the Neuse and Cape Fear watersheds.

US 70 crosses through suburban style development from Pleasant Drive to the Wake County Line. There is mostly commercial development, few residential areas, and some undeveloped forested areas along this corridor.

Relationship to Land Use

The US 70 corridor is fully within the suburban development tier for the city of Durham. There is significant opportunity for growth in this area compared to the relatively sparse development that currently exists. Significant population growth is projected for eastern Durham County between US 70 and NC 98. Furthermore, continued employment growth is projected for the nearby Research Triangle Park.

Commercial and industrial future land use is projected immediately adjacent to the corridor with more medium to low density residential development off of the corridor. With the freeway conversion, access roads and an increased surface street network along US 70 may be necessary to provide land access to adjacent parcels. There are many currently industrial land tracts and future industrial developments projected near the US 70 corridor. As a result, these land uses could likely increase the amount of truck traffic on US 70 in the future.

Linkages to Other Plans and Proposed Project History

Development of this project should be coordinated with the following plans:

- The DCHC MPO, CAMPO and NCDOT began the Triangle Tolling Study in late 2016. The study is scheduled to be complete in 2018.
- This project is funded and thus the NEPA planning process began in 2016.
- *Durham Trails and Greenways Master Plan*, 2011
- *Durham Comprehensive Bicycle Transportation Plan*, 2006
- *DurhamWalks! Pedestrian Plan*, 2006
- DCHC MPO *2040 Metropolitan Transportation Plan*, 2013
- *DCHC MPO Mobility Report Card*, 2015

Multimodal Considerations

There is one GoDurham route that uses US 70 today. The land uses and pedestrian access on US 70 is not conducive to public transportation ridership. As eastern Durham County continues to develop, demand for bus service is likely to increase. When US 70 is converted to a controlled access facility, the bus service most likely to use the road will be express routes. BOSS may be desired on US 70 and the shoulder accommodates should be considered.

As a controlled access freeway, US 70 cannot include on-road bicycle and pedestrian facilities, but a separate multi-use path is recommended along the US 70 corridor. However, it is important to consider bicycle and pedestrian access across the facility and along interchanges. Separated facilities should be provided for crossing streets at busy interchange areas. On-street bicycle and pedestrian facilities should be considered at grade separations for crossing streets.

The DurhamWalks! Pedestrian Plan recommends priority sidewalks on Lynn Road. By policy, the plan also recommends the addition of sidewalks on all roads in Durham except in special cases such as along controlled access roads.

The *Durham Comprehensive Bicycle Transportation Plan* recommends a sidepath along US 70 from the Wake County Line to Miami Boulevard and bicycle lanes on US 70 from Miami Boulevard to Lynn Road. Bicycle lanes are not recommended as part of the US 70 recommended freeway conversion. Wide shoulders are recommended for Lynn Road, Pleasant Drive, Sherron Road (SR 1811), and Leesville Road. Bike lanes are recommended for Miami Boulevard, Angier Avenue, and Page Road extension. A greenway is recommended to cross US 70 at Miami Boulevard and in between Leesville Road and Page Road extension.

The *Durham Trails and Greenways Master Plan* does not recommend any greenways parallel or perpendicular to US 70.

Public/Stakeholder Involvement

During the public comment period, city of Durham staff expressed the need for bicycle or multi-use accommodations along US 70 from Pleasant Drive to Wake County. A multi-use path separate from US 70 has been added to the corridor recommendation, from Carr Road to the recommended Northern Durham Parkway, since on-road bicycle accommodations are not allowed on freeway facilities.

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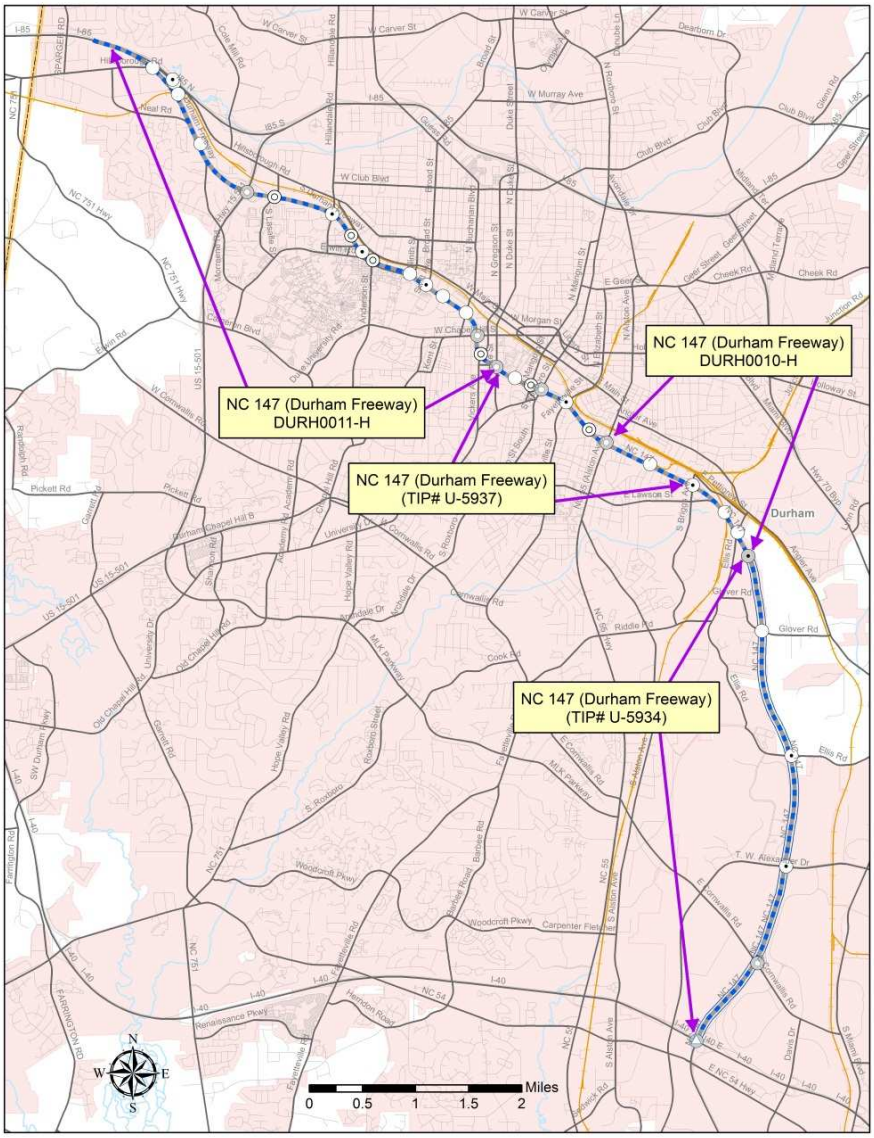
Local ID: [Draft STIP FY 2017-2027]

- DURH0011-H (I-85 to South Duke Street (SR 1445))
- TIP# U-5937 (South Duke Street (SR 1445) to Briggs Avenue), operational improvements and auxiliary lanes
- DURH0010-H (NC 55 (Alston Avenue) to future I-885 (East End Connector))
- TIP# U-5934 (I-40 to future I-885 (East End Connector)), widening

Figure 26



Identified Problem

NC 147, or the Durham Freeway, volumes are projected to exceed a LOS D capacity by 2040 from Cornwallis Road (SR 1121) to Elba Street (SR 2411).

NC 147 is primarily a four-lane freeway from I-85 to I-40. It provides proximate access to several of Durham's top employment centers such as Duke University, downtown Durham, and the Research Triangle Park. It was built in segments with some of the oldest segments through downtown Durham. Currently, the section from Vickers Avenue to South Briggs Avenue experiences backed up traffic during the peak travel periods and the daily traffic counts exceed the roadway capacity. The interchange geometry and short ramps are considered far below today's standards.

Justification of Need

NC 147 crosses through the most significant employment centers in Durham: the Duke University area, downtown Durham, and the Research Triangle Park. Further employment growth in these three areas could increase the travel demand on NC 147. Population growth is also expected around downtown Durham and nearby neighborhoods.

There are lengthy backups from southbound NC 147 onto eastbound I-40 during peak commuting hours, and a corresponding backup from westbound I-40 to northbound NC 147.

Table 16

From	To	Lanes	2015 AADT	Existing Capacity	2040 Volume	2040 V/C	2040 Cross-Section
I-40	Cornwallis Road (SR 1121)	6D	64,000	90,700	76,700	0.9	8D
Cornwallis Road (SR 1121)	T.W. Alexander Drive (SR 2028)	4D	62,000	90,700	92,400	1.5	8D
T.W. Alexander Drive (SR 2028)	Ellis Road (SR 1954)	4D	68,000	61,700	97,000	1.6	8D
Ellis Road (SR 1954)	Future I-885 (East End Connector)	4D	64,000	61,700	77,000	1.3	8D
Future I-885 (East End Connector)	S. Briggs Avenue (SR 1171)	4D	64,000	61,700	77,000	1.3	6A
S. Briggs Avenue	NC 55 (Alston Avenue)	4D	68,000	61,700	87,000	1.4	6A
NC 55 (Alston Avenue)	Fayetteville Street (SR 1118)	4D	82,000	61,700	87,000	1.4	4A
Fayetteville Street (SR 1118)	US 15-501 Business	4D	78,000	61,700	84,000	1.4	4A
US 15-501 Business	West Chapel Hill Street (SR 1127)	4D	63,000	61,700	80,000	1.3	4A
West Chapel Hill Street (SR 1127)	Swift Avenue (SR 1322)	4D	64,000	61,700	81,000	1.3	4A
Swift Avenue (SR 1322)	Elba Street (SR 2411)	4D	59,000	61,700	72,000	1.2	4A
Elba Street (SR 2411)	Fulton Street (SR 1321)	4D	43,000	61,700	61,000	1.0	4A
Fulton Street (SR 1321)	US 15-501 Bypass	4D	41,000	61,700	48,000	0.8	4A
US 15-501 Bypass	I-85	4D	19,000	61,700	29,000	0.5	4A

Note: In the “Lanes” column, “D” means the facility is “divided” (has a median). In the “2040 Cross-Section” column, the number-letter pair indicates the recommended typical cross-section. See Appendix D for typical cross-section details.

There are functionally obsolete bridges on NC 147 at NC 55, US 15-501, West Chapel Hill Street (SR 1127), Vickers Avenue, South Duke Street (SR 1445), Grant Street, Southern Railroad, E. Cornwallis Road, NC 54, LaSalle Street (SR 2403), and Anderson Street.

CTP Project Proposal

Project Description and Overview

The proposed project improvements vary along the corridor. From I-40 to the East End Connector, the project recommends widening to an eight lane divided freeway, and from the East End Connector to NC 55, widening to six lanes is recommended. From NC 55 to I-85, the project recommends a four lane divided freeway. Managed lanes should be evaluated for use in the section from NC 55 to I-40 to both help fund the capacity improvements and encourage higher vehicle occupancy rates, especially during peak periods. Based on the feasibility study for NC 147, the CTP has identified managed lanes for the section from I-40 to the East End Connector.

From NC 55 through Chapel Hill Street, the project recommends operational improvements with the primary objective to improve safety for both vehicles on NC 147 and all road users at interchanges. Access improvements should also be considered. The safety and access improvements may consider speed limit reductions, ramp closures or consolidations, lengthening on- and off-ramps to provide for more merging space, additional connectivity on local streets to maintain or improve access, auxiliary lanes, shoulder improvements, bridge replacements, guardrails, geometric changes, modifications to local streets and intersections at interchanges to improve bicycle and pedestrian facilities and safety, etc. Free flow movements from freeway on- and off-ramps to local streets should be eliminated to improve bicycle and pedestrian safety. The I-40 and US 15-501 Bypass interchanges need capacity and safety improvements.

The DCHC MPO, Capital Area MPO and NCDOT began the Triangle Tolling Study in late 2016 and are scheduled to complete the study by 2018. NC 147 will be part of the tolling study to ascertain whether or not managed lanes are feasible and logical.

Natural and Human Environment Context

NC 147 crosses through suburban and urban development. Near I-40 the road is the major route through the Research Triangle Park. It then transitions to suburban style development briefly before entering the center of urban downtown Durham and the Duke University/Hospital area. The context is again suburban closer to I-85.

The section of NC 147 from the Briggs Avenue to US 15-501 goes through the most intensely developed portion of Durham. There are many nearby neighborhoods, urban development, dense residential areas, and large institutional uses. The section from Chapel Hill Street to Alston Avenue was built first before the National Environmental Policy Act (NEPA) required study and mitigation for natural and human environmental impacts. This section greatly impacted many neighborhoods in Durham including the African American Hayti neighborhood. A later extension to the west impacted the Crest Street neighborhood but required mitigation for these impacts according to NEPA. The original construction of NC 147 had a significant impact on the growth and development of Durham. Many residents are concerned and wary about any additional negative

impacts that a proposed project through the densely developed portion of the city may cause. In addition, there are lingering negative impacts to the city from the original project such as disconnected streets and neighborhoods, high speed on and off ramps that are incompatible with safe pedestrian and bicycle travel and urban type development, noise, and visual impacts. The proposed project needs to mitigate for these prior impacts as well as minimize any additional impacts.

There are multiple stream crossings on this long corridor. However most are relatively small as NC 147 is generally near the ridge line between the Neuse River and Cape Fear River watersheds. There is a larger stream crossing at Northeast Creek near Ellis Road.

Relationship to Land Use

NC 147 crosses through the urban and suburban tier in Durham. It also crosses through or abuts the Compact Neighborhood Districts near Alston Avenue, downtown Durham, and Ninth Street/Duke Hospitals.

The urban and compact neighborhood districts are expected to have the densest development that is more conducive to transit, walking and bicycling transportation. A significant amount of employment growth is projected from Alston Avenue to Duke Hospitals. Population growth is also anticipated in this corridor, much of it in multi-family developments.

The southern segment of NC 147 through the Research Triangle Park is also expected to have significant employment growth, but population growth should continue to be limited. The employment centers in the Research Triangle Park have traditionally been in large campus style developments with a suburban style. The Research Triangle Park is expected to become denser with the anticipated growth, but not to the same density as downtown Durham.

While NC 147 is a freeway for its entire length, the segment through downtown has many more access points and interchanges than the southern segment through the Research Triangle Park. Attention to NC 147 project design is needed to continue to provide access to the densest part of the city while improving safety for all users. The local vision is that NC 147 should not serve as a through route for regional traffic. I-85 to the north and I-40 to the south serve this role. Traffic on NC 147 through downtown should primarily be headed to or from a destination in downtown. This may mean that a lower design speed is necessary to ensure safety in this segment.

In contrast, the segment of NC 147 to the south serves more regional traffic due to the more dispersed land uses in the Research Triangle Park. Furthermore, the future connection of NC 147 to the East End Connector and US 70/I-85 could attract more regional traffic demand for this segment. NC 147 through this area is appropriate for a high speed freeway design with fewer access points and interchanges.

Linkages to Other Plans and Proposed Project History

Development of this project should be coordinated with the following plans:

- The DCHC MPO, CAMPO and NCDOT began the Triangle Tolling Study in late 2016. The study is scheduled to be complete in 2018.
- (Draft) Feasibility Study Improvements to NC 147 (Durham Freeway), From I-40 to NC 55 (Alston Avenue), TIP# FS-2015C, 2016
- D-O LRT *Final Environmental Impact Statement/Record of Decision*, 2016
- *City of Durham Traffic Separation Study*, 2014 (as received by Durham City Council)
- *Durham Trails and Greenways Master Plan*, 2011
- *Durham Comprehensive Bicycle Transportation Plan*, 2006
- *DurhamWalks! Pedestrian Plan*, 2006
- DCHC MPO *2040 Metropolitan Transportation Plan*, 2013
- *DCHC MPO Mobility Report Card*, 2015

The NCDOT Feasibility Studies Unit completed a draft feasibility study in 2016 for the NC 147 section from NC 55 (Alston Avenue) to I-40, TIP# FS-1205C. The study recommended further study of a cross section with 8 general purpose lanes, and a cross-section with 6 general purpose and 2 managed lanes.

Multimodal Considerations

Several GoDurham and GoTriangle bus routes use NC 147. Many of these are express routes. Any improvements to NC 147 should consider how public transportation can use the facility easily and with less impact by potential congestion. BOSS should be considered. If managed lanes are considered in any location, bus transit routes should be able to use the facility at no cost.

The *2013 American Community Survey* data show that Census Tracts bordering NC 147 have some of the highest public transit usage in the State for Commuting to Work. In fact, Census Tract 14 near the intersection of NC 147 and Alston Avenue and Briggs Avenue has the highest public transportation mode share in the State at 32.1%. The NC 147 corridor from Briggs Avenue to the north/west has high public transportation ridership. The NC 147 corridor from Briggs Avenue to the south/east has lower ridership typical of the suburban style development in the Research Triangle Park.

Commuting by bicycle and walking are also high along the central Durham segment of the project from Briggs Avenue to the west. Future development is expected to generate high rates of bicycle and pedestrian trips. Durham's top employment centers are near NC 147 and are within a reasonable walking or biking distance to neighborhoods on the opposite side of the freeway. NC 147 currently is a barrier for safe bicycle and pedestrian access to Duke Hospitals from the north and to downtown Durham from the south. The high speed on and off ramps create dangerous conflicts for bicyclists and pedestrians at many interchanges through the downtown. The NC 147 project should consider improvements to the bicycle and pedestrian crossings.

The *DurhamWalks! Pedestrian Plan* recommends priority sidewalks on Alston Avenue, Pettigrew Street, Morehead Avenue (SR 1365), Buchanan Boulevard, Broad Street (SR 1322), Erwin Road (SR 1320), LaSalle Street, Morreene Road (SR 1317), and Hillsborough Road (US 70 Bus). The plan also recommends the addition of sidewalks on all roads in Durham by policy.

The *Durham Comprehensive Bicycle Transportation Plan* recommends bicycle lanes on T W Alexander Drive, Ellis Road (east/south), Glover Road (SR 1954), Ellis Road (west/north), Briggs Avenue, Bacon Street, Alston Avenue, Fayetteville Street, Roxboro Street (US 15 Bus), Mangum Street (US 15 Bus), Blackwell Street, Duke Street, Gregson Street, Chapel Hill Street, Buchanan Boulevard, Broad Street, Erwin Road, Anderson Street, Fulton Street (SR 1321), LaSalle Street, Neal Road (SR 1314), and US 70. This plan also recommends greenway trails parallel to NC 147 between US 15-501 and Fulton Street and crossing under NC 147 at Fulton Street, parallel to the D-O LRT project and crossing NC 147 near Erwin Road, a greenway extending north and south from the Bryant Bridge, and a greenway along the rail line between Briggs Avenue and Ellis Road. This proposal also recommends a separate multi-use path along NC 147 from the trail at I-40 and TW Alexander Drive (SR 2028) to the CSX trail at Ellis Rd (SR 2149)/NC 147 underpass to provide connection from NC 54 to the Kelly Bryant bridge.

The *Durham Trails and Greenways Master Plan* recommends a trail on Cornwallis Road and T W Alexander Drive. These are both part of the Research Triangle Park trails system.

Public/Stakeholder Involvement

During the public comment period, City of Durham staff expressed the need for multi-use accommodations along NC 147 from NC 54 to the Kelly Bryant bridge. A multi-use path separate from NC 147 has been added to the corridor recommendation from a trail at I-40/T.W. Alexander Drive to the CSX trail at Ellis Road/NC 147 underpass.

NC 54 – Proposed Improvements from US 15-501 (Fordham Boulevard) to NC 55 **Last Updated: 09/20/17**

Local ID: [Draft STIP FY 2017-2027]

- TIP# U-5774 A (US 15-501 interchange), upgrade
- TIP# U-5774 B (US 15-501 (Orange County) to Barbee Chapel Road (SR 1110) (Durham County)), upgrade roadway corridor, convert Barbee Chapel Road intersection to interchange
- TIP# U-5774 C (Barbee Chapel Road (SR 1110) to I-40, upgrade roadway corridor
- TIP# U-5774 D (Falconbridge Road intersection), convert to interchange
- TIP# U-5774 E (Farrington Road (SR 1109) intersection), convert to grade separation
- TIP# U-5774 F (I-40/NC 54 interchange), improvements
- TIP# U-5774 G (I-40 to NC 751), upgrade roadway corridor
- TIP# U-5774 H (NC 751 to Fayetteville Road (SR 1118)), upgrade roadway corridor
- TIP# U-5774 I (Fayetteville Road (SR 1118) to Barbee Road (SR 1106)), upgrade roadway corridor
- TIP# U-5774 J (Barbee Road (SR 1106) to NC 55), upgrade roadway corridor

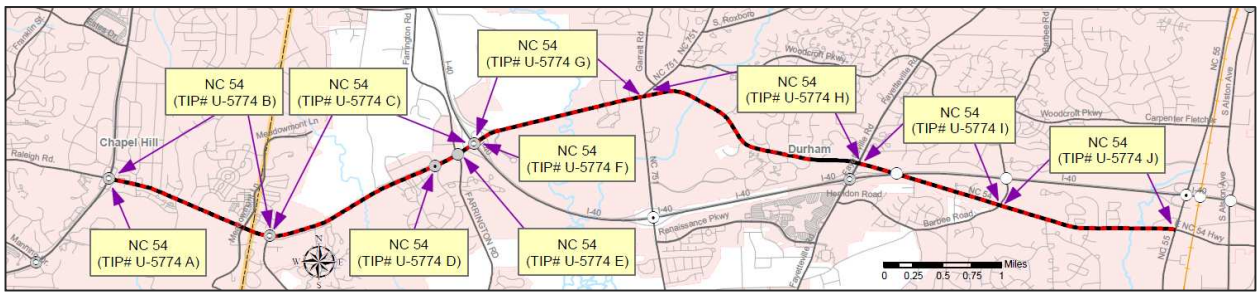


Figure 27

Identified Problem

NC 54 volumes are projected to exceed a LOS D capacity by 2040. The section of NC 54 from Barbee Chapel Hill Road (SR 1110) to NC 55 currently exceeds existing daily capacity.

NC 54 is a principal arterial that parallels the most important travel corridor in the Triangle, I-40, and provides regional access to the some of the most important employments centers, including the Research Triangle Park (RTP) and the University of North Carolina at Chapel Hill and its hospitals. Capacity improvements are needed to ensure that a LOS D or better is attained in several sections that already exceed capacity and maintain that level of service in the remaining sections.

This problem statement addresses the corridor by the roadway sections, intersecting roads, and interchanges identified below. The letter for each of the bulleted items below

matches the letter designation in the TIP ID for the sections of project U-5774 in the draft FY 2017-2027 State Transportation Improvement Program (TIP). This TIP ID is also the CTP ID. The sections denoted with an asterisk (*) were studied in detail in the DCHC MPO's *NC 54/I-40 Corridor Study*, which was completed in November 2011. This study can be referenced for detailed deficiency analyses and transportation facilities that were considered and selected for the corridor.

A. US 15-501 interchange (Orange County)*
B. US 15-501 to Barbee Chapel Road (SR 1110) (Durham County)*, and Barbee Chapel Road intersection*
C. Barbee Chapel Road to I-40*
D. Falconbridge Road intersection*
E. Farrington Road (SR 1109) intersection*
F. I-40/NC 54 interchange*
G. I-40 to NC 751
H. NC 751 to Fayetteville Road (SR 1118)
I. Fayetteville Road to Barbee Road (SR 1106)
J. Barbee Road to NC 55

Justification of Need

The NC 54 corridor is among the most important travel corridors in the Triangle. It parallels I-40 and provides regional access to large employment centers. The roadway cross-section ranges from two in the eastern sections to six lanes in the western sections that are in Chapel Hill. The entire corridor experiences significant delays especially at the interchanges and intersections, and during peak travel periods. The table directly below uses current and forecasted (year 2040) traffic count data for NC 54 from the CTP deficiency analysis to demonstrate the role that high traffic volumes plays in corridor congestion. The "Ref" column in the table refers to the letter in the bulleted project sections above.

Table 17

Ref	From	To	Lanes	2015 AADT	Existing Capacity	2040 Volume	2040 V/C	2040 Cross-Section
B	US 15-501	Barbee Chapel Road (SR 1110)	6D	50,000	55,000	56,800	1.0	6E
C	Barbee Chapel Road (SR 1110)	I-40	4D	46,000	36,600	47,800	1.3	6ESS
G	I-40	NC 751	2	18,000	12,700	24,500	1.9	4D
H	NC 751	Fayetteville Road (SR 1118)	2	17,000	13,800	19,800	1.4	4D
I	Fayetteville Road (SR 1118)	Barbee Road (SR 1106)	2	17,000	12,700	21,300	1.7	4D
J	Barbee Road (SR 1106)	NC 55	2	21,000	12,700	28,100	2.2	4D

Note: In the "Lanes" column, "D" means the facility is "divided" (has a median). In the "2040 Cross-Section" column, the number-letter pair indicates the recommended typical cross-section, and "SS" has been added to indicate a synchronized street corridor treatment for this section. See Appendix D for typical cross-section details.

The DCHC MPO 2014 Mobility Report Card designates these roadway sections as operating at a LOS E and LOS F. In addition, the NCDOT feasibility study TIP# FS-1005C, which was completed in 2012 and covered all the sections east of I-40, showed that all those sections are projected to operate at a LOS E and LOS F in 2035 and that ¾ of the intersections are projected to operate at a LOS E or LOS F.

The section immediately west of I-40 experiences a high number of automobile crashes (see the DCHC MPO's 2014 Mobility Report Card for this crash data at the following link: http://www.dchcmpo.org/programs/cmp/default.asp).

Proposed improvements to the intersections and interchanges shown below have been justified in the detailed deficiency analysis of the *NC 54/I-40 Corridor Study*. The information below is from an additional source, the DCHC MPO's 2014 Mobility Report Card (unless noted from the CTP Deficiency Analysis).

A. US 15-501 interchange – This bridge is functionally obsolete (based on the Deficient Bridge section of the CTP Deficiency Analysis), which means that the bridge is safe but does not meet today's higher standards.
B. Barbee Chapel Road intersection – Turning movements on this roadway experience long delays especially the Barbee Chapel Road northbound to NC 54 westbound movement in the morning peak period.
D. Falconbridge Road intersection – Improvements are needed to provide north-south access to NC 54 and to ensure that the traffic merging movements are an adequate distance from the adjacent I-40/NC 54 interchange to maintain safety and capacity.
E. Farrington Road intersection – This at-grade intersection is too close to the I-40/NC54 interchange, causing backups on the westbound lanes of the interstate when the I-40 westbound to NC 54 westbound movement experiences long delays at the Farrington Road intersection.
F. I-40/NC 54 interchange – Several movements on this interchange are under capacity and the delays will likely worsen given the forecasted increase, i.e., up to 47,800 daily volume.

Both Chapel Hill Transit and Go Triangle operate buses in the corridor west of the I-40/NC 54 interchange to accommodate the regional commutes, and Go Durham operates bus service east of that interchange. The entire corridor currently has a moderate bus transit frequency, 16 to 30 minute headways, during the peak periods. The section west of Friday Center Drive has a very high frequency, 5-minute headways, because shuttle buses operate between the Friday Center park-and-ride lots and the university and hospitals.

The CTP Deficiency Analysis showed that the expected demand for transit, based on the projected population and employment density in the adjacent areas, could benefit from 15-minute bus headways. Go Triangle is in the process of planning the Durham-Orange Light Rail Transit (D-O LRT) that will parallel the NC 54 corridor essentially from US 15-501 to I-40. The D-O LRT is intended to carry passengers traveling between

Durham and Chapel Hill and provide a transit link to the park-and-ride facilities used by regional commuters from southern Durham County and Wake County. The D-O LRT Alternatives Analysis estimates approximately 23,000 passengers using the system each day.

There is significant pedestrian activity because of the proximity of the residential neighborhoods, retail centers and employment centers. Pedestrians need adequate facilities to safety travel among the high automobile traffic volumes. The CTP Deficiency Analysis showed that 2040 forecasted population and employment densities along the NC 54 corridor could generate significant bicycle and pedestrian trips as high as a few thousand trips from US 15-501 to Barbee Chapel Road, and several hundred trips from Rollingwood Drive to NC 55.

Community Vision and Problem History

The NC 54 corridor from Chapel Hill through south Durham and the Research Triangle Park is among the most important travel corridors in the Triangle region. The capacity deficiencies and safety problems have been well vetted with the community through several plans and studies. The *NC 54/I-40 Corridor Study* conducted community workshops attended by over 150 citizens. The DCHC MPO has planned for capacity, safety, bicycle and pedestrian improvements in the long-range plans completed over the last few decades and worked to get those projects in the Transportation Improvement Program (TIP). In the most recent prioritization process, i.e., SPOT 4.0, the MPO assigned the maximum allowable points, i.e., 30 points, to NC 54 improvements. Go Triangle has conducted workshops to gather citizen comments on the proposed D-O LRT. All of these processes included public hearings as well. The community wants to address the automobile and transit capacity problems of the corridor, but they also want to improve the bicycle and pedestrian facilities in the corridor. The inclusion of alternative transportation modes is an important goal of the DCHC MPO, as well.

CTP Project Proposal

Project Description and Overview

In the draft STIP FY 2017-2027, U-5774 indicates the upgrade of the roadway corridor with the upgrade of the US 15-501 interchange, interchange improvements at I-40, the conversion of at-grade intersections to interchanges (or construct intersection improvements) with Barbee Chapel Rd and Falconbridge Rd, and conversion of an at-grade intersection with Farrington Rd to a grade separation. The town of Chapel Hill is interested in keeping options open for Barbee Chapel Road and Falconbridge Road intersection improvements including improved at-grade intersections. The CTP project proposal is described below. This project is to improve bicycle and pedestrian travel the complete length of the corridor, and accommodate the D-O LRT.

A. US 15-501 interchange – Upgrade the current interchange.

B. US 15-501 to Barbee Chapel Road – Upgrade roadway corridor; and Barbee Chapel Road intersection – Construct intersection improvements or convert to interchange.
C. Barbee Chapel Road to I-40 – Upgrade roadway corridor, and extend off-road multi-use path.
D. Falconbridge Road interchange – Construct intersection improvements or convert to interchange.
E. Farrington Road grade separation – Construct grade separation, and add access road from Falconbridge Road to Farrington Road.
F. I-40/NC 54 interchange – Construct interchange improvements, including eastbound I-40 to eastbound NC 54 cloverleaf and Farrington Road to eastbound I-40 slip ramp.
G. I-40 to NC 751 – Upgrade roadway corridor.
H. NC 751 to Fayetteville Road – Upgrade roadway corridor.
I. Fayetteville Road to Barbee Road – Upgrade roadway corridor.
J. Barbee Road to NC 55 – Upgrade roadway corridor.

Natural and Human Environment Context

The NC 54 corridor crosses wetlands and Army Corps of Engineering (ACOE) lands at three different locations:

- Little Creek – between Downing Creek Pkwy and Huntingbridge Road
- New Hope Creek – between the I-40/NC 54 interchange and NC 751
- Third Fork Creek – Garrett Road and Park Ridge Road

The impacts and possible mitigation measures related to these wetlands will be addressed at the environmental impact analysis stage of project development.

Relationship to Land Use

Currently, the land use in the vicinity of this corridor is suburban. However, the socioeconomic growth maps from the CTP Deficiency Analysis show that substantial residential growth is expected to occur near Barbee Chapel and the northwest quadrant of the I-40/NC 54 interchange, and much employment growth is expected to occur around the future light rail stations at Hamilton, Friday Center, Hillmont (near Barbee Chapel) and Leigh Village (northwest quadrant of I-40/NC 54). These areas are expected to function like urban centers in the future. In addition, continued employment growth around the UNC-Chapel Hill campus and hospitals will likely attract more commuters through the NC 54 corridor. The D-O LRT plan has identified park-and-ride facilities at some of the light rail transit stations to accommodate these commuters.

Linkages to Other Plans and Proposed Project History

Many studies have been focused in whole, or part, on the NC 54 corridor. The following studies have important deficiency and project proposal information:

- *NC 54/I-40 Corridor Study*, 2011, addresses section from US 15-501 to I-40

- Feasibility Study, Widening of NC 54 from I-40 to NC 55 (FS-1005C), 2012, addresses sections east of I-40
- *DCHC MPO's 2014 Mobility Report Card*, 2015, addresses roadway, intersections and non-auto travel
- Draft Environmental Impact Statement (DEIS) for the Durham-Orange Light Rail Transit, 2015, addresses rail alignment and station location
- *2040 Metropolitan Transportation Plan* (MTP) for the DCHC MPO, 2013, has NC 54 and related projects

Besides the NC 54 projects already identified in this statement, the 2040 MTP has the following projects and policies that may impact the NC 54 corridor. Projects funded in the Draft State Transportation Improvement Program (STIP) FY 2017-2027 are shown in **bold font**.

- **US 15-501, from South Columbia Street (NC 86) to I-40, TIP# U-5304**, corridor upgrade, including capacity improvements, interchange and intersection improvements, and the conversion of an intersection to an interchange with multimodal accommodations.
- **Durham-Orange Light Rail Transit (D-O LRT) , TIP# TE-5205**, note that the preferred rail alignment changed in 2015 from the original alignment through Meadowmont to one that parallels NC 54 between Friday Center Drive and I-40.
- Southwest Durham Drive, 2040 MTP# 104, 106, 106.1, new alignment from I-40 to NC 54, mostly along George King Road.
- Falconbridge Road extension (or Farrington Road realignment), from NC 54 to Farrington Road, 2040 MTP# 201, (in conjunction with the Farrington Road/NC 54 grade separation) to move NC 54 access away from Farrington Road.
- NC 751, from NC 54 to Renaissance Pkwy, 2040 MTP# 77.2, widen to four lanes.
- **I-40, from Wade Avenue (SR 1728) (Wake County) to US 15-501, TIP# I-5702**, construct managed lanes.
- I-40, from US 15-501 to NC 86 (Chapel Hill exit), 2040 MTP# 43, capacity improvements which might be managed lanes.
- See policy disclaimers in Chapter 2, page 2-1.

Multimodal Considerations

The CTP transit, bicycle and pedestrian plans have identified many alternative mode projects in the NC 54 corridor. Among the most significant are the D-O LRT stations, park-and-ride facilities, multi-use path extension from Friday Center Drive to I-40, and sidewalk and bicycle lanes the entire extent of the corridor.

Public/Stakeholder Involvement

During the public comment period, the North Carolina Wildlife Resources Commission (NCWRC) commented on the impacts of road widening projects on the fragmentation of wildlife habitats. The NC 54 road widening project between I-40 and NC 751 will likely impact Natural Heritage Natural Areas and the NCWRC recommends avoiding the

widening where it intersects these important natural areas. Additionally, when widening cannot be avoided, the NCWRC requires NCDOT to consider building wildlife crossing structures where land is permanently conserved on either side of the road widening to reduce habitat fragmentation. See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

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Northern Durham Parkway – Proposed Improvements from US 70 to I-85 **Last Updated: 09/20/17**

Local ID: [Not programmed in STIP]

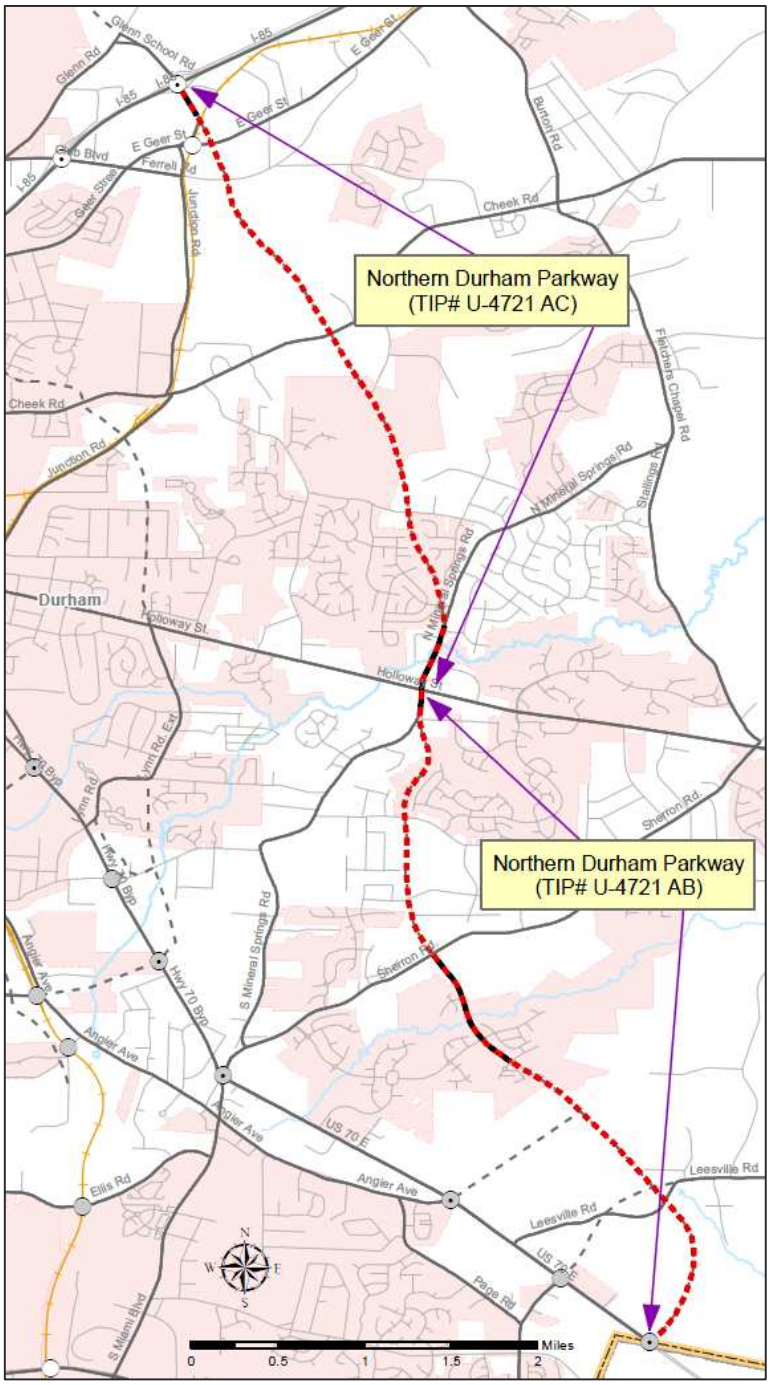
- TIP# U-4721 AB (US 70 to NC 98 (Wake Forest Road))
- TIP# U-4721 AC (NC 98 (Wake Forest Road) to I-85)

Figure 28

Identified Problem

Population and employment are growing in Durham, the Research Triangle Park, and northwestern Wake County. The Research Triangle Park is and will continue to be a major employment center. Residential growth is forecasted to continue in northern and eastern Durham County, as well as Person and Granville counties. Furthermore, the existing routes between the population and employment centers travel primarily through the central city of Durham area and there are many negative impacts to increasing the capacity of many of these routes. As a result, there is a need for a new major arterial from northern Durham County to eastern Durham County, the Northern Durham Parkway.

The Northern Durham Parkway could provide an alternative to routes such as US 501, US 501 Business, US 70, and NC 55 through central Durham. It could also provide better connectivity between growing communities in northern and eastern Durham County, and it would provide direct access to



these communities. It could be a bicycle and pedestrian route through this area as well and would provide a cross-town facility for transit buses in the future. The Northern Durham Parkway should be constructed to serve both regional and local traffic and provide a multimodal facility for all users.

Justification of Need

As the Northern Durham Parkway would be a new facility, traffic counts are not available based on the existing network. A 2013 Traffic Forecast and 2014 Feasibility Study were developed for the Northern Durham Parkway (NDP).

The "2040 Volume (E+C without NDP)" in the table below was developed for the CTP using the 2040 TRM Existing plus Committed (E+C) network and the "2040 Volume (MTP with NDP)" was developed for the 2013 TIP Project U-4721 (NDP) Traffic Forecast using the 2040 TRM standard MTP network. In comparing these two table columns, the US 70 2040 Volume (E+C without NDP) is considerably lower than the 2040 Volume (MTP with NDP) south of NC 98 due to US 70 not being upgraded to a freeway in the E+C network. In the standard MTP network US 70 is upgraded to a freeway. The E+C network also does not include the NDP, whereas the standard MTP network does include the NDP.

Table 18

Facility	**From**	**To**	**Lanes**	**2015 AADT**	**Existing Capacity**	**2040 Volume** (E+C without NDP)	**2040 Volume** (MTP with NDP*)	**2040 V/C** (without NDP)	**2040 Cross-Section**
US 70	I-85	NC 98	4D	50,000 – 55,000	59,900	96,200	89,700 - 102,300*	1.6	6B
US 70	NC 98	S Miami Boulevard (SR 1959)	4, 4D, 5	31,000 – 40,000	27,600 - 59,900	63,700	98,800 - 107,000*	2.2	6B
US 70	S Miami Boulevard (SR 1959)	NDP	4D	30,000 – 36,000	40,500	49,200	82,300 - 83,800*	1.1	6B
NDP (future)	I-85	NC 98	4D	--	--	--	12,900 – 21,700*	--	4G
NDP (future)	NC 98	Sherron Road (SR 1811)	4D	--	--	--	18,700 – 19,600*	--	4G
NDP (future)	Sherron Road (SR 1811)	US 70	4D	--	--	--	23,900 – 27,900*	--	4G

Note: In the "Lanes" column, "D" means the facility is "divided" (has a median). In the "2040 Cross-Section" column, the number-letter pair indicates the recommended typical cross-section. See Appendix D for typical cross-section details.

However, there are several unaddressed needs identified in the CTP on other routes that the Northern Durham Parkway is expected to help ameliorate. Cheek Road (SR 1800), Fletchers Chapel Road (SR 1815), Glenn School Road (SR 1675), Mineral Springs Road (SR 1917), and Red Mill Road (SR 1632) are nearby roads that have unaddressed needs that should be helped by the Northern Durham Parkway.

Significant population growth is anticipated for eastern Durham County, particularly between NC 98 and US 70. In addition, growth in population in Person County to the north and Granville County to the northeast will likely contribute towards demand for north-south travel through Durham County. Employment growth in this area is more modest, but the employment growth in the Research Triangle Park should increase the demand for north-south travel through Durham County.

Community Vision and Problem History

The Northern Durham Parkway has a long history in Durham. For many decades, the Durham Thoroughfare Plan recommended a circumferential road, Eno Drive, which arced from I-85 in Durham County to I-85 in Orange County and was eligible for Highway Trust Fund "loop" project funding. This concept had a NEPA study prepared in the early 2000's that concluded with a decision to not construct the project. The eastern part of this road morphed into the Northern Durham Parkway project. Through much community and governmental discussion, NCDOT and the city of Durham decided to support the Northern Durham Parkway as one of five projects that replaced Eno Drive in the state legislation for "loop" projects.

Eno Drive was proposed as an expressway-type facility. In contrast, the Northern Durham Parkway was envisioned to be a two or four-lane parkway or boulevard type facility. The city of Durham decided that a controlled access freeway or expressway type loop road was not compatible with the land use and growth direction of that part of the city. Northern Durham Parkway is not envisioned to carry solely regional traffic. It is envisioned to serve some regional traffic but also local traffic. Longer regional trips should be directed to I-85 and US 70. Northern Durham Parkway is envisioned to be a complete street that is fully integrated into the neighborhoods that it travels through and that includes facilities for transit, bicycles, and pedestrians. It is likely to have residential, commercial, and institutional uses along it such as subdivisions, retail centers, and schools. Access management should be incorporated and driveways should be consolidated whenever possible.

CTP Project Proposal

Project Description and Overview

The proposed project recommends the construction of a new location four lane divided boulevard from US 70 to Old Oxford Road. The proposed cross-section includes a median, bicycle lanes, and sidewalks. However, a separated bicycle facility should be considered, such as a curb-separated or delineator-separated facility, where possible to increase safety and usage for all cyclists. Sidewalks are an essential part of the project. Interchanges are recommended at US 70 and I-85.

Natural and Human Environment Context

The Northern Durham Parkway is nearly all within the protected watershed for Falls Lake. It includes multiple stream crossings including the Cabin Branch, Eno River, Ellerbee Creek, Panther Creek, Chunky Pipe Creek, and Lick Creek. Segments near the Cabin Branch and Eno River are through land owned by the U.S. Army Corps of Engineers. This includes the Penny's Bend Nature Preserve near the Eno River.

The proposed route crosses near multiple schools including Spring Valley Elementary School, Oak Grove Elementary School, Southern High School, Glenn Elementary School, Little River Elementary School, and Lucas Middle School. A branch of the Durham Tech Community College is also nearby.

Most of the human environmental context is currently rural or suburban. There are many new subdivisions being built along the corridor and many have included the dedication of right-of-way for the proposed road to minimize potential impacts to properties. There are also multiple commercial areas particularly where the proposed route crosses an existing route such as near NC 98 and I-85.

Relationship to Land Use

The proposed Northern Durham Parkway arcs through the eastern side of Durham County within the suburban development tier. Land uses are anticipated to vary along the corridor from medium to low density residential, conservation land, industrial, and commercial. Population growth is anticipated in this area of the county, especially in between NC 98 and US 70. Some employment growth is also anticipated, primarily near I-85 and US 70.

Some of Northern Durham Parkway has already been built by existing large developments. For example, Brightleaf at the Park has built a segment south of Sherron Road. Entrances to residential neighborhoods and Spring Valley Elementary School currently exist on the Northern Durham Parkway in this neighborhood. Northern Durham Parkway is expected to provide both a transportation and land access function. While driveway access directly onto Northern Durham Parkway will generally be limited and discouraged, it is desired for the road to function as a boulevard facility by providing at-grade access to other streets and large properties such as schools. A freeway or expressway would not function well because of the desired bicycle, pedestrian and transit accommodations and at-grade access.

Linkages to Other Plans and Proposed Project History

Development of this project should be coordinated with the following plans:

- *Durham Trails and Greenways Master Plan*, 2011
- *Durham Comprehensive Bicycle Transportation Plan*, 2006
- *DurhamWalks! Pedestrian Plan*, 2006

- DCHC MPO *2040 Metropolitan Transportation Plan*, 2013
- *DCHC MPO Mobility Report Card*, 2015

NCDOT Program Development Branch completed a feasibility study for the Northern Durham Parkway in 2013. However due to a lack of funding in the STIP, further development of the project has been stalled and the project is not currently in the STIP.

Multimodal Considerations

The Northern Durham Parkway is expected to become a major north-south connector through Durham County. It is envisioned to help alleviate traffic demand on current routes that go directly through residential neighborhoods and have high current and projected traffic volumes, including:

- Duke Street (SR 1445) (and Gregson Street) (south of I-85): 10,000 vpd (2015 AADT), and 10,700 vpd (2040 volume)
- NC 55 (Alston Avenue/Avondale Drive) (from NC 147 to I-85): 13,000 to 20,000 vpd (2015 AADT), and 19,800 to 25,000 vpd (2040 volume)
- US 15-501 Business (Roxboro Street) (South of I-85): 15,000 (2015 AADT), 19,600 (2040 volume)

Many of these routes are greatly constrained by development and do not provide adequate bicycle and pedestrian facilities. As such, Northern Durham Parkway provides an excellent opportunity to divert traffic away from residential neighborhoods that have high vehicle traffic volumes and high pedestrian and bicycle activity, as well.

As a new facility, Northern Durham Parkway provides an opportunity to build a fully integrated bicycle and pedestrian facility through the County. And, it can be constructed based on a state-of-the-practice guideline for safety and accessibility. A separated bicycle facility should be provided along the Northern Durham Parkway. Sidewalks should be provided on both sides of the entire facility. Special attention should be given to intersections, especially the major intersections at NC 98, I-85, and US 501.

It is likely that public transportation services will use the Northern Durham Parkway for future routes. As eastern and northern Durham County continues to develop, public transportation demand should increase. Northern Durham Parkway should consider bus pullouts, stops, and shelters throughout the route.

The DurhamWalks! Pedestrian Plan recommends priority sidewalks on Freeman Road (SR 1846) and Geer Street (SR 1670). The plan also recommends the addition of sidewalks on all roads in Durham by policy.

The Durham Comprehensive Bicycle Transportation Plan recommends bicycle lanes and a greenway path along Northern Durham Parkway. Several greenways are proposed to cross the Northern Durham Parkway as described in the next paragraph. Bicycle lanes are recommended to be located on Leesville (SR 1906)/Page Road Extension (SR 2095). Wide shoulders are recommended on Sherron Road (SR 1811),

Mineral Springs Road, Freeman Road, Cheek Road, Ferrell Road (SR 1671), Geer Street, Glenn Road (SR 1636), Hamlin Road (SR 1634), and Old Oxford Road (SR 1004).

The Durham Trails and Greenways Master Plan recommends a Brier Creek Trail, Lick Creek Trail (two branches), Oak Grove Trail, Little Lick Creek Trail, Chunky Pipe Creek Trail, Panther Creek Rail Trail, North Ellerbee Creek Trail, Roxboro Rail Trail, Eno River Trail (part of the Mountains to Sea Trail), and Cabin Branch Trail (two branches) along the Northern Durham Parkway. Most streams and creeks in eastern/northern Durham County flow from west to east and the Northern Durham Parkway is proposed to mostly these streams perpendicularly in a north-south direction. Thus there are many potential greenway crossings parallel to these streams along the route. Special attention is needed to provide safe greenway crossings or overpasses/underpasses.

Public/Stakeholder Involvement

During the public comment period, the North Carolina Wildlife Resources Commission (NCWRC) commented on the impacts of new road projects on the fragmentation of wildlife habitats. The Northern Durham Parkway new location road project between US 70 and Flat Rive Drive will likely impact Natural Heritage Natural Areas and the NCWRC recommends avoiding building roads through these important natural areas and large areas of connected blocks of habitat. When a new road cannot be avoided, the NCWRC requires NCDOT to consider building wildlife crossing structures where land is permanently conserved on either side of the new road to reduce habitat fragmentation.

Additionally, the NCWRC commented on the impacts of new road projects on the degradation of aquatic wildlife in streams and wetlands. The NCWRC encourages the use of Low Impact Development (LID) techniques and other important measures to minimize negative impacts from roads and development along the proposed Northern Durham Parkway sections: US 70 to Flat River Drive; North Mineral Springs Road to Glenn School Road; and Glenn Road to Old Oxford Road. The NCWRC also provided their standard recommendations for bridges, if this project has the opportunity to build bridges or improve existing bridges.

See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

ii. HIGHWAY – Minimum Problem Statements

Note -- The statement listing starts with a proposed one-way pair study recommendation and continues with problem statements listed in order by facility type: Interstates, US highways, NC routes and then other roadways. Each section per facility type is in alphabetical order.

Proposed One-Way Pair Study

The City of Durham and NCDOT are supportive of studying the following one-way pairs:

- Gregson Street (SR 1327)/ Vickers Avenue (SR 1361)/ Duke Street (SR 1445) from US 15-501 Business (University Drive) to I-85, and
- US 15-501 Business (Mangum Street/Roxboro Street) from US 15-501 Business (Lakewood Avenue) to East Markham Street.

A study considering local concerns about traffic volumes, speeding and safety on the listed one-way pairs would also include the adjoining roadway network. More study is needed to define the problems and develop viable solutions.

I-85 (I-40 to Durham County line), 2040 MTP#: 48, 48.1

The 2015 Annual Average Daily Traffic (AADT) volume on segments of I-85 from I-40 to the Durham County line is currently between 43,000 vehicles per day (vpd) and 47,000 vpd. It is projected to be near Level of Service (LOS) D capacity by 2040 with expected volumes of 49,800 vehicles per day (vpd), 51,600 vpd, and 52,700 vpd from I-40 to South Churton Street (SR 1009), South Churton Street to NC 86, and NC 86 to US 70, respectively. LOS D capacity on the facility is 59,300 vpd. Improvements are recommended in order to relieve anticipated congestion and to improve mobility on the interstate facility. This section of I-85 is currently a four-lane divided freeway with three interchanges and corresponding ramps within an approximate 260-foot right-of-way. This section of I-85 is adjacent to the improved six-lane section of I-85 through Durham County.

The CTP project proposal is to improve I-85 to a six-lane freeway with a raised median to better accommodate the projected 2040 volume.

I-85 (US 70 to Granville County), 2040 MTP#: 49, Local ID: DURH0002-H

I-85 from US 70 to the Durham and Granville county boundary is mostly a four-lane freeway but is six lanes in the section closest to US 70. In terms of regional trips, this interstate connects Durham to several small North Carolina cities and towns in the northeast, and is one of the few major roadways that connects Durham to the north and east because of the barrier that Falls Lake imposes. In terms of interstate trips, I-85 is the principal roadway connecting Atlanta (Georgia), Charlotte, the North Carolina

piedmont cities, Richmond (Virginia) and Washington (DC). The CTP recommends the addition of travel lanes on I-85 to create a six-lane freeway and upgraded interchanges and ramps.

The extension of the lane additions and upgrades should be considered across the Falls Lake bridge to the I-85/US 15 interchange because there is a significant number of commuter trips to large employers in Butner, the prisons and state hospital, and to Creedmoor residences. Another CTP project proposes a new four-lane divided roadway, the Northern Durham Parkway, which will intersect I-85 at the current Glenn School Road (SR 1675) interchange.

The 2015 AADT on I-85 ranges from 46,000 vpd to 55,000 vpd with a 60,000 vpd LOS D roadway capacity. The 2040 volumes are projected to range from 65,000 vpd to 70,000 vpd, which would exceed LOS D capacity. This increase will yield volume-to-capacity ratios that approach 1.2 and potentially result in travel delays, and possible crash frequency and severity increases on this important interstate corridor.

Currently, there are not any major interchanges on this segment (east of the US 70 interchange) and as a result there are not any extraordinary intersection delays or safety problems based on the 2014 DCHC MPO Mobility Report Card. Red Mill Road (SR 1632) and East Club Boulevard (SR 1671) are the highest volume intersecting roads and their 2015 AADT is 11,000 vpd and 9,900 vpd, respectively. And, Glenn School Road is the only interchange that has a significant retail presence. However, the volumes on the intersecting roads are expected to increase significantly given the expected residential and employment growth in this portion of the region. The CTP deficiency analysis shows that the Glenn School Road/I-85 and Red Mill Road/I-85 interchanges have functionally obsolete bridges, and the East Club Boulevard/I-85 interchange bridge is both structurally and functionally obsolete. The Red Mill Road/I-85 interchange meets at least one of the intersection crash warrants, and should be further investigated. Upgrading these interchanges and ramps should be considered. The 2040 projected volumes for Red Mill Road, East Club Boulevard and the Northern Durham Parkway (new facility) are projected to individually approach 17,000 vpd, further straining the obsolete design of these facilities.

The DCHC MPO, Capital Area MPO and NCDOT began the Triangle Tolling Study in late 2016 and is scheduled to be complete by 2018. I-85 will be part of the tolling study to ascertain whether or not managed lanes are feasible and logical for I-85.

Residential and employment development will continue to occur around the I-85 interchanges. Bicycle, pedestrian and transit trips should be considered in the interchange upgrades and the cross-section of the intersecting roadways.

The US Army Corps of Engineers and resource agencies should be included in the environmental analysis stage of project development very early. I-85 crosses Falls Lake and its related wetlands, Army Corps of Engineering property, and critical

watershed. The entire length of this study segment is within a protected or critical watershed.

During the public comment period, the North Carolina Wildlife Resources Commission (NCWRC) commented on the impacts of road widening projects on the fragmentation of wildlife habitats. The I-85 road widening project between Granville County and Red Mill Road will likely impact Natural Heritage Natural Areas and the NCWRC recommends avoiding the widening where it intersects these important natural areas. Additionally, when widening cannot be avoided, the NCWRC requires NCDOT to consider building wildlife crossing structures where land is permanently conserved on either side of the road widening to reduce habitat fragmentation. See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

I-85/US 70 Connector (SR 1239), 2040 MTP#: 206

Peak-period traffic flow on Efland-Cedar Grove Road (SR 1372) from US 70 to Forest Avenue (SR 1322), from Forest Avenue to Mount Willing Road (SR 1120), and from Mount Willing Road to I-85/I-40 currently exceeds the realistic design capacity and service flow rate on the subject two lane facilities. These facilities collectively serve as the only option for many commuters with origins in northern Orange County to access I-85/I-40 in the northbound/eastbound (respectively) direction to further access the region's major employment centers to the south and east. This particular route involves taking two (2), 90-degree turns and traversing an at-grade railroad crossing located approximately 30 feet from two (2) intersections on either side. The combination of facilities creates a major capacity contraction relative to the facilities that feed it traffic. Additionally, stacking at the intersections connecting the combination of facilities may create hazardous conditions for vehicles encountering the at-grade railroad crossing adjacent to the intersections.

The CTP proposal is to convert the existing I-85/US 70 Connector's interchange with US 70 approximately 1.25 miles east to a full-movement interchange with ramps providing access from all directions. Orange County would like other options considered in the environmental review process besides converting to a full movement interchange: converting the interchange to a full-movement T-shaped at-grade intersection and converting to an at-grade roundabout. Currently, ramps only provide access from northbound on the Connector to eastbound US 70 and from westbound US 70 to southbound on the Connector. There is no access from eastbound US 70 to the Connector or from the Connector to US 70 westbound. The project would allow an improved mobility alternative for commuters using Efland-Cedar Grove Road to access I-40/I-85 and avoidance of a major capacity contraction and at-grade railroad crossing safety concern using the previously described combination of local streets approximately 1.25 miles west. Any change to the interchange should consider the accommodation of bicycle travel along US 70.

"Downtown Loop" (US 15-501 Business (North Roxboro Street), US 70 Business (East and West Morgan Street, South Great Jones Street, Ramseur Street,) and North Great Jones Street (SR 1380)) (US 15-501 Business to US 70 Business (West Main Street)), Local ID: DURH0073-H

The Durham "Downtown Loop," consisting of US 15-501 Business (North Roxboro Street), US 70 Business (East and West Morgan Street, South Great Jones Street, Ramseur Street) and North Great Jones Street (SR 1380) from US 15-501 Business to US 70 Business (West Main Street), is the main roadway circulator for downtown Durham. The City of Durham developed a feasibility study, *Downtown Durham Loop Two-Way Feasibility Study* (2010), for the Downtown Loop because of the local interest in converting the loop to two-way traffic to encourage economic redevelopment. Improved vehicular and pedestrian access throughout the downtown core is expected to help economic redevelopment. Along with converting the Downtown Loop to two-way operation, other traffic calming and capacity reducing measures could be incorporated, such as reducing posted speed, narrowing lanes and on-street parking, to help project characteristics of a Central Business District (CBD).

The study analyzed existing and future conditions with the current one-way movement of the Downtown Loop and with the proposed conversion of the Downtown Loop to two-way movement. The study shows that the one-way Downtown Loop signalized intersections currently operate at an adequate level-of-service and are projected to continue to do so through 2025 due to one-way operation minimizing conflict points between opposing movements and also minimizing delay at traffic signals. The study also shows that the Downtown Loop signalized intersections, if converted to two-way operation, would be adequate through 2025. The CTP recommendation is for the conversion of the Downtown Loop to two-way operation, in coordination with the feasibility study and future environmental analysis, to encourage economic redevelopment.

For more information regarding the *Downtown Durham Loop Two-Way Feasibility Study* (2010), see the study website (https://durhamnc.gov/1087/Downtown-Loop-2-Way-Conversion-Feasibili) or contact the City of Durham, Transportation Department.

US 501 (North Duke Street) (I-85 to US 501 Business (North Roxboro Street)), Local ID: DURH0005-H

US 501 (North Duke Street), from I-85 to US 501 Business (North Roxboro Street), is currently a five-lane roadway with sidewalks on both sides of the segment from I-85 to Murray Avenue. This US highway is the principal road between north Durham and I-85 and central Durham. US 501 merges with US 501 Business (North Roxboro Road) in northern Durham to continue north to the city of Roxboro (approximately 28 miles). The CTP recommends the creation of a four-lane, divided synchronized street cross-section with turn lanes at major intersections and commercial driveways. A six-lane divided

roadway would likely require impacts to many structures and could be more difficult for pedestrians and bicyclists to maneuver.

US 501 is expected to attract the majority of new trips as northern Durham County grows because there are no planned improvements on parallel routes. NC 157 (Guess Road) does not have any improvements and possible capacity improvements on North Roxboro Street (US 501 Business) might be limited to the addition of a narrow median because of the proximity of residential and commercial buildings to the current roadway. Guess Road has similar limitations. Thus, capacity improvements for this corridor are likely to be less costly and complex on North Duke Street given a relatively lower density of residential and commercial development.

The current volume on US 501 exceeds the existing LOS D capacity. The 2015 AADT ranges from 22,000 to 37,000 vehicles per day (vpd) on US 501 with a 26,800 vpd capacity (LOS D). There appears to be excess capacity on one parallel route. Guess Road (1.3 miles to the west) has 23,000 vpd on a roadway with a 44,000 vpd capacity. The current 28,000 vpd on North Roxboro Street (US 501 Business) (0.8 miles to the east), however, greatly exceeds 22,200 vpd capacity of that roadway. The 2040 volumes on US 501 (North Duke Street) are projected to range from 37,000 to 43,000 vpd. This will yield volume-to-capacity ratios from 1.4 to 1.7, an indication of heavy travel delays on this important corridor. The projected 2040 volume on North Roxboro Street results in a highly congested 1.9 volume-to-capacity ratio between Old Oxford Road (SR 1004) and East Club Boulevard (SR 1669), but Guess Road will continue to operate at a volume that is below capacity.

There are not any major roads that intersect US 501 along this segment and as a result there are not any extraordinary intersection delays or safety problems. The intersections on this corridor have a level-of-service of C or better (i.e., A or B) based on the 2014 DCHC MPO Mobility Report Card.

Residential development along this segment and the retail and office development on the northern section generate bicycle, pedestrian and transit trips. The CTP recommends bike lanes for the complete extent of this road segment and consideration of sheltered transit stops and bus pull-outs in the design. The State Transportation Improvement Program (TIP) project EB-5715 is a sidewalk on the east side of US 501 from Murray Avenue to North Roxboro Road that is planned for construction in 2017.

US 501 crosses Ellerbee Creek immediately south of the US 501/Stadium Drive intersection but there are not any associated wetlands or floodplains. The entire length of this study segment is within a protected watershed.

US 501 (North Roxboro Road) (North Duke Street (US 501) to Sandlewood Drive (SR 1698), 2040 MTP#: 92

US 501 (North Roxboro Road) needs additional capacity between the US 501 (North Duke Street)/ US 501 Business (North Roxboro Street) split and Sandlewood Drive (SR

1698) due to projected future congestion and to improve mobility. A 4-lane divided synchronized street is proposed for the current 5-lane section from North Duke Street to Milton Road (SR 1456). A median is recommended to be added from Milton Road to Sandlewood Drive. Providing a divided roadway in this segment will improve mobility and effectively creates a divided cross-section from I-85 to Person County in the north.

North Roxboro Road is the major thoroughfare that connects I-85 and central Durham with northern Durham County and the city of Roxboro. It is the most important commuter route in northern Durham County and currently experiences significant traffic delays at intersections such as Latta Road/Infinity Road. Retail, commercial, schools, libraries and other service locations for northern Durham residents are clustered along this thoroughfare. It is in the North Carolina truck network and in some cases twin and 53-foot trucks are permitted. Most of the area in the vicinity of this roadway segment is within the water and sewer service area of the city of Durham and expected to experience moderate residential growth in the future.

The current LOS D capacity is 36,600 vehicles per day (vpd), and 2015 daily traffic counts range from 31,000 vpd near the Eno River to 20,000 vpd near Sandlewood Drive. There has been no measureable increase in daily traffic counts from 2003 through 2015. However, 2040 traffic forecasts have daily volumes increasing to as high as 48,000 vpd just north of North Duke Street, which result in volumes that are 30% over capacity, i.e., volume-to-capacity ratio (v/c) of 1.3. Capacity increases on North Duke Street and the extension of North Alston Avenue to North Roxboro Street (US 501 Business)/Old Oxford Road (SR 1004) may attract more trips to this segment of North Roxboro Road.

It should be noted that the Omega Road intersection is a potentially hazardous intersection as indicated in the 2014 NC Highway Safety Improvement Program (HSIP) report, i.e., it exceeds the warrant for frontal impact crashes. In addition, the Eno River bridge is functionally obsolete, which means that it was not constructed to the standards that are currently used.

Although this project was not funded in the FY 2016-2025 State Transportation Improvement Program (TIP), it did receive a moderate score in the NCDOT prioritization process (SPOT P3.0). However, it was not submitted in the SPOT P4.0 process, but if submitted, it might score well enough in the next prioritization cycle to be funded in the TIP. A funded project, TIP# U-5516, is to provide intersection improvements to the Latta Road/Infinity Road intersection with US 501, which is just north of Omega Road.

During the public comment period, the North Carolina Wildlife Resources Commission (NCWRC) commented on the impacts of road widening projects on the fragmentation of wildlife habitats. The US 501 (North Roxboro Road) road widening project between US 501 (North Duke Street) and Infinity Road (SR 1639) will likely impact Natural Heritage Natural Areas and the NCWRC recommends avoiding the widening where it intersects these important natural areas. Additionally, when widening cannot be avoided, the NCWRC requires NCDOT to consider building wildlife crossing structures where land is

permanently conserved on either side of the road widening to reduce habitat fragmentation. See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

US 70 (I-85/US 70 Connector to US 70 Alternate), Local ID: ORAN0101-H

Traffic volume on segments of US 70 from the I-85/US 70 Connector to US 70 Alternate is projected to exceed LOS D capacities by 2040 with expected volumes of 17,200 vehicles per day (vpd), 19,700 vpd, and 22,200 vpd from the I-85/US 70 Connector to West Hill Avenue (SR 1161), West Hill Avenue to NC 86 (North Churton Street), and North Churton Street to US 70 Alternate, respectively. LOS D capacities on the facility range from 12,400 vpd to 12,700 vpd. Improvements are needed in order to relieve anticipated congestion and to maintain a LOS D on the facility. This section of US 70 is currently a two-lane, 24-foot undivided cross section with left and right-turn lanes at various intersections and a center two-way left turn lane at various locations along the facility.

The CTP project proposal is to provide a four-lane divided cross section for this facility with five-foot bike lanes and five-foot sidewalks separated from the travel lanes to better accommodate the projected traffic volume.

During the public comment period, the North Carolina Wildlife Resources Commission (NCWRC) commented on the impacts of road widening projects on the fragmentation of wildlife habitats. The US 70 road widening project, between I-85/US 70 Connector and West Hill Avenue North, and between US 70 Business/NC 86 (North Churton Street) and US 70 Alternate, will likely impact Natural Heritage Natural Areas and the NCWRC recommends avoiding the widening where it intersects these important natural areas. Additionally, when widening cannot be avoided, the NCWRC requires NCDOT to consider building wildlife crossing structures where land is permanently conserved on either side of the road widening to reduce habitat fragmentation. See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

NC 54 (Old Fayetteville Road (SR 1107/SR 1937) to Bethel Hickory Grove Church Road (SR 1104)), STIP#: R-5821

NC 54 from Old Fayetteville Road (SR 1937 and SR 1107) to Bethel Hickory Grove Church Road (SR 1104) starts as a four-lane divided urban boulevard and quickly turns into a rural, two-lane highway as it heads west out of town. This road primarily serves commuters from western Orange County and Alamance County. Traffic volumes on NC 54 from Bethel Hickory Grove Church Road to Old Fayetteville Road currently are near or exceed Level of Service (LOS) D capacity of 12,400 vehicles per day (vpd) with existing volumes of 12,000 to 15,000 vpd. Volume on the facility is projected to increase to 24,900 vpd near Old Fayetteville Road by 2040 in the CTP. However, NCDOT counts from the last decade show no increase in AADT just west of the

intersection of NC 54 and Old Fayetteville Road, so a corridor study is desired along this corridor to better project traffic growth and recommend improvements.

Improvements are needed in order to relieve existing and anticipated congestion and to maintain a minimum LOS D on the existing facility. This section of NC 54 is currently a two-lane, 24-foot undivided cross section with limited-storage right- and left-turn lanes at its intersection with Neville Road (SR 1945). The CTP project proposal is to improve the capacity of this roadway, but further study is needed before any definitive cross-section or specific improvements are identified. The corridor runs through two watershed protection areas and the roadway is popular among bicyclists.

This project is in the current STIP FY 2016-2025 for planning and environmental study only and is described as the construction of operational improvements including bicycle/pedestrian accommodations from Orange Grove Road (SR 1006) to Old Fayetteville Road (SR 1107/SR 1937), and improvement of the Orange Grove Road intersection. In the draft STIP FY 2017-2027, the project is scheduled for construction in FY 2023. An upcoming corridor study is anticipated to analyze traffic growth of the corridor and environmental constraints, and will recommend any needed improvements. The study is to be developed by the DCHC MPO in coordination with the local governments and NCDOT.

It should be noted that the 2013 Orange County Comprehensive Transportation Plan (CTP) covering the portion of the Triangle Area Rural Planning Organization (TARPO) planning area within Orange County recommends a four-lane divided cross section for this facility from Orange Grove Road (SR 1006) to Neville Road (SR 1945).

NC 751 (NC 54 to Martha's Chapel Road (SR 1752)), 2040 MTP#: 77.2, 77.3, Local ID: CHAT0102-H

NC 751 runs from US 64 in Chatham County to US 70 in Durham County. This particular section of NC 751 is from Martha's Chapel Road (SR 1752) in rural Chatham County, which is next to the DCHC MPO border, to NC 54 in the city of Durham. Most of this section is a two-lane road with turn lanes at cross streets and major driveways. The section adjacent to I-40 and Renaissance Parkway, which runs from Southpoint Auto Park Boulevard to Renaissance Parkway, has four to five lanes to accommodate the relatively high traffic volume with turn lanes for I-40 and Renaissance Parkway. The roadway drains to nearby Jordan Lake and there are over twenty fresh water ponds in the corridor.

Improvements are recommended on NC 751 to accommodate projected traffic in order to maintain a Level of Service D and provide mobility between I-40 and the growing retail, residential and employment development in southern Durham County and eastern Chatham County. Improvements will likely vary along the corridor and could include adding turn lanes at intersections, widening the current lanes and shoulders at a minimum, or adding lanes.

It should be noted that a feasibility study (FS-1008B) was started in 2014 for this section of NC 751 that collected field data and produced traffic forecasts. Although the feasibility study was not completed, it can provide details on capacity needs for this roadway.

This problem statement presents the roadway in four different sections below.

The southern section, from Martha's Chapel Road (SR 1752) to O'Kelly Chapel Road (SR 1731), is a two-lane major collector with turn lanes at some intersections. It mostly has a 60-foot right-of-way but some subsections have 90-foot and even 200-foot right-of-way sections. The area is rural but has occasional churches and small scale commercial development such as nurseries. The 2015 AADT is 7,600 vehicles per day (vpd) and this volume has been about the same since 2003. The capacity is 12,400 vpd at LOS D. Although the current volume is well within capacity, the high peak volume split (75%) and the narrow rural roadway (24 feet overall width) combine to create safety concerns and congestion that is not common on rural highways. The 2040 volume is expected to increase to 14,000, or a 1.1 V/C ratio, which could increase the safety concerns and congestion problems. It is recommended that this southern section be widened to a four-lane divided boulevard facility.

The middle section, from O'Kelly Chapel Road to Renaissance Parkway, is a two-lane major thoroughfare with turn lanes at intersections. It mostly has a 60-foot right-of-way but some subsections have up to 90-foot, and the overall road width is 19 feet to 24 feet. It should be noted that this section connects to two east-west roads, Stagecoach Road (SR 1107) and O'Kelly Chapel Road, that provide travelers with a southern alternative to congested I-40 and NC 54. The area is a mixture of residential and retail/commercial, and there is ample undeveloped land that is developing at suburban densities. Recent development includes large single-family or multi-family development.

The 2015 AADT ranges from 13,000 vpd at the southern end to 14,000 vpd at the northern end and exceed the existing LOS D capacity of 12,700 vpd. The high peak volume split (65% to 75%), the narrow overall roadway, and multiple driveways and intersections combined can contribute to safety concerns and to congestion as well. The 2040 volume is expected to be 18,000 vpd to 21,000 vpd, resulting in a 1.4 to 1.8 V/C ratio that could increase delay.

The section adjacent to I-40, from Renaissance Parkway to Southpoint Autopark Boulevard, is a four -lane major thoroughfare south of I-40 and a four-lane divided boulevard north of I-40. It has many right turn slip lanes and double left turn lanes at the I-40 and Renaissance Parkway intersections to accommodate traffic to nearby South Pointe Mall and the adjacent big box and chain retail stores, and growing office developments. Local planners do not anticipate further widening of this roadway section because the roadway in some locations are close to buildings and the area to the west is mostly unbuildable given its proximity to Third Fork Creek and New Hope Creek.

The 2015 AADT ranges from 16,000 vpd north of I-40 to 14,000 vpd south of I-40. The capacity is as high as 36,600 vpd. The 2040 volume is projected to be 30,600 vpd and 18,800 vpd north and south of I-40, respectively. Additional lanes are not recommended for this section in the long-range plan because the 2040 projected volumes do not exceed existing capacities.

The northern section, from Southpoint Autopark Boulevard to NC 54, is mostly a two-lane major thoroughfare with turn and accessory lanes at the driveways for apartment complexes. It has a 60-foot right-of-way and the overall road width is 24 feet. The area is a mixture of multi-family residential and retail such as car dealerships, which has a relatively low trip volume among retail establishments. The road widens to a five-lane facility with a 110-foot right-of-way for about 800 feet south of NC 54 at the Hope Valley Commons shopping center. This roadway section provides an important connection between south Durham and I-40.

The 2015 AADT is 16,000 vpd and has increased from 12,000 vpd in 2003. The capacity is 12,700 vpd at LOS D for the two-lane section and 27,600 for the five-lane section. The DCHC MPO's Mobility Report Card did not discern any extraordinary delays in this alignment. The lack of congestion is probably because there are very few driveways and those that exist have turn and accessory lanes to help traffic flow. The 2040 volume is expected to be 31,000 vpd, resulting in a 2.4 V/C ratio in the two-lane section and considerable delays and potential safety problems. The NC 54/NC 751 intersection had an LOS C and LOS D rating in 2013 (see DCHC MPO Mobility Report Card) and this service level is expected to continue to deteriorate. It is recommended that this northern section be widened to a four-lane divided boulevard facility where it is two lanes and a median be added where it is a five lane section.

The future residential and commercial development around the section of NC 751 that is north of Fayetteville Road (SR 1118) could generate significant bicycle, pedestrian, and transit traffic. There are currently just a few sections with sidewalks and some bike lanes between Stagecoach Road (SR 1107) and Fayetteville Road. There is no transit service south of Renaissance Parkway. The CTP recommends sidewalks and bike lanes along this section of NC 751, and as well as a multi-use path called Eagle Spur Greenway to connect to the popular American Tobacco Trail.

NC 751 (Hope Valley Road) (Woodcroft Parkway to South Roxboro Street), 2040 MTP#: 77.1

NC 751 (Hope Valley Road), from NC 54 to South Roxboro Street, is currently a two-lane undivided major thoroughfare north of Woodcroft Parkway and a four to five-lane major thoroughfare south of Woodcroft Parkway. There are turn lanes at cross streets and major driveways, e.g., apartment complexes. Improvements to a four-lane divided boulevard are recommended between Woodcroft Parkway and South Roxboro Street to accommodate projected traffic in order to maintain a LOS D and to provide mobility between southwest Durham, I-40 and central Durham. The CTP recommends an

extension of Woodcroft Parkway from NC 751 to Garrett Road (SR 1116) that is expected to attract trips away from the section of NC 751 between Woodcroft Parkway and Garrett Road.

This section of NC 751 currently has a 60-foot right-of-way, sidewalks covering many locations along the route, and no bicycle lanes. The 2015 AADT is 16,000 vpd to 18,000 vpd north and south, respectively, of Woodcroft Parkway. The capacity north of Woodcroft Parkway is 11,600 vpd and thus already experiences LOS E congestion. Although the capacity south of Woodcroft Parkway, 31,600 vpd, is higher than the current 18,000 vpd, there are many traffic signals, driveways and lane changing that cause delays in this section. The 2040 volume is expected to increase to 22,800 vpd and 25,700 vpd in the north and south sections, respectively, and increase the congestion and delays.

Intersection improvements should be considered, as well. The NC 751/Garrett Road intersection exceeds the NCDOT standard safety warrant for frontal impact crashes (as indicated in the 2014 NC Highway Safety Improvement Program (HSIP) report), and has an LOS D rating in the 2014 Mobility Report Card.

In this vicinity, there are many residential developments, shops, and restaurants, and a high school and two large grocery stores. There are also plans for more neighborhoods to be developed around this area. With the current and future developments around NC 751, a significant percent increase in traffic congestion on this stretch of NC 751 is expected, especially during the PM peak time frame when both the nearby high school and working commuters are on the road at the same. Furthermore, the intersection of NC 751 and South Roxboro Street needs to be improved, possibly by making South Roxboro Street to NC 751 (south) a through movement and creating NC 751 (north) as the single leg of a T-intersection into South Roxboro Street. South Roxboro Street is a four-lane divided arterial that is planned to be extended in the future to provide a direct route to downtown Durham.

The current residential and commercial development around NC 751, in addition to the future residential development, could generate increased bicycle, pedestrian, and transit traffic. The current pedestrian facilities are discontinuous and inadequate for existing pedestrian traffic. There are no bicycle facilities, and many of the bus stops do not have amenities nor include bus pull-outs resulting in blocked traffic. The need for pedestrian, bicycle, and transit facilities increases with additional development along NC 751. In the Durham Comprehensive Bicycle Transportation Plan, bicycle lanes have been proposed along NC 751. The Third Fork Creek Trail intersects with this section of NC 751 and additional bicycle and pedestrian facilities are needed to connect nearby destinations to the trail. The DurhamWalks! Pedestrian Plan recommends sidewalks on both sides of NC 751.

During the public comment period, the NCWRC commented on the impacts of road widening projects on the degradation of aquatic wildlife in streams and wetlands. The NCWRC encourages the use of Low Impact Development (LID) techniques and other

important measures to minimize negative impacts from roads and development along the NC 751 section of South Roxboro Street to Woodcroft Parkway. The NCWRC also provided their standard recommendations for bridges, if this project has the opportunity to build bridges or improve existing bridges.

See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

NC 86 South (Pittsboro Street) (West Cameron Avenue to NC 86 North (South Columbia Street)), Local ID: ORAN0103-H

Pittsboro Street (NC 86 South) runs from West Cameron Avenue to NC 86 North (South Columbia Street) and is a main thoroughfare down the West side of UNC's campus. The road segment is the continuation of NC 86 heading to the south and corresponds with South Columbia Street (NC 86) heading to the north. The 2015 AADT is 9,400 vpd; by 2040, the AADT is expected to be 11,100 vpd compared to a LOS D capacity of 12,700 vpd for the existing right-of-way. This is indicative of a competitive segment for vehicular travel in 2040 if all things stayed the same; however, the planned Bus Rapid Transit (BRT) route could make a change to this road segment necessary. In order to maintain the facility's mobility with proposed additional buses having designated right-of-way, capacity expansion is recommended on this segment.

NC 86 (Old NC 10 (SR 1710) to US 70 Business), Local ID: ORAN0104-H

NC 86, from Old NC 10 (SR 1710) to the US 70 Business route is currently a two-lane, undivided arterial that is approaching capacity and is recommended to be expanded to a four lane divided boulevard facility. There are two potential project sections: US 70 Business to I-85 and I-85 to NC 10. Improvements are needed to accommodate both current and projected traffic in order to maintain a LOS D. The current LOS D roadway capacity, 12,400 vehicles per day (vpd), struggles to handle the 11,000 vpd (2015 AADT). The 2040 volume forecast of 18,500 vpd and 32,700 vpd on NC 86 north and south of I-85, respectively, could create very high levels of congestion and delay.

This section of NC 86 currently has sidewalks at select locations, but no bicycle lanes. There are many neighborhoods, restaurants, and shops along this stretch of NC 86. This section of NC 86 serves as a major commuting route between Hillsborough and Chapel Hill, and provides access to an existing park-and-ride along Waterstone Drive and would provide access to future park-and-ride lots in the Hillsborough area. A future passenger rail station is also proposed north of this segment on the NC 86 corridor at South Churton Street (SR 1009) and Orange Grove Road Extension. Additionally, the Old NC 10 corridor is heavily used by both commuting and recreational bikers moving between Durham and Hillsborough. This route appears on both the Hillsborough Connectivity Plan and the Orange County bicycle plan.

The current residential and commercial development around NC 86, in addition to the planned office and residential development, could likely generate increased bicycle, pedestrian, and transit traffic. The current pedestrian facilities are discontinuous and inadequate for existing pedestrian traffic. There are no bicycle facilities, and many of the bus stops do not have amenities nor include bus pull-outs resulting in blocked traffic. The need for pedestrian, bicycle, and transit facilities will increase with additional development along NC 86 and with the construction of a passenger rail station.

NC 86 (US 70 Bypass (Cornelius Street) to north of the NC 86/NC 57 split), Local ID: ORAN0105-H

NC 86, from US 70 Bypass (Cornelius Street) to north of the NC 86/NC 57 split, is currently a two-lane undivided regional facility that is expected to be over capacity by 2040. NC 86 overlaps with NC 57 on this section of roadway. Improvements are recommended to accommodate projected traffic in order to maintain a LOS D and to improve pedestrian safety.

This section of NC 86 currently has a 60-foot right-of-way, no sidewalks, and no bicycle lanes. The 2015 AADT is 16,000 vehicles per day (vpd); by 2040, the volume is expected to be over 20,000 vpd compared to an LOS D capacity of 12,900 vpd for the existing cross section. There are many neighborhoods, restaurants, shops, and a couple schools nearby this stretch of NC 86. This route provides an important connection to Roxboro and several towns in the southern Virginia region, which contribute to the high traffic volume on this route. Any further suburbanization of this northern Hillsborough area could also account for a significant percent increase in traffic on NC 86. Portions of NC 86 north of NC 57 and along US 70 Business/NC 86 (South Churton Street) are a part of a 92 mile North Carolina Scenic Byway called Colonial Heritage Byway.

Improvements at the NC 86/NC 57 intersection are identified as a need in the Safe Routes to School Action Plan for Stanford Middle School. While the intersection was reconfigured more than a decade ago to install a traffic signal, the intersection is still less than desirable with closely intersecting local streets and a right turn short cut that remains open. Additionally, the acute intersection angle with US 70 Bypass makes certain maneuvers difficult for the significant heavy truck traffic routed through this intersection by the town's designated truck route which prohibits non-local trucks continuing south on NC 86.

The current residential and commercial development around NC 86, in addition to any planned development, will likely generate increased bicycle, pedestrian, and transit traffic. The current pedestrian facilities are discontinuous and inadequate for existing pedestrian traffic. There are no bicycle facilities. There is an existing Orange Public Transportation (OPT) bus service, the Orange-Chapel Hill Midday Connector, which traverses NC 86 to Ceder Grove, north of Hillsborough. There is also a GoTriangle route on NC 86 and the US 70 bypass directly south of this section. The need for

pedestrian, bicycle, and transit facilities increases with additional development along NC 86 and more through traffic from northern Orange County.

NC 98 (Holloway Street/Wake Forest Highway) (US 70 Business (North Miami Boulevard) to Wake County Line), 2040 MTP#: 81.1, Local ID: DURH0014-H

NC 98, from US 70 Business to the Wake County boundary, is currently a four-lane undivided road from US 70 Business to Nichols Farm Drive and a two-lane section east of the intersection with Nichols Farm Drive. The short section from US 70 to Junction Road (SR 1838) is already five lanes and is planned to receive capacity improvements as part of the East End Connector construction that is already in progress. There are two possible project sections: US 70 Business to Nichols Farm Drive; and Nichols Farms Drive to the Wake County Line. There are turn lanes at many cross streets, center left turn lanes at some retail developments, and turn and acceleration lanes at driveways to major subdivisions. Sidewalks and bike lanes are rare and mostly concentrated in the segment near US 70. NC 98 is the principal road between Durham and northern Wake County (including Wake Forest) because Falls Lake limits the number of roadways that can make this east-west connection. It is the only major east-west roadway between I-85 and I-540, which is ten miles or more, and these rural areas are likely to experience substantial residential growth over the next few decades. The CTP recommends the addition of a narrow median in the current four-lane sections and the addition of two travel lanes in the current two-lane section to create a four-lane divided boulevard on NC 98 from US 70 Business to Wake County.

The 2015 AADT for the four-lane segment of NC 98 ranges from 12,000 vpd to 28,000 vpd, and the segment just east of Junction Road is approaching the four-lane undivided 24,000 vpd LOS D capacity. The 2040 volume, however, is projected to range from 24,000 vpd to 39,000 vpd. This will create volume-to-capacity ratios from 1.0 to 1.5, an indication of travel delays on a key corridor. The 2015 AADT for the two-lane segment of NC 98 east of Nichols Farm Drive is 12,000 vpd, which given the 12,400 vpd LOS D capacity, is creating some delays and safety concerns (e.g., passing vehicles on a two-lane road). The 2040 volume is expected to increase to 18,000 vpd, which could result in more delays and crashes if additional capacity is not added. In the four lane sections near US 70, the intersections with Hardee Street, Adams Street and Lynn Road Extension (SR 1919) exceed the NCDOT standard safety warrant for frontal impact crashes (as indicated in the 2014 NC Highway Safety Improvement Program (HSIP) report).

Although long-range plans provide for additional lanes on I-85 and I-540, this additional capacity is likely to have little effect in drawing traffic away from NC 98 given the ten plus mile distance between those roadways and the expected residential growth.

There are other transportation issues on NC 98 besides congestion. The US 70/NC 98 bridge is considered functionally obsolete. The East End Connector project, which started construction in 2015, plans to make needed improvements to this bridge. Intersection delay is currently not a problem. The intersections on the NC 98 corridor

have a level-of-service of C or better (i.e., A or B) based on the 2014 DCHC MPO Mobility Report Card.

The current and future residential development in the NC 98 area and the expected retail development on NC 98 will likely generate increased bicycle, pedestrian, and transit traffic. Sidewalks and bike lanes are rare, and bus stops do not have any amenities. The CTP recommends a bike lane for the complete extension of the NC 98 corridor and sidewalks to fill any of the existing gaps. In addition, NC 98 roadway improvements need to consider safe crossing treatments for bicycle and pedestrian traffic that cross NC 98.

The US Army Corps of Engineers and resource agencies should be included early in the environmental analysis stage of the project development. Potential environmental impacts will be a concern and likely have an influence on the design and viability of adding lanes to this roadway. NC 98 crosses over Lick Creek and Little Lick Creek, and the Lick Creek section contains wetlands, Army Corps of Engineers property and critical watershed. The entire length of this project segment is within either a protected or critical watershed.

During the public comment period, the North Carolina Wildlife Resources Commission (NCWRC) commented on the impacts of road widening projects on the fragmentation of wildlife habitats. The NC 98 road widening project between Wake County and Nichols Farm Road will likely impact Natural Heritage Natural Areas and the NCWRC recommends avoiding the widening where it intersects these important natural areas. Additionally, when widening cannot be avoided, the NCWRC requires NCDOT to consider building wildlife crossing structures where land is permanently conserved on either side of the road widening to reduce habitat fragmentation. See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

Barbee Chapel Road (SR 1110) (NC 54 to Farrington Mill Road (SR 1109)), Local ID: DURH0019-H

Barbee Chapel Road (SR 1110), from NC 54 to Farrington Mill Road (SR 1109), is currently a two-lane undivided suburban road that does not provide adequate pedestrian and on-road bicycle facilities. Improvements are needed to accommodate pedestrian and bicycle traffic and improve connectivity between Chapel Hill, Chatham County, Durham, and Research Triangle Park.

This section of Barbee Chapel Road currently has a 60-foot right-of-way, sidewalks at a few locations, and no bicycle lanes. The 2015 AADT is 13,000 vehicles per day (vpd); by 2040, the AADT is expected to be 19,100 vpd compared to a LOS D capacity of 11,600 vpd for the existing right-of-way. There are mostly residential units along this stretch of Barbee Chapel Road/Farrington Road and plans to build more residential units nearby as well. The traffic around Barbee Chapel Road will continue to increase with the increased development around this area. The CTP proposes to improve this

facility to a four lane divided boulevard facility to accommodate projected 2040 vehicular traffic, and anticipated increased bicycle and pedestrian traffic.

This route also serves as a connection to developing Chatham County neighborhoods and as a relief route for nearby NC 54 and I-40. This route is part of the Triangle Commuter Bike Initiative.

The current and planned residential development around Barbee Chapel Road could generate increased bicycle, pedestrian, and transit traffic. The current pedestrian facilities are discontinuous and inadequate for existing pedestrian traffic. There are no bicycle facilities, and many of the bus stops do not have amenities nor include bus pull-outs resulting in blocked traffic. The need for pedestrian, bicycle, and transit facilities could increase with additional development around Barbee Chapel Road. Bicycle lanes have been proposed along this route in the Durham Comprehensive Bicycle Transportation Plan. The DurhamWalks! Pedestrian Plan recommends sidewalks on both sides of this route.

Carver Street Extension (Danube Lane (SR 1648) to Hamlin Road (SR 1634)), City of Durham CIP#: ST-257, 2040 MTP#: 9

East Carver Street is proposed to be extended from Danube Lane (SR 1648) to Hamlin Road (SR 1634) to improve east-west connectivity in northern Durham County. This area has recently experienced significant residential growth and East Carver Street provides access to the retail, medical and commercial facilities clustered along US 501 Business (North Roxboro Street) and Ben Franklin Boulevard. This two-lane divided roadway extension with sidewalks and bicycle lanes is currently under construction. The only other east-west connectors in this area, Hebron Road (SR 1656) and Old Oxford Road (SR 1004), are about 1 ½ miles apart along US 501 Business (North Roxboro Street).

This project is funded in the city of Durham Capital Improvement Program (CIP), the funding source being local traffic impact fees, and the City's Public Works Department is also managing the project. Construction began in fall of 2016 and it is scheduled to be complete in spring of 2019.

During the public comment period, the North Carolina Wildlife Resources Commission (NCWRC) commented on the impacts of new road projects on the fragmentation of wildlife habitats. The Carver Street Extension new location road project between Old Oxford Road and Danube Lane will likely impact Natural Heritage Natural Areas and the NCWRC recommends avoiding building roads through these important natural areas and large areas of connected blocks of habitat. When a new road cannot be avoided, the NCWRC requires NCDOT to consider building wildlife crossing structures where land is permanently conserved on either side of the new road to reduce habitat fragmentation.

Additionally, the NCWRC commented on the impacts of new road projects on the degradation of aquatic wildlife in streams and wetlands. The NCWRC encourages the use of Low Impact Development (LID) techniques and other important measures to minimize negative impacts from roads and development along the proposed Carver Street Extension section of Old Oxford Road to Danube Lane. The NCWRC also provided their standard recommendations for bridges, if this project has the opportunity to build bridges or improve existing bridges.

See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

South Churton Street (SR 1009) (Eno River Bridge to I-40), TIP No. U-5845

Current 2015 AADT volumes on South Churton Street (SR 1009) are 13,000 vpd north of I-40 and 16,000 vpd from I-85 to US 70 Business/NC 86. Traffic volumes on all segments of South Churton Street (SR 1009) from I-40 to the Eno River are currently over LOS D capacity of 11,600 vehicles per day (vpd) in the two-lane sections and 12,800 vpd in the three-lane sections; the section north of I-85 is projected to exceed 21,000 vpd by 2040. Improvements are recommended in order to relieve anticipated congestion and to maintain a minimum LOS D on the existing facility. South Churton Street currently has a two-lane section from I-40 to Oakdale Drive (SR 1133) with turn lanes at some intersections. The cross-section converts to a three-lane profile from Oakdale Drive to north of Orange Grove Road (SR 1006) and converts back to a two-lane section before crossing bridge #240 over the Southern Railroad.

This corridor provides significant access to neighborhoods and shopping areas throughout Hillsborough as well as connecting all portions of town to both I-85 and I-40. With only two bridges over the Eno River in town, this route is the primary north-south travel conduit. Significant development and redevelopment along this corridor is also projected in the town's land use plan. The anticipated development is planned to be compact in nature increasing the need for bicycle and pedestrian improvements in the corridor to more seamlessly connect the entire community and maximize the options to use alternate modes of transportation. The Collins Ridge development Phase 1 off of Orange Grove Street is approximately 100 acres including 674 planned dwellings, a community center and a walking trail. This development is expected to add significant traffic to the adjacent roadways of South Churton Street and Orange Grove Road. The town also plans to have a passenger rail station near the intersection of Orange Grove Road and South Churton Street, which is planned to also serve as a transit hub for the existing services in the community.

The CTP project proposal is to provide a four-lane divided cross section with a raised median for this facility to better accommodate the projected 2040 volume. Bike lanes and sidewalks are also recommended along the project length. This project is scheduled in the current STIP FY 2016-2025 for construction in FY 2023. It is described as the widening of South Churton Street (SR 1009) from I-40 to the Eno River in Hillsborough to multi-lanes.

US 70 Business/NC 86 (Churton Street) north of the Eno River through downtown Hillsborough is currently over existing LOS D capacity with 2015 AADT ranging from 12,000 vpd south of US 70 Bypass to 20,000 vpd north of the Eno River bridge. Projected traffic volumes through downtown Hillsborough range from 24,500 vpd north of the Eno River bridge to 16,200 vpd south of the US 70 Bypass; the projected traffic growth will increase existing traffic congestion over time. Widening US 70 Business/NC 86 (Churton Street) is not an option for alleviating traffic since it would significantly impact the downtown character, the businesses and residential properties. It is also a historic district, so impacts should be avoided. There are turn lanes at most intersections and several areas with a center left turn lane that helps with mobility.

Developing alternative routes around downtown US 70 Business/NC 86 (Churton Street) have been discussed in the past, but there is no local government consensus. It is believed, and the Triangle Regional Model (TRMv5) confirms, that there is not much through traffic on Churton Street, so not enough traffic could be diverted on a bypass around Churton Street to significantly alleviate congestion. There are natural environmental concerns and historic areas in and around Hillsborough that would need to be considered if a bypass were developed.

There are several existing major alternate routes around Hillsborough to head north up NC 86 and NC 57, such as US 70 Bypass (or Alternate) from Durham along I-85 and the I-85/US 70 Connector from I-40/85 to US 70 Bypass. There are other existing minor roadways that connect up to US 70 Bypass that can be traveled east and west of downtown to avoid the Churton Street congestion as well.

Eno Mountain Road (SR 1148) & Mayo Street (SR 1192) at Orange Grove Road (SR 1006) Intersection, TIP No. U-3436, 2040 MTP #: 89.3

The Eno Mountain Road (SR 1148) and Mayo Street (SR 1192) intersections with Orange Grove Road (SR 1006) are suburban intersections that need improved safety and traffic flow. Improvements are also needed for adequate pedestrian, on-road bicycle and bus accommodations.

The Eno Mountain Road and Mayo Street intersections with Orange Grove Road are two 3-leg intersections that are approximately 300 feet apart. Orange Grove Road is the east-west street, with Eno Mountain Road intersecting it from the north and Mayo Street intersecting it from the south. These three roads combined make an alternative route to get from South Hillsborough to downtown Hillsborough without using congested South Churton Street (SR 1148).

All three roads are two-lane undivided, have 60-foot right-of-ways, no sidewalks, and no bicycle lanes. The 2015 AADT on Orange Grove Road is 8,100 vehicles per day (vpd); by 2040, the AADT is expected to be 9,100 vpd with 11,100 vpd and 8,700 vpd on the Eno Mountain Road and Mayo Street legs, respectively.

This CTP project recommends Eno Mountain Road to be realigned to the intersection of Mayo Street and Orange Grove Road. This project is not currently in the STIP. Orange Grove Road is also scheduled, TIP# U-5848, to be extended east to US 70 Business from South Churton Street, creating a critical east-west connection south of the river. This realignment could influence the future traffic through this intersection.

Nearby residential and commercial development, in addition to any future development, could significantly increase traffic along these routes. There are existing townhomes in the northwest quadrant of Eno Mountain Road and Orange Grove Road. The current and planned development around Eno Mountain Road, Mayo Street, and Orange Grove Road could generate increased bicycle, pedestrian, and transit traffic, especially the planned Collins Ridge development with one of its access points across Churton Street from Orange Grove Road at the end of Orange Grove Street. The Collins Ridge development Phase 1 is approximately 100 acres including 674 planned dwellings, a community center and a walking trail. This development could add significant traffic to the adjacent roadways of South Churton Street and Orange Grove Road.

The current pedestrian facilities are discontinuous and inadequate for existing pedestrian traffic. There are no bicycle facilities, and many of the bus stops do not have amenities nor include bus pull-outs resulting in blocked traffic. The need for pedestrian, bicycle, and transit facilities will continue to increase with additional development around these three roads.

Erwin Road (SR 1734/1306) (US 15-501 (Fordham Boulevard/Durham-Chapel Hill Boulevard) to NC 751), Local ID: ORAN0107-H, DURH0036-H

Erwin Road (SR 1734/1306), between US 15-501 (Fordham Boulevard/Durham-Chapel Hill Boulevard) and NC 751, is a two-lane minor thoroughfare road that does not provide adequate pedestrian and on-road bicycle facilities. The CTP recommends improving Erwin Road to a good two to three lane road with from US 15-501 to Whitfield Road and a four lane divided roadway north of Whitfield with bicycle and pedestrian accommodations on both sections to relieve projected congestion. Improvements are also recommended to accommodate pedestrian and bicycle traffic and improve connectivity between Durham and Chapel Hill.

Erwin Road currently has a 60-foot right-of-way, sidewalks at certain locations, a brief stretch of wide shoulders from Weaver Dairy Road (SR 1733) to I-40, and no bicycle lanes. The 2015 AADT ranges from 7,200 vpd to 12,000 vpd; by 2040, the AADT is expected to be 14,200 vpd to 23,400 compared to a LOS D capacity of 11,600 vpd to 12,900 vpd for the existing right-of-way. There are many residential units along Erwin Road with some schools, churches, and shops along it as well. Erwin runs parallel to US 15-501 and offers a direct connection between Durham and Chapel Hill. It is a convenient route for access to Duke University. In addition to inadequate shoulder width, there are several intersections with inadequate sight distance. Improvements are needed to better the roadway conditions for motorists, bicyclists, and pedestrians.

The development around Erwin Road will likely generate increased bicycle, pedestrian, and transit traffic. The current pedestrian facilities are discontinuous and inadequate for existing pedestrian traffic. There are no bicycle facilities, and many of the bus stops do not have amenities nor include bus pullouts resulting in blocked traffic. The need for pedestrian, bicycle, and transit facilities will continue to increase with additional development around Erwin Road. Bicycle lanes have been proposed along this route in the Durham Comprehensive Bicycle Transportation Plan. The DurhamWalks! Pedestrian Plan recommends sidewalks on both sides of Erwin Road within the Durham city limits. In Chapel Hill's inactive *Bike and Pedestrian Action Plan*, sidewalks have been proposed from US 15-501 to I-40, crossing improvements have been proposed at US 15-501, Sage Road, and just north of Chippoaks Drive, and a greenway has been proposed from just north of Chippoaks Drive to I-40. Chapel Hill is currently developing a Mobility and Connectivity Plan to replace the inactive plan. Duke Forest is along the northern section of Erwin Road near NC 751. Hollow Rock Nature Park is along Erwin Road at Pickett Road (SR 1734/1303).

During the public comment period, the North Carolina Wildlife Resources Commission (NCWRC) commented on the impacts of road widening projects on the fragmentation of wildlife habitats. The Erwin Road widening project between Sage Road and Whitfield Road will likely impact Natural Heritage Natural Areas and the NCWRC recommends avoiding the widening where it intersects these important natural areas. Additionally, when widening cannot be avoided, the NCWRC requires NCDOT to consider building wildlife crossing structures where land is permanently conserved on either side of the road widening to reduce habitat fragmentation.

Additionally, the NCWRC commented on the impacts of road widening projects on the degradation of aquatic wildlife in streams and wetlands. The NCWRC encourages the use of Low Impact Development (LID) techniques and other important measures to minimize negative impacts from roads and development along the Erwin Road section of Sage Road to Whitfield Road. The NCWRC also provided their standard recommendations for bridges, if this project has the opportunity to build bridges or improve existing bridges.

See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

Estes Drive Extension (SR 1780) (North Greensboro Street (SR 1772) to Seawell School Road (SR 1843)), 2040 MTP#: 17.1

Estes Drive Extension (SR 1780) from North Greensboro Street (SR 1772) to Seawell School Road (SR 1843) is one of the only routes on the western end of Town to travel from Carrboro to Chapel Hill. It is a narrow two-lane road at the North Greensboro end and gradually widens as it crosses the railroad tracks and approaches Seawell School Road. There are currently no sidewalks along the entire corridor, but there are wide paved shoulders of three to four feet east of the railroad tracks. The segment sees an average of 13,000 vehicles daily (2015 AADT), which exceeds the LOS D capacity.

The only significant congestion on this segment of roadway is at the Estes Drive Extension/North Greensboro Street intersection, which is planned to be improved in 2018 (TIP # U-5846) with the construction of a roundabout. Additional travel lanes cannot be added to this segment of Estes Drive Extension due to the close proximity of residential homes to the roadway. Bike lanes and sidewalks are currently recommended on Estes Drive Extenstion to increase capacity some with additional safety improvements to be considered.

During the public comment period, the NCWRC commented on the impacts of road widening projects on the degradation of aquatic wildlife in streams and wetlands. The NCWRC encourages the use of Low Impact Development (LID) techniques and other important measures to minimize negative impacts from roads and development along the Estes Drive Extension section of North Greensboro Street to Seawell School Road. The NCWRC also provided their standard recommendations for bridges, if this project has the opportunity to build bridges or improve existing bridges.

See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

Estes Drive Extension (SR 1780) (Seawell School Road (SR 1843) to NC 86 (Martin Luther King Jr Boulevard)), 2040 MTP#: 17

Estes Drive Extension (SR 1780), from Seawell School Road (SR 1843) to NC 86 (Martin Luther King Jr Boulevard), is currently a two-lane undivided minor thoroughfare that does not provide adequate pedestrian and on-road bicycle facilities, and is projected to exceed its vehicular capacity by 2040. Improvements are also recommended to accommodate pedestrian and bicycle traffic and improve connectivity between Carrboro and Chapel Hill. Estes Drive currently has many residential areas, a couple schools, and a small airport located nearby.

This section of Estes Drive Extension currently has a 30-foot right-of-way, sidewalks at certain locations, and no bicycle lanes. The 2015 AADT is 12,000 vehicles per day (vpd); by 2040, the AADT is expected to be 14,000 vpd compared to a LOS D capacity of 12,900 vpd for the existing right-of-way. This volume produces a volume- to-capacity ratio of just 1.1, which is unlikely to require a widening project. Estes Drive Extension may see significant traffic increases by 2040 due to Chapel Hill's plans (plans are currently indefinite) to construct a northern campus, "Carolina North," for the University of North Carolina (UNC) just north of Estes Drive Extension.

The current development around this section of Estes Drive Extension, in addition to the future development (especially with Carolina North to be built along Estes Drive Extension), may generate increased bicycle, pedestrian, and transit traffic. The current pedestrian facilities are discontinuous and inadequate for existing pedestrian traffic. There are no bicycle facilities, and many of the bus stops do not have amenities nor include bus pull-outs resulting in blocked traffic. The need for pedestrian, bicycle, and transit facilities will continue to increase with additional development around Estes Drive

Extension, especially with the construction of Carolina North. The development of this new campus for UNC is expected to drastically increase non-motorized and transit traffic along Estes Drive Extension.

The CTP proposal for Estes Drive Extension recommends widening and intersection improvements at NC 86 with bicycle, pedestrian, and transit traffic accommodations from Seawell School Road to NC 86 due to the development of Carolina North and anticipates these improvements to the roadway with its development.

In the Carrboro Bicycle Network Plan, bicycle lanes are proposed from Estes Drive Extension to the Carrboro town limits (the railroad tracks). The Chapel Hill Bike Plan proposes bicycle lanes from Seawell School Road to Martin Luther King Jr Boulevard.

Sidewalks have been proposed along the east side of Estes Drive Extension (from North Greensboro Street (SR 1772) to town limits) in the Carrboro Bicycle Policy and Sidewalk Policy. The inactive Chapel Hill *Bike and Pedestrian Action Plan* has proposed sidewalks from Martin Luther King Jr Boulevard (NC 86) to the proposed Carrboro sidewalks. In both the Carrboro and Chapel Hill pedestrian plans, the Bolin Creek Greenway is proposed to cross underneath Estes Drive with a proposed underpass. Chapel Hill is currently developing a Mobility and Connectivity Plan to replace the inactive plan.

During the public comment period, the NCWRC commented on the impacts of road widening projects on the degradation of aquatic wildlife in streams and wetlands. The NCWRC encourages the use of Low Impact Development (LID) techniques and other important measures to minimize negative impacts from roads and development along the Estes Drive Extension section of Seawell School Road to Martin Luther King Jr Boulevard. The NCWRC also provided their standard recommendations for bridges, if this project has the opportunity to build bridges or improve existing bridges.

See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

Eubanks Road (SR 1727) (Millhouse Road (SR 1725) to NC 86 (Martin Luther King Jr Boulevard)), 2040 MTP#: 222

Eubanks Road (SR 1727), from Millhouse Road (SR 1725) to NC 86 (Martin Luther King Jr Boulevard), is currently a two-lane undivided minor thoroughfare road. The CTP proposal recommends widening to a four lane divided boulevard to accommodate projected 2040 vehicular traffic and to adequately accommodate increased pedestrian and bicycle traffic.

This section of Eubanks Road currently has a 60-foot right-of-way, sidewalks at select locations, and no bicycle lanes. The 2015 AADT is 8,600 vehicles per day (vpd); by 2040, the AADT is expected to be 21,800 vpd compared to a LOS D capacity of 12,400 vpd for the existing right- of- way. There are some residential units, some offices, a

landfill, and a park-and-ride lot along this stretch of Eubanks Road. Many residential units and a town/village center are proposed along this section of Eubanks Road and nearby. Eubanks Road is an important connector route between NC 86 (Martin Luther King Jr Boulevard) (which connects to I-40) and Old NC 86 (northwestern end of Carrboro), and could see significant traffic increase due to its connectivity and proposed development.

The current and planned development around Eubanks Road may generate increased bicycle, pedestrian, and transit traffic. The current pedestrian facilities are discontinuous and inadequate for existing pedestrian traffic. There are no bicycle facilities, and the park-and-ride lot is almost at capacity in use. The need for pedestrian, bicycle, and transit facilities will continue to increase with additional development around Eubanks Road.

In the Chapel Hill Bike Plan, there is a proposed greenway path that is planned to cross Eubanks Road near the park-and-ride lot (with proposed crossing improvements where it crosses) and another greenway path that is planned to cross Eubanks Road near NC 86. There are proposed sidewalks along the south side of Eubanks Road from Millhouse Road (SR 1725) to NC 86 in Chapel Hill's inactive *Bike and Pedestrian Action Plan*. Chapel Hill is currently developing a Mobility and Connectivity Plan to replace the inactive plan. Also, the western edge of Eubanks Road is along Duke Forest.

During the public comment period, the NCWRC commented on the impacts of road widening projects on the degradation of aquatic wildlife in streams and wetlands. The NCWRC encourages the use of Low Impact Development (LID) techniques and other important measures to minimize negative impacts from roads and development along the Eubanks Road section of Rogers Road (SR 1729) to Martin Luther King Jr Boulevard. The NCWRC also provided their standard recommendations for bridges, if this project has the opportunity to build bridges or improve existing bridges.

See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

Fayetteville Road (SR 1118) (Woodcroft Parkway to Riddle Road (SR 1171)), 2040 MTP#: 23

Fayetteville Road (SR 1118), between Woodcroft Parkway and Riddle Road (SR 1171), is currently a two-lane road except for the area immediately adjacent to Martin Luther King Jr Parkway, which has multiple through lanes and turning lanes. There are three potential project sections: Riddle Road to Martin Luther King Jr Parkway; Martin Luther King Jr Parkway to Barbee Road; and, Barbee Road to Woodcroft Parkway. A 4-lane divided cross-section with sidewalks, bicycle lanes and bus facilities is proposed on Fayetteville Road for accommodating expected future traffic volume. Fayetteville Road serves as a major north-south route that connects the growing residential, retail and commercial areas around the Streets at Southpoint Mall with downtown Durham.

This section of Fayetteville Road currently has a 60-foot right-of-way, an existing greenway path running parallel to the road, sidewalks at select locations, no bicycle lanes, and almost a dozen bus stops. The 2015 daily traffic count ranges from 17,000 vehicles per day (vpd) north of Martin Luther King Jr Parkway to 19,000 vpd between Martin Luther King Jr Parkway and Barbee Road. The traffic counts south of Barbee Road, 17,000 vpd, have not increased in the last several years. The LOS D capacities range from 12,700 vpd to 14,600 vpd on the two-lane sections of this roadway, and the 2040 traffic volume is projected to be as high as 22,500 vpd, putting the projected volume at about 80% over the capacity, i.e., v/c is 1.8.

There are many neighborhoods, restaurants, shops, schools, and a church along this stretch of Fayetteville Road. A high level of new residential, retail and commercial development is expected in the future, including a large residential development near the Juliette Drive intersection. Major retail centers anchored by Lowes Home Improvement and Wal-Mart were recently constructed at the Martin Luther King Jr Parkway intersection and along Martin Luther King Jr Parkway. Bicycle, pedestrian and transit facilities are needed to connect the different land uses and to connect to the American Tobacco Trail. The current pedestrian facilities are discontinuous and inadequate for existing pedestrian traffic and there are no bicycle facilities. Many of the bus stops do not have amenities nor include bus pull-outs resulting in blocked traffic. The Durham Comprehensive Bicycle Transportation Plan proposed bicycle lanes along this route, and the DurhamWalks! Pedestrian Plan recommends sidewalks on both sides of the roadway.

The city of Durham has funded two phases of this project using traffic impact fees. The realignment of Buxton Road and Riddle Road to form a single intersection with Fayetteville Road is funded in the City's Capital Improvement Program (CIP), project # ST-254, and construction is scheduled to begin in early 2017. The CIP project # ST-264 is the addition of lanes in the East Cornwallis Road (SR 1121) to Barbee Road section and is scheduled to start construction in late 2017. Contact the City of Durham Public Works Department for the latest information on these projects.

South Greensboro Street (SR 1919) (East Main Street (SR 1010) to NC 54), Local ID: ORAN0109-H

This section of roadway leads from NC 54 into the heart of downtown Carrboro. It is a narrow, two-lane road lined with single and multi-family homes. There is some office and storage space at the bottom of the hill near NC 54, and a large commercial center has recently broken ground. This is also a major gateway road into Carrboro, with a current 2015 count of 12,000 vehicles per day. The 2040 projected count is estimated to produce a volume-to-capacity ratio of 1.3 and the road is identified in the CTP as needing improvement. However, adding travel lanes could greatly impact the neighborhoods because the residential and commercial buildings are very close to the roadway. Additionally, once in downtown Carrboro, Greensboro Street (SR 1919) remains a two-lane road, and widening just the southern portion would create even more of a bottleneck than already exists.

Recommended improvements to the road include adding bike lanes and sidewalks. While bike lanes are not in the current STIP (again, due to limited right-of-way), the 2016-2025 STIP includes construction of a sidewalk along one side of the roadway. TIP# U-4726DX, currently programmed for FY 2016, is to construct a sidewalk from the north end of Old Pittsboro Road to NC 54. Sidewalk improvements are recommended from the north end of Old Pittsboro Road to East Main Street. In addition, the commercial development being built near the intersection of Old Pittsboro Road and South Greensboro Street plans to construct a roundabout at the intersection to improve traffic flow.

North Greensboro Street (SR 1772) (Estes Drive Extension (SR 1780) to East Main Street (SR 1010)), Local ID: ORAN0110-H

This segment of North Greensboro Street (SR 1772) is one of the primary arteries through downtown Carrboro. It runs from a very congested intersection with Estes Drive Extension (SR 1780), past single and multi-family residential, and into dense high-volume commercial development near East Main Street (SR 1010). The northern portion of the roadway has a speed limit of 35 mph and decreases to 20 mph as it enters the commercial area. It is primarily two lanes, but has a right-turn lane at Estes Drive Extension and a center lane at the highest volume commercial area. Currently (2015 AADT) 13,000 vehicles travel this segment north of Weaver Street daily, putting the roadway at a daily volume greater than the LOS D capacity of this segment. In 2040 the volume is projected to be 17,500 vpd, with a volume-to-capacity ratio of 1.5. The CTP proposal identifies this segment as needing improvement to relieve congestion.

The primary sources of congestion on this segment of roadway are the intersections at either end. The Estes Drive Extension/North Greensboro Street intersection experiences severe delays, but is planned to receive improvements in 2018 (TIP# U-5846) to ease congestion with the construction of a roundabout. The intersection at the south end of the corridor, North Greensboro Street and East Main Street, is also very congested and improvements should be considered to ease traffic flow. North Greensboro Street should not be widened so as to avoid significant impacts to residential and commercial development along the corridor. Bicycle and pedestrian improvements are recommended with some safety improvements to increase the roadway capacity. Safety improvements should be considered along this corridor. The North Greensboro Street/East Main Street intersection exceeds the NCDOT standard safety warrant for frontal impact crashes (as indicated in the 2014 NC Highway Safety Improvement Program (HSIP) report), and the 2014 Mobility Report Card indicates a high number of auto and pedestrian crashes in the corridor. Also, the North Greensboro Street/Shelton Street intersection exceeds one safety warrant for potentially hazardous pedestrian intersection locations (as indicated in the 2014 NC Highway Safety Improvement Program (HSIP) report).

Hillsborough Road (SR 1009)/North Greensboro Street (SR 1772) (Old Fayetteville Road (SR 1107) to Estes Drive Extension (SR 1780)), Local ID: ORAN0111-H

Hillsborough Road (SR 1009) is a primary thoroughfare through Carrboro. This segment runs from the rural buffer at the western end of Town, past McDougle Elementary and Middle schools, through residential neighborhoods, and ends at one of the busiest intersections in Carrboro (Estes Drive Extension (SR 1780) and North Greensboro Street (SR 1772)). The roadway currently operates at less than LOS D volumes, and is projected to be near 1.0 volume-to-capacity ratio in 2040. The segment is projected to average almost 11,000 vehicles daily in 2040 and improvements are proposed from Old Fayetteville Road to Estes Drive Extension for improved mobility from downtown Carrboro to Old Fayetteville Road.

The roadway does not experience significant congestion, except for peak hours near the schools and at the Estes Drive Extension/North Greensboro Street intersection. This intersection is planned to be improved, likely in the form of a roundabout in 2018 (TIP # U-5846), which is planned to ease peak hour congestion at that end of the roadway segment. Bike lanes and sidewalks were installed in response to the last call for corridor improvements. Additionally, there is transit service along the entire corridor that serves downtown Carrboro and Chapel Hill, and provides connection to other routes. Finally, Pathway Drive, just to the north of Hillsborough Road, was identified as a parallel route and takes a number of trips off of the roadway.

Homestead Road (SR 1777) (Rogers Road (SR 1729) to Old NC 86 (SR 1009)), 2040 MTP#: 36

This segment of Homestead Road (SR 1777) is a windy, two-lane road through residential and agricultural areas. It is an area of high development pressure, with new subdivisions being built frequently. There is only one road, Stratford Drive, that runs north-south and connects Homestead Road to Hillsborough Road (SR 1009) in the middle of Carrboro. Due to the limited connectivity of this part of Town, Homestead Road experiences a fair amount of traffic driving the entire length. There are currently 5,200 to 7,200 vpd (2015 AADT) traveling on this segment, making it operate at less than LOS D capacity. However, there is significant congestion in the morning and afternoon peak due to school traffic at the intersection of High School Road (SR 1834) and Homestead Road. The corridor is projected to more than double its AADT in 2040 to 15,500 south of High School Road, which exceeds LOS D capacity. This segment is recommended to be improved to a good two lane road with turn lanes where needed from Rogers Road to Old NC 86.

Additional vehicle lanes could jeopardize existing residential and agricultural land uses along the corridor. Bike lanes and sidewalks are also recommended along the entirety of the corridor to increase multimodal capacity. Intersection improvements, particularly improvements to the High School Road/Homestead Road intersection, should be considered to improve congestion. Additionally, improvements developed in

accordance with the drop-off and pick-up practices of the three schools adjacent to Homestead Road could reduce peak hour congestion.

During the public comment period, the NCWRC commented on the impacts of road widening projects on the degradation of aquatic wildlife in streams and wetlands. The NCWRC encourages the use of Low Impact Development (LID) techniques and other important measures to minimize negative impacts from roads and development along the Homestead Road section of Rogers Road to Old NC 86. The NCWRC also provided their standard recommendations for bridges, if this project has the opportunity to build bridges or improve existing bridges.

See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

Homestead Road (SR 1777) (Rogers Road (SR 1729) to NC 86 (Martin Luther King Jr Boulevard)), 2040 MTP#: 35

Homestead Road (SR 1777), from Rogers Road (SR 1729) to NC 86 (Martin Luther King Jr Boulevard), is currently a two-lane undivided minor thoroughfare road. Improvements are needed to adequately accommodate pedestrian and on-road bicycle traffic.

This section of Homestead Road currently has a 60-foot right-of-way, sidewalks at certain locations, and no bicycle lanes. The 2015 AADT is 8,100 vehicles per day (vpd); by 2040, the AADT is expected to be 13,600 vpd compared to a LOS D capacity of 11,600 vpd for the existing roadway. Currently, there are mostly residential units and a couple of religious institutions along Homestead Road. There are plans for the construction of new residential, office, town/village center, and university developments near Homestead Road. The university development is planned to be the north campus of UNC (however, plans are currently indefinite), which will likely create the need for the many other supporting developments and a significant increase in traffic. With current and existing development along Homestead Road, a complete widening may not be feasible, but improvements to intersections and spot improvements could be possible and are recommended.

The current and planned development around Homestead Road could generate increased bicycle, pedestrian, and transit traffic. The current pedestrian and bicycle facilities are discontinuous and inadequate for existing pedestrian and bicycle traffic. Many of the bus stops do not have amenities nor include bus pull-outs resulting in blocked traffic. The need for pedestrian, bicycle, and transit facilities will continue to increase with additional development around Homestead Road, especially the development of the Carolina North campus. In Chapel Hill's inactive *Bike and Pedestrian Action Plan*, sidewalks are proposed to be built from High School Road (SR 1834) to connect with existing sidewalks that run from NC 86 to around Northern Park Drive. Chapel Hill is currently developing a Mobility and Connectivity Plan to replace the inactive plan.

Improvements to transit, pedestrian, and bicycle facilities are recommended and could assist in reducing congestion in this corridor, since much of the traffic at peak hours is associated with the local schools, and providing alternative modes of travel may help to shift some trips away from personal vehicles.

Old NC 86/Hillsborough Road (SR 1009) (I-40 to Old Fayetteville Road (SR 1107)), Local ID: ORAN0119-H

Traffic volumes on segments of Old NC 86 (SR 1009) from I-40 to Old Fayetteville Road (SR 1107) are projected to exceed LOS D by 2040 with expected volumes of 15,300 vehicles per day (vpd), 17,900 vpd, and 23,700 vpd from I-40 to Eubanks Road (SR 1727), Eubanks Road to Dairyland Road (SR 1104), and Dairyland Road to Old Fayetteville Road, respectively. LOS D capacities on the facility range from 12,400 vpd to 13,800 vpd. The section of Old NC 86 (SR 1009) from I-40 to Dairyland Road is currently a two-lane, 20 to 24-foot undivided cross section with right and left-turn storage at various intersections. The section of Old NC 86 from Dairyland Road to Old Fayetteville Road is currently a two-lane, 20 to 24-foot undivided cross section that widens to a 30 to 40-foot undivided cross section with a center two-way left turn lane transitioning to left-turn storage at two intersections.

The CTP proposal is to provide a two-lane undivided cross section comprised of twelve-foot travel lanes with five-foot shoulders or bike lanes and improve sight distance where needed to better accommodate vehicular and bicycle travel. Improvements related to travel lane width, intersection and driveway entrance sight distance, and paved shoulders accommodating bicycle travel are needed to alleviate safety concerns and to modernize the roadway to accommodate some projected increase in traffic volume and multimodal use. Orange County would like an off-road multi-use path to be a considered option, but understands that right-of-way needs and costs make a multi-use path less likely to be constructed than wide shoulders or bicycle lanes.

Additional vehicle lanes could affect the character of the roadway and likely impact residential and agricultural areas. Bicycle lanes along the segment between Hillsborough Road and Dairyland Road could benefit the corridor users, as this segment of roadway sees very heavy bicycle traffic at certain times. The road is narrow and it can be difficult for vehicles to pass bicyclists when there is traffic, and bicycle lanes would alleviate this pressure. There are existing turn lanes at major intersections along the entire corridor, but additional improvements could ease some congestion in the future.

Orange Grove Road Extension (South Churton Street (SR 1009) to US 70 Business), TIP No. U-5848

Orange Grove Road (SR 1006) is currently a two-lane undivided road that terminates just past the South Churton Street (SR 1009) intersection. South Churton Street (US 70 Business/NC 86), just north of its intersection with US 70 Business/NC 86, is currently

exceeding capacity and traffic delays are expected to increase in the future. Additional connectivity is needed between Orange Grove Road and US 70 Business/NC 86 to provide an alternative route to South Churton Street. Having an alternative route could lessen the vehicle volume passing through the South Churton Street/US 70 Business intersection, and therefore could help maintain a LOS D along the section of Churton Street north of US 70 Business/NC 86, which is just south of downtown Hillsborough.

Orange Grove Road currently has a 60-foot right-of-way, no sidewalks, and no bicycle lanes. South Churton Street (south of US 70 Business) currently has a 100-foot right-of-way, no sidewalks, and no bicycle lanes. Churton Street (north of US 70 Business to US 70 Bypass, in downtown Hillsborough) has a 60-foot right-of-way, sidewalks at certain locations, and no bicycle lanes. The 2015 AADT along Churton Street ranges from 12,000 vpd (south of US 70 Bypass) to 20,000 vpd (north of US 70 Business), causing substantial traffic delays on a roadway that only has a LOS D capacity of 11,600 vpd. Extending Orange Grove Road would provide more connectivity for drivers and a means to use an alternate road to bypass the heavily congested Churton Street route. In addition, the town of Hillsborough has developed a planned rail station, STIP# P-5701, and government services development adjacent to this corridor.

This project is scheduled in the current STIP FY 2016-2025 (and draft STIP FY 2017-2027) for construction in FY 2023. It is described as the extension of Orange Grove Road (SR 1006) to US 70 Business on new location with sidewalks and bicycle lanes. The CTP recommends the extension to be a four lane divided boulevard facility.

The current residential and commercial development around South Churton Street and Orange Grove Road, in addition to planned developments, could generate increased bicycle, pedestrian, and transit traffic, especially the planned Collins Ridge development with one of its access points across Churton Street from Orange Grove Road at the end of existing Orange Grove Street. The Collins Ridge development Phase 1 is approximately 100 acres including 674 planned dwellings, a community center and a walking trail. The extension of Orange Grove Road will likely improve access to this development and lessen projected traffic on the adjacent existing roadways of South Churton Street and Orange Grove Road.

The current pedestrian facilities are discontinuous and inadequate for existing pedestrian traffic. There are no bicycle facilities, and many of the bus stops do not have amenities nor include bus pull-outs resulting in blocked traffic. Additional transit routes could serve the proposed rail station. The need for pedestrian, bicycle, and transit facilities will continue to increase with additional development along South Churton Street. Four foot shoulders are proposed along this section of Orange Grove Road and along South Churton Street from I-40 to the Eno River in the DCHC MPO 2040 Metropolitan Transportation Plan (MTP). The related widening project along South Churton Street also calls for the installation of sidewalks and bike lanes from the Eno River to I-40.

During the public comment period, the NCWRC commented on the impacts of new road projects on the degradation of aquatic wildlife in streams and wetlands. The NCWRC encourages the use of Low Impact Development (LID) techniques and other important measures to minimize negative impacts from roads and development along the Orange Grove Road Extension section of Orange Grove Road to US 70 Business. The NCWRC also provided their standard recommendations for bridges, if this project has the opportunity to build bridges or improve existing bridges.

See the DCHC MPO's CTP website (http://bit.ly/DCHCMPO-Draft-CTP) for the full detailed comments provided by the NCWRC.

Woodcroft Parkway Extension (NC 751 to Garrett Road (SR 1116)), TIP No. U-5823

Woodcroft Parkway runs west from Carpenter Fletcher Road to NC 751 (Hope Valley Road) on the east. Connecting the terminus of Woodcroft Parkway to the next road west, Garrett Road (SR 1116), is expected to increase both time and route efficiency when travelling around the area. Improvements such as this are recommended to increase grid connectivity and to divert traffic away from the already overloaded Garrett Road and NC 751 intersection. The CTP recommends the extension to be a four lane divided boulevard facility on new location.

Woodcroft Parkway is predominantly a two-lane, undivided collector street, although there are lengths at which the road is divided by a grassy median. With the current and future developments around NC 751 and Garrett Road, there could be a significant percent increase in traffic congestion on this stretch of NC 751 and Garrett Road, especially during the PM peak time frame when both the nearby high school (Jordan High School) and working commuters are on the road at the same time. These roadways have several tightly spaced intersections that are often overloaded at peak hours with queues exceeding available storage.

The current LOS D capacity for NC 751 south of Woodcroft Parkway is 31,600 vpd, and 2015 AADT daily traffic counts are currently 18,000 vpd and expected to rise to 26,000 vpd in 2040. The current LOS D capacity for Garrett Road is 14,000 vpd, and 2015 AADT daily traffic counts are 19,000 vpd and expected to rise to 25,000 vpd in 2040 resulting in a volume-to-capacity ratio of 1.8.

The extension of Woodcroft Parkway provides a direct connection between the current residential areas along Woodcroft Parkway and Garrett Road to the shopping centers and retail stores clustered at the confluence of Woodcroft Parkway, NC 751, Garrett Road, and NC 54 and to employment centers via NC 54 and I-40. Woodcroft Parkway has a shared pedestrian/bicycle sidepath along the entire route from Hope Valley Road to Fayetteville Road. A portion of this sidepath is part of the city's Third Fork Creek Trail. Woodcroft Parkway also provides connectivity to the American Tobacco Trail.

iii. Referenced Problems Statements

Under Construction

The study segments shown below are currently under construction. For additional construction information about the Alston Avenue and I-885 projects, contact NCDOT's Construction Unit. For additional information, including the Purpose and Need, contact NCDOT's Project Development and Environmental Analysis Branch. See Appendix A for agency contact information.

Alston Avenue – Holloway Street to NC 147 [TIP #U-3308]

Facility	From	To	Type	CTP Status
NC 55 (North Alston Avenue)	Holloway Street	East Main Street	Boulevard	Needs Improvement
NC 55 (South Alston Avenue)	E Main Street	NC 147	Boulevard	Needs Improvement

Carver Street Extension – Danube Lane to Hamlin Road [City of Durham Capital Improvement Program]

Facility	From	To	Type	CTP Status
Carver Street Extension	Danube Lane	Hamlin Road	Minor Thoroughfare	Recommended

More detail for the Carver Street Extension is given in the HIGHWAY-- Minimum Problem Statements section.

I-885 (East End Connector) – US 70 to NC 147 [TIP #U-0071]

Facility	From	To	Type	CTP Status
East End Connector/ US 70 Bypass	US 70	NC 147	Freeway	Recommended
Lynn Road Extension	Lynn Road	Pleasant Drive	Minor	Recommended
NC 98 (Holloway Street)	US 70 East	North Miami Boulevard	Major	Needs Improvement
NC 98 (Holloway Street)	Junction Road	US 70	Boulevard	Needs Improvement
US 70 Bypass	I-885 (East End Connector)	NC 98 (Holloway Street)	Freeway	Needs Improvement
US 70	Pleasant Drive	I-885 (East End Connector)	Freeway	Needs Improvement

Note that the Lynn Road segment and NC 98 segment will be constructed as part of the East End Connector project. The following link is the East End Connector Web page: http://www.ncdot.gov/projects/eastendconnector/.

In addition, the East End Connector will be constructed as a four-lane cross-section. However, the CTP assumes that this roadway will need additional lanes to address future travel demand and thus the ultimate cross-section is shown as six lanes in the CTP.

b) PUBLIC TRANSPORTATION & RAIL

A public transportation and rail assessment was completed during the development of the CTP. There are many recommended improvements associated with the public transportation and rail mode, such as light rail transit, commuter rail, bus rapid transit, express bus, improved regular bus service, park and ride facilities, transit centers, multimodal centers and rail stations. The Durham-Orange Light Rail Transit (D-O LRT) project, TIP# TE-5205, is included in the CTP recommendations. More information on the D-O LRT and comparisons of different transit technologies can be found at http://ourtransitfuture.com. The North-South Bus Rapid Transit (BRT) project, ORAN00104-R in Chapel Hill is included in the CTP recommendations. More information on the North-South BRT can be found at http://nscstudy.org.

Enhanced feeder bus routes are a concern of Carrboro and are planned for and have been proposed to access the D-O LRT and North-South BRT. Feeder bus routes that will serve Carrboro include the Chapel Hill Transit (CHT) Mason Farm Feeder route that connects Carrboro park and ride lots and downtown Carrboro to the proposed Mason Farm D-O LRT station, and the CHT Carrboro BRT Feeder route connects Hillsborough Road (SR 1009) and Estes Drive Extension (SR 1780) to the North-South BRT at the park and ride lot on NC 86 (Martin Luther King Jr Boulevard).

The CTP supports additional bus coverage, increased schedules (evenings and weekends), and more frequent service. These improved and recommended bus routes along with other enhanced feeder bus routes in the DCHC MPO area are listed in Appendix C. See Appendix C for all the public transportation and rail recommendations and details.

A direct transit connection from the Carrboro/Chapel Hill area to Raleigh Durham International (RDU) Airport is highly desired. However, a previous study found that people were coming from all over the area to RDU so a direct bus service from one or two towns was not feasible. Recently GoTriangle, in conjunction with the Research Triangle Foundation (RTF), the North Carolina Railroad Company (NCRR) and Raleigh-Durham Airport Authority have formed a transit task force to investigate improved transit connections with RDU, although not a direct connection with any new municipalities. See the RTP website for more information: www.rtp.org/transportation-and-business-leaders-announce-rtp-transit-task-force/.

c) BICYCLE

During the development of the CTP, a bicycle assessment was completed including the incorporation of local bicycle plans and policies. More information on and links to local bicycle plans and policies can be found in Appendix I, Existing Transportation Plans and Policies.

In accordance with American Association of State Highway and Transportation Officials (AASHTO), roadways identified as bicycle routes should incorporate the following standards as roadway improvements are made and funding is available:

- Curb & gutter sections require at minimum 5 foot bike lanes or 14 foot wide shoulder lanes.
- Shoulder sections require a minimum of 4 foot paved shoulder.
- All bridges along the roadways where bike facilities are recommended shall be equipped with 54 inch railings.

There are many recommended improvements associated with the bicycle mode, such as bicycle lanes, wide paved shoulders, wide outside lanes and off-road bicycle trails and they are recommended to follow AASHTO standards and local plans and policies. See Appendix C for a list of bicycle recommendations.

d) PEDESTRIAN

During the development of the CTP, a pedestrian assessment was completed including the incorporation of local pedestrian plans and policies. However, only off-road pedestrian path recommendations were developed for the CTP. This allows the CTP to not be in conflict with developing or existing, more comprehensive local plans and policies. More information on and links to local pedestrian plans and policies can be found in Appendix I, Existing Transportation Plans and Policies.

There are many recommended off-road pedestrian improvements and they are listed in Appendix C.

e) MULTI-USE

A bicycle, pedestrian and multi-use assessment was completed during the development of the CTP including the incorporation of local bicycle, pedestrian and multi-use plans and policies. There are many recommended improvements associated with multi-use paths. See Appendix C for a complete list of multi-use path recommendations.

On the next page is a problem statement that was developed for the Durham-Orange Light Rail Transit (D-O LRT) multi-use path recommendation.

MULTI-USE – Full Problem Statement

Durham-Orange Light Rail Transit Multi-use Path **Last updated: 04/06/17**

Local ID: DURH0040-M and ORAN0134-M

The Durham-Orange Light Rail Transit Project (D-O LRT) is planned to run between UNC Hospitals in Chapel Hill and Alston Avenue in east Durham. The 17-mile alignment will have 17 stations and run along parts of the major commuting corridors in the western Triangle, including NC 54, I-40, US 15-501 Erwin Road, and Main Street.

The corridor connects three major universities and three major medical centers, and currently includes 175,000 people. The population of the corridor is forecast to grow to 231,000 people by 2035. Light-rail vehicles are planned to run every 10 and 20 minutes at peak times and off-peak/weekends, respectively. The light rail tracks run in an exclusive guideway, except that a short section will run at-grade along Pettigrew Street in downtown Durham in mixed traffic with buses only.

The timeline for development, design and implementation of the D-O LRT includes the following milestones:

- Environmental impact statement (EIS) and preliminary engineering was completed in 2016;
- Final design and engineering began in 2016 and is scheduled to be completed in 2019;
- A federal Full Funding Grant Agreement (FFGA) is expected to be awarded in 2019, with construction beginning thereafter;
- D-O LRT is expected go into service in 2026.

The expected population and employment growth around rail stations along the D-O LRT alignment would also support an adjacent multi-use path. As a result, the CTP recommends construction of a multi-use path parallel to the D-O LRT alignment. However, there will likely be sections of the D-O LRT alignment where a parallel multi-use path would not be safe, appropriate or financially feasible. Therefore, other options that better fit the context of the corridor would be studied, such as providing a multi-use path that deviates from the alignment and corridor, providing new or enhanced sidewalk and bicycle accommodations along or near the alignment, or using existing sidewalk and bicycle accommodations along or near the alignment.

At this time, it is not known in which sections of the D-O LRT alignment a multi-use path would be safe, appropriate, or financially feasible, or if some other pedestrian or bike infrastructure would more appropriate. Evaluation of bicycle and pedestrian accommodations along the alignment is underway and will continue through final design.