
The University of North Carolina at Chapel Hill

Annual Development Plan Report on Transportation



February 2006

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Introduction

This report summarizes the transportation impacts of the University's Development Plan. It is based on the results of the most recent biennial Transportation Impact Analysis (TIA), and has been prepared in accordance with the June 27, 2005 guidelines issued by the Town of Chapel Hill.

1: Development Plan Overview

Overview of Development Plan Projects

The Development Plan projects continue to be implemented, with some now completed, some under construction and some awaiting construction. The main projects completed so far include the Rams Head Center, Student Family Housing buildings, addition to Carrington Hall, addition to Cobb Residence Hall, additions to Memorial Hall, additions to Alexander, Connor, and Winston Residence Halls, and Thermal Storage Facility. Construction continues at a number of locations throughout the campus, including the Science Complex Phase I, Global Education Center, Student and Academic Services Building, addition to the Medical Science Research Building, Genetic Medicine, ITS-Manning, Jackson Circle Parking Deck, North East Chiller and Parking Deck, Manning Steam Plant, North Carolina Cancer Hospital, Residence Halls Phase II, and other infrastructure projects.

In total, the Development Plan projects involve about 6.5 million gross square feet of new buildings. This includes about 1.9 million square feet for parking decks and 258,000 square feet for infrastructure projects. About 235,000 gross square feet of existing buildings will be demolished. This means the net increase in occupiable floor area is about 4.1 million square feet, which is an estimated 39 percent increase over the pre-Development Plan occupiable floor area. However, some of the new floor area is required to address current space deficits and will not result in an increase in employees or student numbers.

Projects by Location

Table 1.1 lists the projects in detail, and Figure 1.1 shows their locations. The projects can be summarized as follows:

<u>Type of building</u>	<u>Square Footage</u>
Academic	1,385,626
Cultural	112,725
Housing	783,162
Infrastructure	258,000
Office	268,200
Parking	1,907,900
Research	457,400
Student Life	335,300
UNC Health Care	<u>961,350</u>
Total	6,469,663

Parking Space Impacts

Existing Parking

In 2000-2001, there were about 14,200 parking spaces on the main campus. Then, like now, this was not enough for all the employees or students wanting to park there. There were about 8,000 spaces for about 13,000 Main Campus employees, or 0.61 spaces per Main Campus employee. The rate for students was much lower - less than 10 percent for both resident students and commuting students. No freshman is eligible for a permit on Main Campus, and no student living off-campus within a 2-mile radius of the Bell Tower is eligible.

Parking Changes

The Development Plan involves extensive changes to the parking supply. Around 3,970 existing spaces will be permanently closed, and around 5,550 new spaces will be provided, mostly in new structures. Some other spaces will be temporarily used for construction staging at various times.

The net effect is an approved increase of 1,579 spaces on campus when all the projects are completed. Table 1.2 and Figure 1.2 show these net changes. These figures are estimates only, as the final design of buildings and landscaping will determine how many surface spaces, if any, could be retained (particularly for service and disability spaces).

Visitor parking accounts for most of the net increase, reflecting the importance of accommodating visitors (particularly the growing number of hospital patients). However, there is expected to be a net increase of about 480 commuter spaces and a decrease of about 340 resident student spaces.

Impacts

The increase in commuter spaces is very low compared with expected population growth over the ten-year period of the plan. Employee numbers are forecast to grow by 35%, and student numbers by 13%. If resident and commuter parking were to continue to be provided at the existing (2000-2001) level, the overall increase would have been much greater than the approved 1,579.

The 'shortfall' (i.e. the difference between the amount of parking that would be required if parking continued to be provided at existing rates, and the amount that will actually be provided) is about 2,500 employee spaces, 200 commuting student spaces and 500 resident student spaces. The shortfall in commuter parking will be met by alternative modes, and the Development Plan includes a range of transportation initiatives to accommodate this. The shortfall in resident student parking will be met in storage lots off-campus. The needs of visitors will continue to be satisfied on-campus.

The amount of traffic that will be generated by the Development Plan is a function of the amount of parking that will be provided. The limited increase in parking will therefore limit the traffic impact. The increased parking is estimated to generate about 10,500 vehicle trips daily. A typical campus development of similar size, with unlimited parking and little or no transportation alternatives, would generate an estimated 30,100 trips daily. This means that the Development Plan projects will only generate about one-third of the trips that would be expected from a typical campus development of this size.

Table 1.1: University of North Carolina at Chapel Hill Development Plan

Map Number	Description	Anticipated Construction Start Date	Anticipated Construction Completion	New facility/expansion/replacement	Gross Square Footage	General Use	Current Activities or buildings on site	Origin of employees or other occupants	Remarks
A-1	Academic	03/05	02/07	New facility	31,800	Office/classroom	Hill Annex	combination of existing and new employees	to address space deficiencies and allow for expanding multimedia programs
A-2	Academic	03/05	02/07	New facility	73,100	Office/classroom	Hill Hall Addition, parking		
A-3	Academic	03/05	02/07	New facility	25,600	Office/classroom	parking		
A-4	Academic	03/05	02/07	New facility	20,000	Office/classroom	Abernethy, parking		
A-5	Academic	03/05	02/07	New facility	55,200	Office/classroom	Abernethy, parking		
A-6	Academic	07/03	06/05	Replacement	90,000	Classroom/research	parking	employees from Venable Hall	will replace Venable Hall and allow for expansion
A-7	Academic	02/06	08/08	New facility	41,000	Office/class/research	parking	combination of existing and new employees	to address space deficiencies and allow for enrollment expansion
A-8	Academic	02/06	08/08	New facility	154,500	Office/class/research	NROTC		
A-9	Academic	02/06	08/08	New facility	396,700	Office/class/research	Venable Hall		
A-10	Academic	07/03	06/05	New facility	112,500	Office/class/research	parking	combination of existing and new employees	to address space deficiencies and allow for enrollment expansion
A-11	Academic	03/04	02/06	New facility	82,000	Office/classroom	parking		to address space deficiencies and allow for enrollment expansion
A-12	Academic	11/01	10/03	Expansion	69,500	Classroom/lab/office	parking		to allow for expansion of program
A-13	Academic	08/02	07/04	New facility	10,200	Classroom/office	none	employees from second floor of Chase Hall	
A-14	Academic	08/04	08/06	New facility	84,990	Classroom/office	parking		to address space deficiencies and allow for enrollment expansion
A-15	Academic	03/04	02/06	New facility	59,700	<i>(H-22) Residential</i>	<i>parking</i>	new students	<i>to address space deficiencies and allow for enrollment expansion</i>
A-16	Academic	03/04	02/06	New facility	23,100	<i>(H-23) Housing</i>	<i>parking</i>	new students	<i>to address space deficiencies and allow for enrollment expansion</i>

Notes:

1. As of March 15, 2004 (Development Plan Modification No. 2)
2. Shaded items in italics indicate changes since the January 2004 TIA Update submittal.

Map Number	Description	Anticipated Construction Start Date	Anticipated Construction Completion	New facility/ expansion/ replacement	Gross Square Footage	General Use	Current Activities or buildings on site	Origin of employees or other occupants	Remarks
A-17	Academic	06/02	12/03	Expansion	53,200	Classroom/office	none	combination of existing and new employees	to accommodate expanding program
A-18	Academic	08/05	03/05		936				
A-19	<i>Academic</i>	<i>03/05</i>	<i>03/05</i>	<i>Expansion</i>	<i>1,600</i>	<i>Classroom/office</i>	<i>addition</i>	<i>combination of existing and new employees</i>	<i>to accommodate expanding program</i>
	Total Academic				1,385,626				
C-1	Cultural	12/02	05/04	Expansion	36,000	Gallery	parking, open space	existing employees	expanding public spaces, adding galleries
C-2	Cultural	05/02	11/03	Expansion	26,400	Planetarium	none	existing employees	includes renovation of planetarium
C-3	Cultural	12/01	01/03	Expansion	37,325	Auditorium	parking, open space	existing employees	expansion of stage house and public facilities; removing some seats
C-4	Cultural	11/02	02/04	Renovation	3,000	Office/lounge/snack bar	YMCA	existing employees	primarily pedestrian traffic
C-5	<i>Cultural</i>	<i>01/05</i>	<i>01/05</i>	<i>Expansion</i>	<i>10,000</i>	<i>Planetarium</i>	<i>expansion</i>	<i>existing employees</i>	<i>enhanced visitor space</i>
	Total Cultural				112,725				
H-1	Housing	05/03	07/04	Renovation	13,500	Residential	vacant	no new people	no additional units
H-2	Housing	05/03	07/04	Renovation	13,500	Residential	vacant	no new people	no additional units
H-3	Housing	05/02	07/03	Renovation	6,656	Residential	vacant	no new people	no additional units
H-4	Housing	05/02	07/03	Renovation	6,656	Residential	vacant	no new people	no additional units
H-5	Housing	01/04	08/05	New facility	68,400	Residential	none		
H-6	Housing	01/04	08/05	New facility	60,000				
H-7	Housing	01/04	08/05	New facility	74,800				
H-8	Housing	01/04	08/05	New facility	43,200	Residential	parking	new students	to accommodate expanding enrollment
H-9	Housing	01/04	08/05	New facility	42,000				
H-10	Housing						Deleted		
H-11	Housing						Deleted		
H-12	Housing						Deleted		
H-13	Housing	08/03	08/04	New facility	60,500				
H-14	Housing	08/03	08/04	New facility	60,500				
H-15	Housing	08/03	08/04	New facility	58,200	Residential	none; some parking	students relocating from Odum Village	
H-16	Housing	08/03	08/04	New facility	59,400				
H-17	Housing	08/03	08/04	New facility	59,400				
H-18	Housing	08/03	08/04	New facility	44,400	Residential	none	new students	to allow for enrollment expansion
H-19	Housing	08/03	08/04	New facility	44,400				

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H-20	Housing	08/03	08/04	New facility	37,600				
H-21	Housing	08/03	08/04	New facility	30,050	Residential		students relocating from Odum Village	
<i>H-24</i>	<i>Housing</i>	<i>01/05</i>	<i>12/05</i>	<i>Expansion</i>	<i>31,200</i>	<i>Residential</i>		<i>new students</i>	<i>addition to Cobb Hall</i>
	Total Housing				783,162				
I-1	Infrastructure	07/03	12/04		20,000	N/A	N/A	N/A	
I-2	Infrastructure	08/03	12/05		115,600	N/A	N/A	N/A	
I-3 Mod	Infrastructure	03/04	03/06		21,600	N/A	N/A	N/A	
<i>I-5</i>	<i>Infrastructure</i>	<i>01/05</i>	<i>01/05</i>	<i>New</i>	<i>100,800</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>replace existing chiller</i>
	Total Infrastructure				258,000				
O-1	Office	07/03	05/05	New facility	133,200	Office	Grounds and Housing Support Services		to relocate employees currently off-site
O-2	Office	11/02	05/06	New facility	30,000	Office	parking	existing and new employees	relocated ticket office, museum space and offices
O-3 Mod	Office	07/04	03/06		105,000			existing and new employees	
	Total Office				268,200				
P-1	Parking	12/04	05/06	New facility	115,500	Parking	parking, part of Swain Hall		330 spaces
<i>P-2</i>	<i>Parking</i>					<i>Deleted</i>			
P-3	Parking	05/02	10/04	New facility	252,600	Parking	parking		700 spaces
<i>P-4</i>	<i>Parking</i>	<i>12/05</i>	<i>01/07</i>	<i>New facility</i>	<i>566,400</i>	<i>Parking</i>	<i>parking</i>		<i>1,600 spaces; incorporates spaces from Sci Complex II</i>
P-5	Parking	11/07	03/10	New facility	255,500	Parking	none		730 spaces
P-6	Parking	12/02	11/05	New facility	134,400	Parking	parking		350 spaces
P-7	Parking					Deleted			
P-8	Parking	03/04	07/06	New facility	42,000	Parking	below building		120 spaces
P-9 Mod	Parking	03/03	03/06	New facility	191,500	Parking			500 spaces - 462 in deck, 38 surface
P-10 Mod	Parking	04/04	12/05	New facility	350,000	Parking			800 spaces
	Total Parking				1,907,900				
R-1	Research	07/07	07/10	New facility	109,000	Research	parking	new	to address space deficiencies and allow for enrollment expansion

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R-2	Research	07/07	07/10	New facility	49,000	Research	parking	new	to address space deficiencies and allow for enrollment expansion
R-3	Research	07/07	07/10	New facility	74,400	Research	parking	new	to address space deficiencies and allow for enrollment expansion
R-4	Research	08/02	12/04	New facility	225,000	Research	Grounds and Housing Support Services	new	to address research space deficiencies
Total Research					457,400				
SL-1	Student Life	06/02	07/04	New facility	54,400	recreation/bookstore/ grocery/office	parking	a few new employees	to address space deficiencies and allow for enrollment expansion
SL-2	Student Life	06/02	07/04	Replacement	126,900	Dining	parking	Chase Hall	replacing Chase Hall (dining)
SL-3	Student Life	06/04	08/05	New facility	126,000	Office	Chase Hall, service parking	employees relocating from existing academic buildings	to relocate some employees currently off-site
<i>SL-4</i>	<i>Student Life</i>	<i>12/05</i>	<i>06/05</i>	<i>Addition</i>	<i>28,000</i>	<i>Fetzer addition</i>	<i>none</i>	<i>existing employees</i>	<i>expansion and elevated pedestrian walkway</i>
Total Student Life					335,300				
UNCH-1	UNC Health Care	06/03	12/05	Expansion	196,280	Clinic/office/procedures	parking	Hospital and ACC Clinic	to decompress existing facilities
UNCH-2	UNC Health Care	12/07	12/10	Replacement	343,180	Clinic/office/procedures	parking	Hospital and ACC Clinic	to decompress existing facilities
UNCH-3	UNC Health Care	03/05	02/08	Replacement	291,890	Clinic/office/procedures	parking	Gravely Building	to replace Gravely Building, which will be demolished
<i>UNCH-4</i>	<i>UNC Health Care</i>	<i>03/05</i>	<i>07/05</i>	<i>New facility</i>	<i>130,000</i>	<i>Clinic/office/procedures</i>	<i>none</i>	<i>Gravely Building and Hospital</i>	<i>to decompress existing facilities</i>
Total UNC Health Care					961,350				
Campus Total					6,469,663				

Notes:

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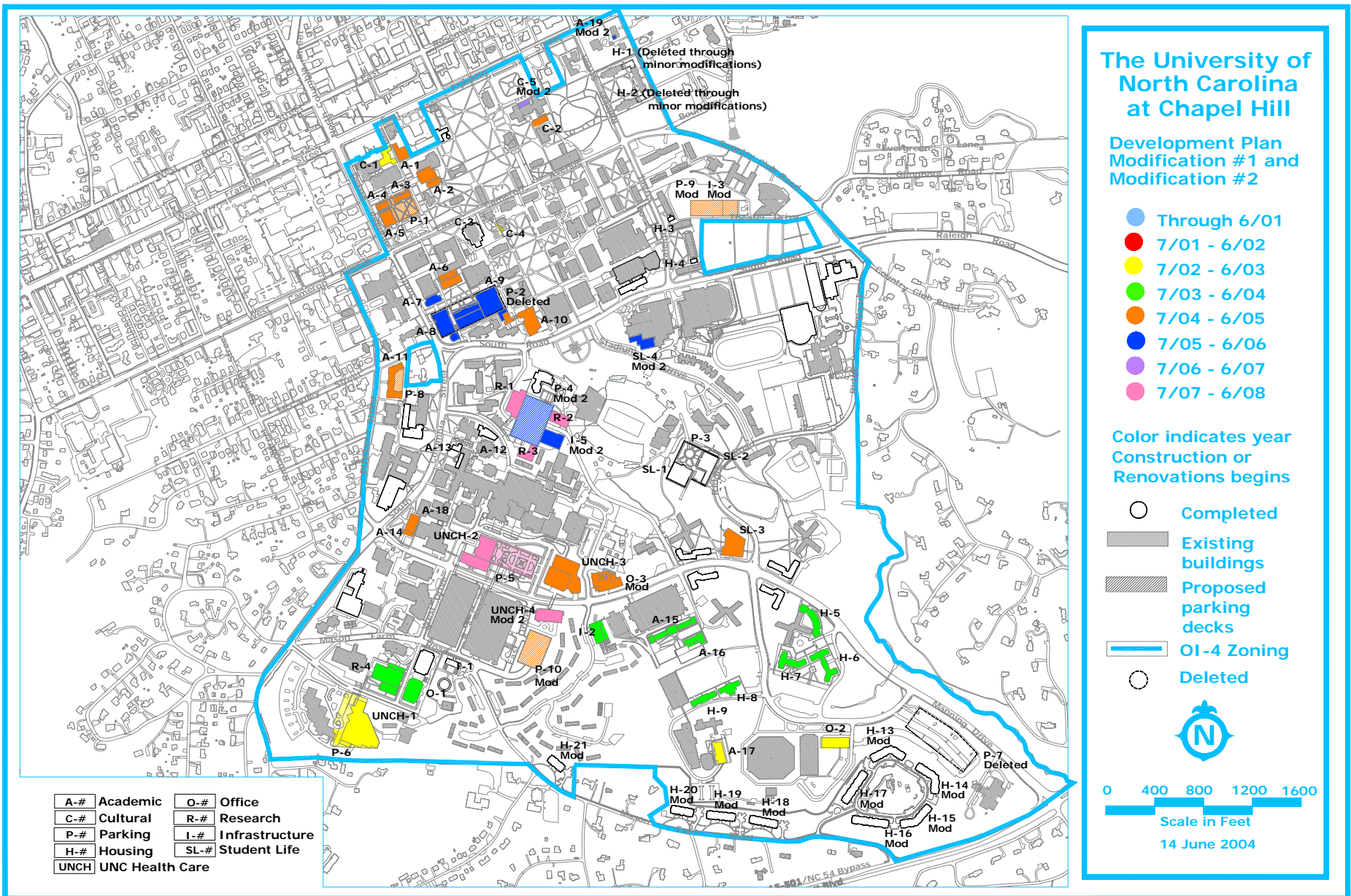


Figure 1.1: Development Plan Projects Map

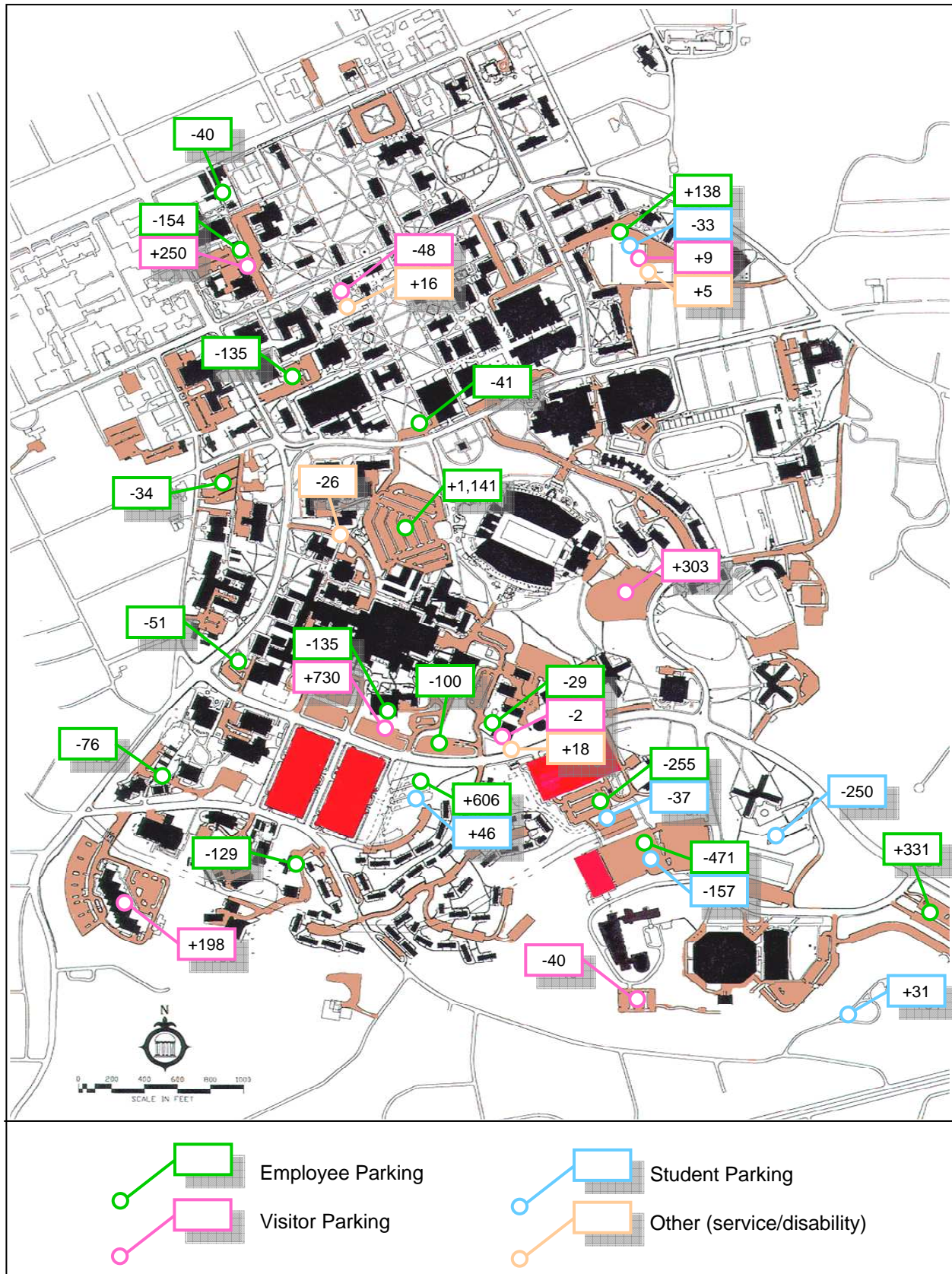
Table 1.2: Parking Space Impacts

Lot Name	Number of Spaces ^{1,2}							Net Change
	Parking Zone	Employee	Commuting Student	Resident Student	Student in Family Housing	Visitor	Other	
ACC (new structure)						198		198
Bell Tower (new structure)	BG	1,141						1,141
Bowles	S11	-471	-157					-628
Cameron/Swain (Arts Common Deck - new structure)	ND1/NG1	-154				250		96
Cobb/Joyner (new structure and surface parking)		138	-33			9	5	119
Craige Surface	CD	-255		-37				-292
Dental School	S6	-51						-51
Glaxo / Housing Support / MFM / MRI	S6	-76						-76
Gravelly (NC H&C) (new structure)	CG	-135				730		595
Hanes						-48	16	-32
Hinton James	M			-250				-250
ITS		-29				-2	18	-13
Jackson Circle (new structure)		606	100	-54				652
Kenan/McColl Visitor Parking						-40		-40
McCauley Street (Global Education Deck - new structure)	W	-34						-34
Neurosciences	CG	-100						-100
North Medical Drive							-26	-26
Porthole	N2	-40						-40
Rams Head (new structure)	S5					303		303
Stadium Drive	S4							0
Sitterson	NG2	-135						-135
South Chiller	S6	-129						-129
Student Family Housing	MR/MR2				31			31
Venable (new structure) ⁴	ND2							0
Wilson Library	N8	-41						-41
Subtotal		235	-90	-341	31	1,400	13	1,248
Unassigned spaces ³		331						331
Total								1,579

Notes:

1. Numbers are subject to change, depending on the final footprint of each project.
2. These numbers represent net changes only. For example, the Rams Head structure will have 700 spaces, but 397 are displaced as a result of its construction. The net impact, which is shown in this table, is 303 spaces.
3. Spaces not assigned to a specific location on the campus and whose location(s) will be determined in future development plan modification requests. The total net change in parking is 331 spaces less than the approved 1,579 space increase (due primarily to parking space changes since Modification #1). The traffic assessment accounts for the entire 1,579 space net increase.
4. Eliminated in Modification #2

Figure 1.2: Parking Impacts of Development Plan



2: Development Plan Transportation Changes

Overview of Traffic Analysis

The Development Plan's impact on roads on or near the campus, including 47 intersections, was analyzed using standard techniques for Traffic Impact Analysis. Three scenarios are considered:

- Existing conditions (the traffic levels in 2005);
- No-Build conditions (the forecast conditions in 2010 if the Development Plan projects did not exist); and
- Build conditions (the forecast conditions in 2010 including the effects of the Development Plan projects).

The existing conditions were measured using traffic counts collected in Fall 2005 on days when the University was in session. Because similar analyses were undertaken in 2001 and 2003, changes in traffic levels can be tracked.

The No-Build conditions are forecast by applying annual growth rates to the existing traffic levels. The Build conditions are forecast by taking the No-Build traffic levels and adding the trips due to Development Plan projects. These trips are estimated from the forecast parking changes (described above), using known trip rates per parking space.

Changes in Traffic Volumes

Table 2-1 shows the average daily traffic volumes (ADTs) in 2001 and 2005, along with the No-Build and Build forecasts for 2010. Figure 2.1 illustrates the two forecasts for 2010.

Traffic volumes have generally decreased since the 2003 counts, which in turn were lower than in 2001. One possible reason is the fare-free operation of Chapel Hill Transit.

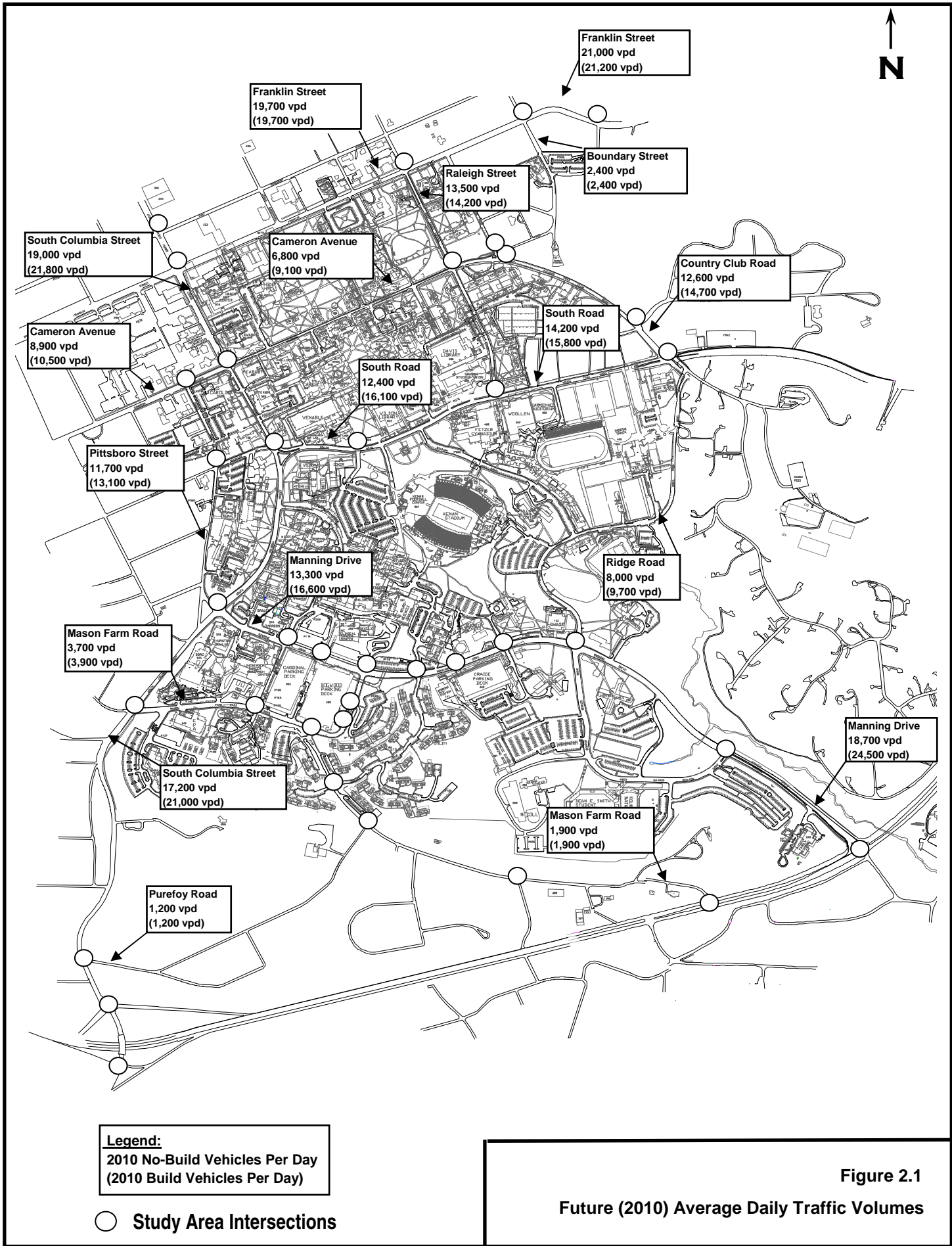
In the No-Build scenario, background traffic growth is expected to produce increased volumes. This is normal for growing areas such as Chapel Hill.

In the Build scenario, the further increase in traffic along most campus roads is expected to be minimal, although some intersections near proposed parking facilities will see particular turning movements increase noticeably. In some areas where parking is being eliminated, some turning movements will decrease compared to the No-Build scenario. The largest increases in traffic volumes will be on Columbia Street and Manning Drive.

Table 2.1: Existing and Future (2010) Traffic Volumes

Link #	Roadway	2001-2010 Annual Growth Rate	2001 ADT	2005 ADT	2001-2010 Annual Growth Rate	Projected 2010 No-Build ADT	Estimated 2010 Build ADT
1	S. Columbia St. (south of Franklin St.)	1.7%	20,720	17,530	1.7%	19,000	21,800
2	Raleigh St. (south of Franklin St.)	0.6%	14,470	13,080	0.6%	13,500	14,200
3	Cameron Ave. (west of Pittsboro St.)	0.9%	9,820	8,510	0.9%	8,900	10,500
4	Cameron Ave. (east of S. Columbia St.)	1.2%	9,070	6,430	1.2%	6,800	9,100
5	Country Club Rd. (north of South Rd.)	0.7%	13,470	12,200	0.7%	12,600	14,700
6	South Rd. (east of Columbia St.)	1.7%	10,460	11,400	1.7%	12,400	16,100
7	South Rd. (east of Raleigh St.)	2.0%	9,840	12,890	2.0%	14,200	15,800
8	Pittsboro St. (south of McCauley St.)	1.4%	10,960	10,920	1.4%	11,700	13,100
9	Manning Dr. (east of Columbia St.)	1.4%	14,100	12,480	1.4%	13,300	16,600
10	Ridge Rd. (at Manning Dr.)	2.0%	8,320	7,300	2.0%	8,000	9,700
11	S. Columbia St. (south of Mason Farm Rd.)	1.3%	18,470	16,190	1.3%	17,200	21,000
12	Manning Dr. (east of Ridge Rd.)	0.9%	17,260	17,880	0.9%	18,700	24,500
13	Franklin (west of Raleigh St.)	0.9%	17,000	18,850	0.9%	19,700	19,700
14	Franklin (east of Boundary St.)	0.9%	-	20,190	0.9%	21,000	21,200
15	Boundary (south of Franklin St.)	0.6%	-	2,320	0.6%	2,400	2,400
16	Mason Farm Rd.(east of Columbia St.)*	2.0%	7,700	3,400	2.0%	3,700	3,900
17	Mason Farm Rd. (north of Fordham Blvd.)*	0.4%	1,360	1,830	0.4%	1,900	1,900
18	Purefoy Rd. (east of Columbia St.)*	0.4%	970	1,130	0.4%	1,200	1,200

* Year 2001 ADT estimated using calculated 2005 peak to daily ratio (K-factor).



Intersection Level of Service Analysis

Delays at intersections are measured in terms of the Level of Service (LOS) in the peak hour. LOS ranges from A through F, based on the average control delay (the delay due to signals, stop signs, etc.). Table 2-2 explains the LOS categories. In urban areas, level D or above is generally regarded as acceptable for signalized intersections. At unsignalized intersections, level E or above on the side street is generally regarded as acceptable, although it is recognized that side streets typically function at level F because the traffic volumes often do not warrant a traffic signal to assist the side street traffic.

Table 2-2: Level of Service Descriptions for Intersections

Level of Service	Description	Delay at a Signalized Intersection	Delay at an Unsignalized Intersection
A	Little or no delay	10 seconds or less	10 seconds or less
B	Short traffic delay	10-20 seconds	10-15 seconds
C	Average traffic delay	20-35 seconds	15-25 seconds
D	Long traffic delay	35-55 seconds	25-35 seconds
E	Very long traffic delay	55-80 seconds	35-50 seconds
F	Unacceptable delay	More than 80 seconds	More than 50 seconds

Table 2.3 summarizes the LOS at each intersection for each scenario. Each cell includes the overall LOS at the intersection and the LOS for the worst-performing approach.

Existing conditions

As a result of the reduced volumes, the levels of service at most intersections have improved since 2003 and again since 2001. At most intersections, the overall level of service is acceptable, although some minor street approaches are suffering some longer delays. The worst delays are at the Manning Drive / Fordham Boulevard intersection in the afternoon peak hour.

Although the LOS at some intersections on US 15-501 has improved since 2003, the US 15-501 / Europa Drive / Erwin Road intersection continues to be unacceptable during both peaks. Although minor improvements could be made at some locations, a recent Major Investment Study (MIS) concluded that the size of the problem along 15-501 requires a large-scale integrated multimodal solution.

A couple of unsignalized intersections are experiencing long delays on the minor approaches. However, the traffic volumes do not warrant signals.

No-Build conditions

In the No-Build scenario (that is, without the Development Plan projects), the intersections with poor LOS performance in 2005 will continue to perform poorly in 2010. In addition, the background traffic growth will make some other intersections perform poorly. In particular, the following intersections will deteriorate substantially:

- Columbia Street / Mason Farm Road: projected to operate with heavy delays in the afternoon peak period.
- US 15-501 / Ephesus Church Road / Eastgate Road: deteriorates.

Build conditions

Although the Development Plan has minimized the increase in parking, the location of some of the planned parking decks will add traffic to some intersections. Under the Build conditions (that is, with the Development Plan projects), three intersections are expected to degrade further:

- Cameron Avenue / South Columbia Street: deteriorates in the afternoon peak period.
- Cameron Avenue / Raleigh Street: deteriorates in the afternoon peak period.
- Mason Farm Road / Columbia Street: deteriorates further in the afternoon peak period.
- US 15-501 / Ephesus Church Road / Eastgate Road: deteriorates further in the afternoon peak period.

Table 2.3: Existing and Forecast Intersection Levels of Service

ID #	Intersection	Control	Existing (2005)		No-Build (2010)		Build (2010)	
			AM	PM	AM	PM	AM	PM
1	Columbia Street/Rosemary Street	Signalized	C (WB-E)	C (WB-D)	C (WB-E)	C (WB-D)	C (WB-D)	C (WB-D)
2	Columbia Street/Franklin Street	Signalized	C (EB-D)	C (EB-D)	C (EB-D)	C (EB-D)	C (EB-D)	C (EB-D)
3	Franklin Street/Raleigh Street	Signalized	B (SB-B)	B (NB-C)	B (SB-C)	C (NB-C)	B (SB-C)	C (NB-C)
4	Merritt Mill Road/Cameron Avenue	Signalized	B (WB-C)	B (WB-C)	B (WB-D)	B (WB-C)	C (WB-D)	B (WB-C)
5	Cameron Avenue/Pittsboro Street	Signalized	B (EB-D)	B (EB-C)	B (EB-D)	B (EB-C)	B (EB-C)	B (EB-C)
6	Cameron Avenue/Columbia Street	Signalized	C (WB-D)	D (WB-E)	C (WB-D)	D (WB-E)	C (WB-D)	F (SB-F)
7	Cameron Avenue/Raleigh Street	Signalized	C (WB-D)	C (EB-D)	C (WB-D)	C (EB-D)	C (WB-D)	C (EB-D)
8	Pittsboro Street/McCauley Street	Signalized	B (EB-C)	B (EB-B)	B (EB-C)	B (WB-C)	B (EB-C)	C (WB-C)
9	Columbia Street/South Road	Signalized	C (EB-D)	C (EB-E)	C (EB-D)	C (EB-D)	C (EB-D)	D (EB-E)
10	Raleigh Street/South Road	Signalized	A (SB-C)	A (SB-B)	A (SB-C)	A (SB-B)	A (SB-B)	A (SB-B)
11	Country Club Road/South Road	Signalized	B (NB-D)	C (NB-D)	B (NB-D)	C (NB-D)	C (NB-D)	D (NB-F)
12	Columbia Street/Manning Drive	Signalized	D (EB-F)	B (EB-C)	C (EB-C)	B (EB-C)	C (EB-D)	B (EB-C)
13	Manning Drive/West Drive	Signalized	A (SB-D)	A (SB-C)	A (SB-D)	A (SB-C)	A (SB-D)	A (SB-C)
14	Manning Drive/East Drive	Signalized	A (NB-C)	B (NB-C)	B (NB-C)	B (NB-C)	B (NB-C)	B (NB-C)
15	Ridge Road/Manning Drive	Signalized	B (NB-D)	B (NB-D)	B (NB-D)	C (NB-D)	C (NB-D)	B (NB-D)
16	Mason Farm Road/Columbia Street	Signalized	A (WB-C)	C (WB-D)	B (WB-C)	D (WB-D)	B (WB-C)	E (WB-F)
17	Mason Farm Road/West Drive	Unsignalized	A (SB-B)	A (NB-B)	A (SB-B)	A (NB-C)	A (SB-B)	A (SB-C)
18	Mason Farm Road/East Drive	Unsignalized	B (EB-B)	B (EB-B)	B (EB-B)	B (EB-B)	B (EB-B)	B (EB-B)
19	Mason Farm Road/Purefoy Road	Unsignalized	A (EB-A)	A (EB-A)	A (NB-A)	A (EB-A)	A (NB-A)	A (EB-A)
20	Manning Drive/Skipper Bowles Drive	Unsignalized	A (EB-B)	B (EB-E)	A (EB-B)	B (EB-E)	A (EB-B)	C (EB-F)
21	Columbia Street/Purefoy Road	Unsignalized	F (WB-F)	A (WB-F)	F (WB-F)	A (WB-F)	F (WB-F)	B (WB-F)
22	Columbia Street/Fordham Boulevard (northern ramp)	Signalized	B (WB-D)	C (WB-D)	B (WB-D)	D (WB-E)	B (WB-E)	D (WB-E)
23	Columbia Street/Fordham Boulevard (southern ramp)	Signalized	B (EB-D)	B (EB-E)	B (EB-D)	B (EB-D)	C (EB-D)	B (EB-D)
24	Mason Farm Road/Fordham Boulevard	Unsignalized	A (SB-B)	A (SB-D)	A (SB-B)	A (SB-D)	A (SB-B)	A (SB-D)
25	Manning Drive/Fordham Boulevard	Signalized	C (SB-F)	F (WB-F)	C (SB-F)	F (WB-F)	C (SB-F)	F (WB-F)
26	Mason Farm Road/Oteys Road	Unsignalized	A (WB-A)	A (NB-A)	A (WB-A)	A (NB-A)	A (WB-A)	A (NB-A)
27	Franklin Street/Boundary Street	Signalized	A (SB-C)	A (SB-C)	A (SB-E)	B (SB-E)	A (SB-E)	B (SB-E)
28	Franklin Street/Park Place	Unsignalized	A (NB-A)	A (NB-B)	A (NB-A)	A (NB-B)	A (NB-B)	A (NB-B)
29	Battle Lane/Boundary Street	Unsignalized	A (WB-A)	A (WB-A)	A (WB-A)	A (WB-A)	A (WB-A)	A (WB-A)
30	Country Club Road/Battle Lane	Unsignalized	A (SB-C)	A (SB-E)	A (SB-C)	A (SB-F)	A (SB-C)	B (SB-F)
31	Country Club Road/Gimghoul Road	Unsignalized/ Signalized	A (EB-B)	A (EB-C)	A (EB-D)	A (EB-D)	A (WB-C)	A (EB-D)
32	Manning Drive/Hibbard Drive	Signalized	A (SB-D)	A (SB-C)	A (SB-D)	A (SB-C)	A (SB-D)	A (SB-C)
33	Manning Drive/Craige Drive	Signalized	A (SB-D)	A (SB-D)	A (SB-D)	B (SB-D)	A (SB-D)	B (SB-D)
34	East Drive/Jackson Circle/Dogwood Deck Entrance	Unsignalized	A (NB-A)	A (NB-A)	A (NB-A)	A (NB-A)	A (NB-A)	A (NB-A)
35	East Drive/Dogwood Deck Exit	Unsignalized	A (EB-B)	A (EB-B)	A (EB-B)	A (EB-B)	A (EB-B)	B (EB-C)
36	Mason Farm Road/Hibbard Drive	Unsignalized	A (EB-B)	A (EB-B)	A (EB-B)	A (EB-B)	A (EB-B)	A (EB-B)
37	South Road/Bell Tower Drive	Signalized	A (NB-D)	B (NB-D)	A (NB-D)	B (NB-D)	B (NB-D)	C (NB-D)
38	Manning Drive/Old East Drive	Signalized	C (WB-D)	C (WB-D)	C (WB-C)	B (WB-C)	B (WB-C)	B (WB-C)
39	Manning Drive/Craige Deck	Signalized	B (EB-B)	B (EB-C)	A (EB-A)	B (NB-C)	A (EB-B)	B (NB-C)
101	US 15-501/Estes Drive	Signalized	C (EB-E)	C (EB-D)	C (EB-F)	C (EB-E)	D (EB-F)	D (EB-E)
102	US 15-501/Willow Drive	Signalized	A (WB-F)	C (EB-E)	B (WB-F)	B (EB-E)	B (WB-F)	B (EB-E)
103	US 15-501/Elliott Road	Signalized	A (EB-D)	C (EB-D)	A (EB-D)	B (EB-E)	A (EB-D)	B (EB-E)
104	US 15-501/Ephesus Church Road	Signalized	E (EB-F)	E (EB-F)	E (EB-F)	E (WB-F)	E (EB-F)	F (EB-F)
105	US 15-501/Europa Drive/Erwin Road	Signalized	E (WB-F)	F (SB-F)	F (WB-F)	F (NB-F)	F (SB-F)	F (NB-F)
106	US 15-501/Sage Road	Signalized	C (WB-F)	C (WB-F)	C (WB-F)	C (WB-F)	C (WB-F)	C (WB-F)
107	US 15-501/Eastowne Drive/BCBS	Signalized	B (EB-D)	B (WB-E)	A (EB-D)	B (WB-E)	A (EB-D)	B (WB-E)
108	US 15-501/Eastowne Drive/Lakeview Drive	Signalized	D (EB-F)	E (EB-F)	D (EB-F)	E (EB-F)	D (EB-F)	E (EB-F)

Legend: X = overall intersection level of service (X) = worst movement level of service

3: Development Plan Transportation Mitigation Measures and Recommendations

Overview of Mitigation Strategies and Measures

As the No-Build scenario showed, geometric improvements could be considered at several intersections even without the Development Plan. The analysis has identified opportunities to make improvements at a number of intersections:

- Columbia Street / South Road: Current plans call for remodeling to improve pedestrian safety. Upgrading and minor widening could also assist traffic flow.
- South Road / Country Club Road: There is expected to be a long-term need for remodeling to reflect future traffic flows. Some improvements here were stipulated as part of a Development Plan Modification. In addition, realignment of the Ridge Road / County Club Road intersection, to give priority to Ridge Road, could be useful.
- Cameron Avenue / Raleigh Street: Signal phasing changes are desirable to improve traffic flow.
- Country Club Road / Battle Lane / Boundary Street: Bollards and chains are proposed for controlling pedestrian movements in and around this intersection. Further improvements may also be necessary.
- Manning Drive / Ridge Road: Although traffic delays are not an egregious problem here, there are speed and appearance issues. Measures to reduce and calm traffic and to improve the appearance of Manning Drive should be studied, to enhance pedestrian safety and aesthetics.
- Mason Farm Road / East Drive: Signalization may be needed in future.
- Mason Farm Road / West Drive: Field observations suggest that signalization may be needed in future.
- Manning Drive / Skipper Bowles Drive: Previous analyses suggested restricting eastbound left-turns from Skipper Bowles Drive to Manning Drive to improve traffic flow and safety. This has now been implemented.

Some additional improvements were also identified:

- South Columbia Street, between Manning Drive and South Road: safety for cyclists and pedestrians would be improved by narrowing the pavement and widening and enhancing the sidewalks. This scheme is already in the planning stage.
- Ridge Road: remodeling would improve sight distances at the driveway beside the practice field. Other safety improvements have already been made near the Rams Head Center.

Impacts to Date and Target Mode Splits

Table 3.1 shows the proportions of employees and students traveling to campus by each mode of transportation ('mode splits') in 2001 and in 2004, plus the current targets for 2010. In 2001, the University was already performing well, with 28% of employees and 67% of students using alternative modes to reach the campus. The 2004 commuter

survey provided a snapshot of progress part-way into the Development Plan, and the 2010 targets have been updated in the light of this experience.

As expected, the proportion of both employees and students driving alone has fallen further since 2001. This is because (a) construction to date has resulted in a net loss of over 1,000 employee spaces, (b) the employee and student populations have increased, and (c) the University has invested heavily in improvements to alternative modes. Park-and-ride has been particularly popular for employees, and Chapel Hill Transit (CHT) has been particularly popular for students. This is a successful result of investment in extensive park-and-ride lots with frequent shuttle services, and in fare-free transit and other service enhancements.

It appears that some employees living in Chapel Hill and Carrboro are choosing to drive to a park-and-ride lot rather than walk to a local CHT stop, in order to take advantage of the more frequent transit service. Also, geocoding data show that University employees are living further away from campus than in previous years, increasing the value of park-and-ride compared to CHT.

Table 3.1: Baseline, Current and Target Mode Splits

Mode	Employees			Commuting Students		
	2001 Existing Ratio	2004 Existing Ratio	2010 Projected Ratio	2001 Existing Ratio	2004 Existing Ratio	2010 Projected Ratio
Drive alone	0.72	0.61	0.54	0.33	0.19	0.23
Carpool/vanpool	0.06	0.05	0.08	0.08	0.07	0.08
Bus	0.06	0.08	0.12	0.21	0.34	0.33
Bicycle	0.03	0.02	0.03	0.09	0.05	0.08
Walk	0.02	0.02	0.02	0.12	0.14	0.12
Park-and-ride	0.07	0.15	0.17	0.12	0.16	0.11
Other	0.04	0.06	0.04	0.06	0.06	0.06

Estimated Air Quality Impacts

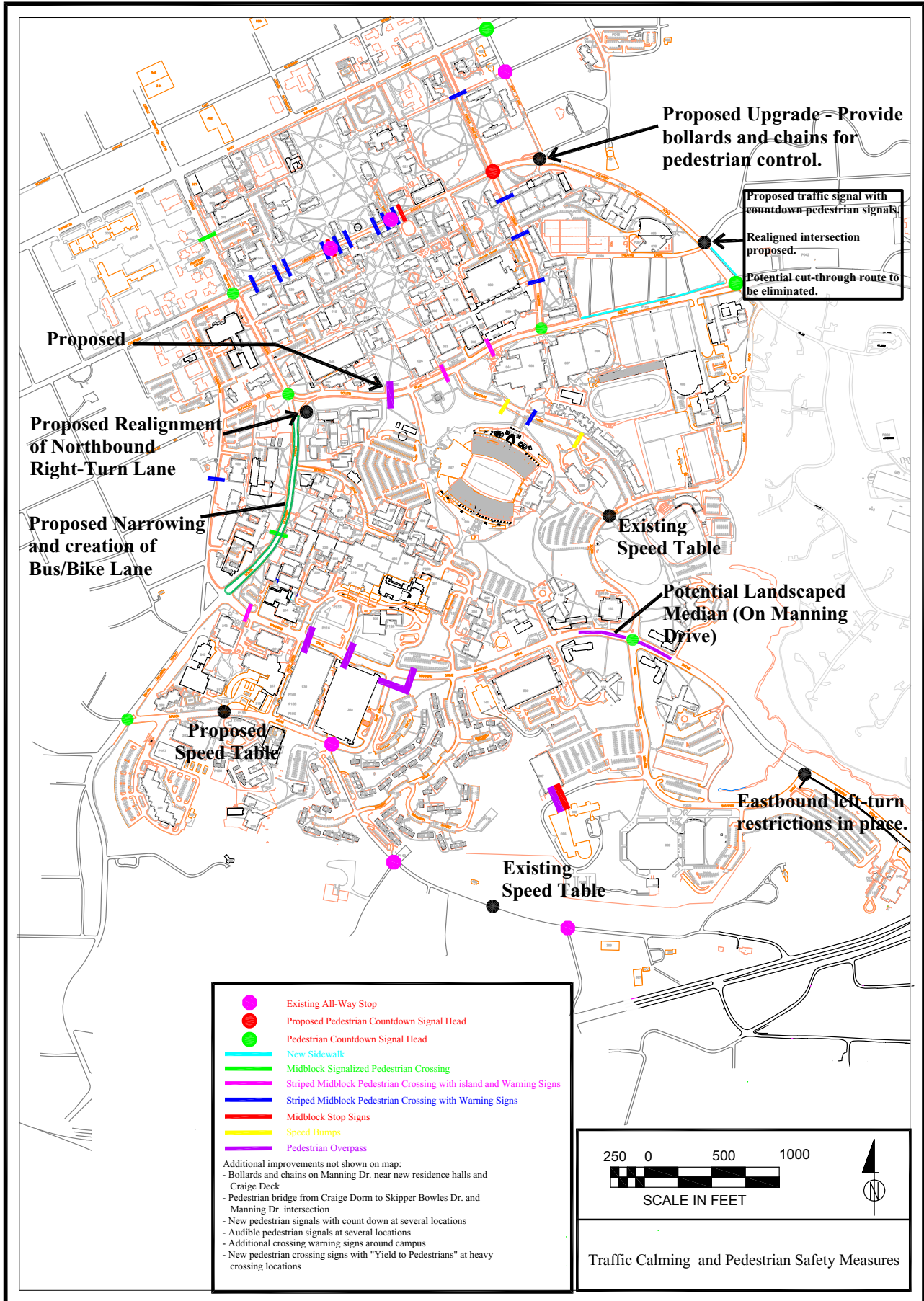
The strong use of alternative modes, compared to a typical development of this size, also has a benefit for air quality. The emission reductions, compared to a typical development, are estimated to be:

- Nitrous Oxides (NOx): 25 kg/day (6,220 kg/year)
- Volatile Organic Compounds (VOC): 13 kg/day (3,340 kg/year)
- Carbon Monoxide (CO): 252 kg/day (63,022 kg/year)

Existing and Proposed Traffic Calming Measures On Campus

Figure 3.1 shows the recent and proposed traffic calming measures on campus, including pedestrian and bicycle improvements. Recent improvements include new pedestrian countdown signal heads at several intersections, new sidewalks, and new mid-block pedestrian crossings using a variety of engineering treatments. Further measures are proposed, including the narrowing of South Columbia Street (which will have major benefits for pedestrians and cyclists), pedestrian bridges at South Road and the Craige residence hall, and a range of other improvements across the campus.

Figure 3.1: Traffic Calming and Pedestrian Improvements On Campus



Existing and Proposed Traffic Calming Measures in Adjacent Neighborhoods

The Transportation Impact Analysis (TIA) guidelines agreed by the Town of Chapel Hill and the University in 2001 do not require the TIA to analyze traffic calming in adjacent neighborhoods. However, the University maintains an ongoing dialog with the Town about possible impacts and potential mitigation measures.

Table 3.2 shows the streets that have recently been examined for possible impacts and potential mitigation measures, taking into account the 2005 traffic counts. Some of the streets already have traffic calming measures in place or planned. Other streets are recommended for further consideration.

The Town and the University will be working together to deliver the anticipated mitigation measures, and will involve citizens in this process. The University will be developing initial plans for the measures in the next few months.

Table 3.2: Neighborhood Streets Considered for Traffic Calming Measures

Street	Recommended for Further Consideration? Justification	Traffic Calming Measures	
		Existing or Planned	To Be Considered
Westwood Drive, Ransom Street, and adjoining neighborhood streets	Yes. The Town of Chapel Hill reports citizen complaints of increased truck and University-related traffic. Peak hour traffic volumes at the intersection of S. Columbia Street at Mason Farm Road/Westwood Drive have continued to increase.	Improved sidewalks already being constructed	All-way stops Improved pavement markings Speed tables / humps
Oteys Road	Yes. The Town of Chapel Hill reports citizen complaints about increased traffic volumes. A.M. peak hour traffic has increased slightly since the 2004 TIA update.	None	Speed table / hump
Purefoy Road	Yes. The Town of Chapel Hill reports citizen complaints about increased traffic volumes. P.M. Peak hour traffic has increased slightly since the 2004 TIA Update.	None	Speed table / hump
Mason Farm Road	No. Traffic calming measures have already been implemented or already planned.	All-way stops Speed table/hump	None
Ridge Road	No. Traffic calming measures have already been implemented.	Speed table	None
Laurel Hill Road	No. Alignment and cross-section of road is already a calming measure prohibiting high travel speeds and creating longer travel times than competing routes.	None	None
Gimghoul Road	No. Church property is reportedly being sold and will be redeveloped as residential units. As a result, the existing cut-through route connecting to South Road (NC 54) will be eliminated. Some measures are already planned for implementation in 2006.	New traffic signal Decreased corner radii at intersection with Country Club Road Stamped asphalt crosswalks Audible, countdown pedestrian signals	None
Raleigh Street	No. Traffic calming measures have already been implemented.	Marked crosswalks (with and without median signs) Speed table	None
Cameron Avenue	No. Traffic calming measures have already been implemented.	Marked crosswalks All-way stops	None
Battle Lane	No. Traffic calming measures have already been implemented.	On-street parking All-way stop	None
Boundary Street	Yes. Peak hour traffic has not increased since the 2004 Update. However, Boundary Street is most likely utilized by University-related traffic.	None	Speed table All-way stop
Park Place	Yes. Peak hour traffic has not increased since the 2004 Update. However, Park Place is most likely utilized by University-related traffic.	None	Speed tables All-way stop