CAMBRIDGE SYSTEMATICS

US 64-NC 49 Corridor Study Travel Demand Model Calibration

technical

memorandum

prepared for

North Carolina Department of Transportation

prepared by

Cambridge Systematics, Inc.

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Post, Buckley, Schuh & Jernigan (PBS&J)

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1.0 Introduction

The US 64-NC 49 travel demand model is a TransCAD-based forecasting tool that has been designed to support the Tier 1 and Tier 2 phases of the US 64-NC 49 Corridor Study. The principal use of the model is to estimate and assess the likely transportation impacts of various roadway improvements that could be implemented in the US 64-NC 49 corridor over a 25-year timeframe. This model has been developed and applied specifically for this study and is not intended to be used for any other purpose without further refinements. It has been designed and calibrated to properly represent the changes in path choice that are likely to occur when large increments of highway capacity are added to a congested corridor. It is being used as a screening tool to assess the long-term benefits of alternative roadway configurations between Raleigh and Charlotte, and Raleigh and Statesville.

It is standard practice to judge the reliability and validity of the model, in part, by its ability to replicate a set of observed data. Such data might include zonal-level trip-making frequencies; trip distribution patterns; proportions of travel by alternative modes of travel such as auto, transit, and potentially other modes; and traffic counts on roadway segments. As a sketch-planning tool covering a 185-mile-long corridor, the US 64-NC 49 model is being calibrated to: 1) achieve a "reasonable" match to traffic counts on the principal routes of interest to this study; and 2) screenlines comprising imaginary end-to-end boundaries that capture major movements of traffic between and among significant subregions within the model area.

This document describes the structure of the model, the model calibration process, and the results obtained. Appendix A presents the transportation improvement projects (TIP) and long-range transportation plan (LRTP) projects included in the year 2030 traffic forecasts. The user's guide to the user interface for the model presents a list of the inputs and outputs of the model.

2.0 Model Structure

The US 64-NC 49 transportation model follows the standard four-step modeling sequence of:

- Trip generation, which estimates the number of trips people make;
- Trip distribution, which estimates the starting and ending points of trips;

- Mode split, which converts person trips to vehicle trips and transit trips; and
- Trip assignment, which determines which routes vehicles take to get from their origins to their destinations.

As is common practice, the land use activities used in the trip generation step are represented as idealized spatial aggregations, known as traffic analysis zones, or TAZs. At their greatest level of detail, the TAZs used in the model correspond to census tracts in a 24-county area. The 24-county area encompasses a 19-county area that has been defined as the official study area (See Figure 1 below Outside of the 24-county area, TAZs are represented as counties (76 counties in all). The highway network in the 24-county area (the "core area") includes most roadway facilities up to and including the major collector functional classification; in the remainder of the State, The highway network is correspondingly less detailed. A number of external stations at key entry/exit points around the State are included as well. The non-core portion of the model region, whose highway network includes only primary arterials, is included in the US 64-NC 49 network in order to capture through traffic and other long-distance traffic adequately. Some basic statistics about the model are presented in Table 1 below.

Table 1. 2002 Basic Model Statistics

	Model Core (24 Counties)	Rest of State	External	Total
Zones	793	76	35	904
Households (2000)	1,579,763	1,552,250		3,132,013
Jobs (2002)	2,165,661	1,479,490		3,645,151
Lane Miles	30,000	13,750		43,750

Other primary features of the model process are:

- Travel Markets – The model accounts for home-based work (HBW), home-based non-work, (HBNW), non-home-based (NHB) trips, long-distance trips (defined as travel greater than 100 miles), and travel starting and/or ending at an external station. Truck demand is represented as light, medium, and heavy truck travel.

- Land Use Data – Household data at the census tract level were derived from the 2000 US Census. 2002 employment data were provided by InfoUSA, which provides marketing data on commercial establishments. InfoUSA provides employee totals at the four-digit standard industrial classification (SIC) level as well as the geographic coordinates of each establishment, which facilitates the transfer of the employment data to TAZs. These data were scrutinized and screened to eliminate the possible misassignment of corporate national employment totals to corporate headquarters

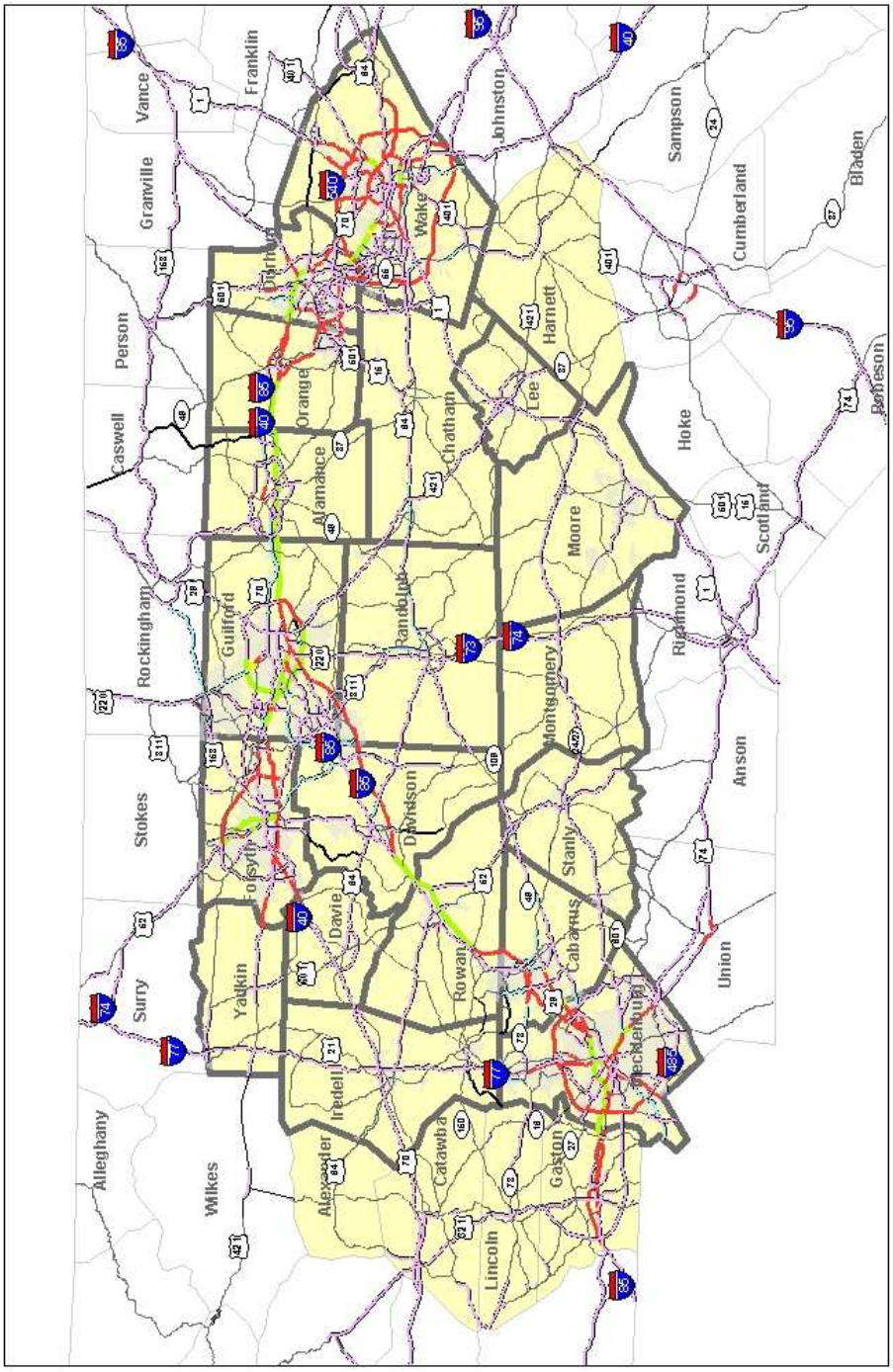


Figure 1. Model Core Area and Study Area

locations. This was a particular concern for the City of Charlotte, because it is the corporate headquarters for several large banks. Questionable data were shared with the North Carolina Department of Employment Security, which corrected all the invalid entries that were identified. Following the validation of the data, all individual establishment database records were assigned to TAZs using ArcVIEW's spatial join routine.

- Trip Generation – For non-truck travel, trip generation production rates are stratified by area type (central business district (CBD), urban and rural) auto ownership, and household size. Attraction rates are stratified by area type and each of nine employment types[1]. For truck travel, trip generation (attraction and production) rates are stratified by seven categories of employment[2]. The rates were derived from the National Cooperative Highway Research Program (NCHRP) 365 quick response manual.

- Trip Distribution – A gravity-type model develops production/attraction trip tables for each purpose. The gravity model used for trip distribution generates impedances using an exponential form, where the exponents have been derived (with slight modifications) from a statewide model developed for the Missouri Department of Transportation (DOT). The Missouri DOT (MODOT) data was used for this project because MODOT had recently conducted a statewide home interview survey to develop its own model. Trip tables are developed for all-day travel, using appropriate production/attraction factors derived from NCHRP 365. This model was calibrated to all-day conditions only.

- Mode Split – The US 64-NC 49 travel demand model estimates highway travel only. Origin/destination person trips are converted to vehicle trips through the application of trip-purpose-specific vehicle occupancy factors derived from NCHRP 365.

- Trip Assignment – Auto, light/medium, and heavy-duty truck trips are assigned separately in a multiclass assignment. Each class (i.e., autos, trucks, etc) is assigned to the highway network in a 15-iteration equilibrium assignment.

The model input requirements are listed in the user's guide.

3.0 Development of Highway Network

In the US 64-NC 49 study, travel demand was modeled as a set of demand flows that travel over a transportation network. To capture the zone-to-zone demand flows in the

[1] Agriculture/forestry/fishing, mining, construction,manufacturing, transportation/communication/utilities, wholesale, retail, services, other.

[2] Retail, service, construction/manufacturing, wholesale/retail, transportation, agricultural/forestry/fishing and other

study area, a TransCAD highway network database was populated with all significant roadway facilities and their associated characteristics. The model network required a foundation of major facilities, such as interstates, freeways, highways, and other principal arterials, that provide connectivity and mobility across the study area and beyond to the external zones.

The highway network was developed in multiple stages.

3.1 Development of highway network for major facilities. First, the major facilities of the network were developed in a Geographic Information System (GIS) using the US Department of Transportation's Freight Analysis Framework (FAF) highway database and North Carolina Department of Transportation's (NCDOT's) Universe File, a roadway inventory database containing spatial attributes. The FAF was used to build the spatial foundation of principal arterial roadways, to crosscheck the Universe File's spatial attributes for major facilities, and to ensure connectivity at all junction points. FAF links were spatially joined (merged) to their associated sections in the Universe File in order to acquire the attributes (e.g., functional classification) of the Universe File.

The integration of the Universe File with the FAF and its eventual development into a model-ready network database was a collaborative effort between the consultant team and NCDOT. NCDOT provided the Universe File in a GIS format that could be processed by the travel demand model software, TransCAD. In processing this data and merging them with the FAF network file, some inaccuracies, network gaps, and problematic route segments were identified and rectified. Functional classification designations on some roadway segments in the study area were updated to reflect actual ground conditions. The effort to edit and correct the functional classification and other important network attributes focused on the major facilities in the core area Additionally, numerous highway segments were less than 0.1 miles in length on many highway routes. This would not have affected the modeling results per se, but could have created problems when a scenario called for a change in the speed, capacity, or number of lanes, because it is very easy to overlook these very short segments. Lastly, as mentioned above, there were numerous gaps on certain links in the network that were identified. These gaps required extensive manual resolution, and the entire network was checked with automated procedures to ensure that each roadway was fully connected. The results of the network editing process were reviewed by NCDOT.

For the traffic assignment calibration, year 2002 traffic counts were provided by NCDOT in a GIS point layer and merged with the US 64-NC 49 highway network. This merger of data, which is an automated process, was reviewed extensively by the consultant team and NCDOT, and then manually edited to ensure that the traffic counts were assigned to their proper locations on the highway network.

3.2 Addition of secondary roads. The Universe File was used as the source of lower functional classification roadway segments to be added to the highway network. The Universe File is the only GIS-based source of information on these

facilities. As was the case with the primary roadway system, incidences of unconnected links were resolved manually, and edited to ensure that each roadway segment was fully connected.

3.3 Development of future year highway networks. Thirdly, the future-year model networks were assembled. To develop the existing and committed (E+C) 2030 highway network, information from the transportation improvement programs (TIPs) and long-range transportation plans (LRTPs) developed by regional and metropolitan planning organizations (RPOs and MPOs) was extracted and assembled. The TIPs and LRTPs for all agencies within the study area were collected and examined for regionally significant projects. Existing roadways slated for significant improvements over the life of the respective plans were added to both the base- and future-year networks.

More than one dozen regional plans were reviewed to determine which projects to include in the 2030 highway network. The Metropolitan Planning Organizations (MPOs), Regional Planning Organizations (RPOs) and Councils of Governments (COGs) whose plans were reviewed all assigned regional significance ratings to their TIP projects, and these factors were applied in the initial filtering of projects. Using this designation, the TIP projects that provided increased capacity were included, but bridge or safety improvement projects or projects that occurred outside the study area were excluded.

The future year network development required one additional processing step. The detail used in the analysis had to be consistent with the zone size to ensure that reasonable and properly distributed flows on the network were achieved. Too much detail would result in links with no traffic volumes. This is because additional low-speed, low-capacity links would not provide enough of a time savings to make the added distance of using them worthwhile, given the relatively coarse detail of the zone structure. Conversely, too little detail would produce too much traffic on too few network links, artificially increasing congestion levels and resulting in path diversions that would improperly distribute traffic over the highway network. Each of the LRTP projects that passed the first phase of filtering was scrutinized for its utility in the corridor model, with special attention given to projects less than one mile in length. If these projects were on a roadway with a functional classification of principal arterial or above or if they provided a connection between two such roadways, they were generally included in the highway network.

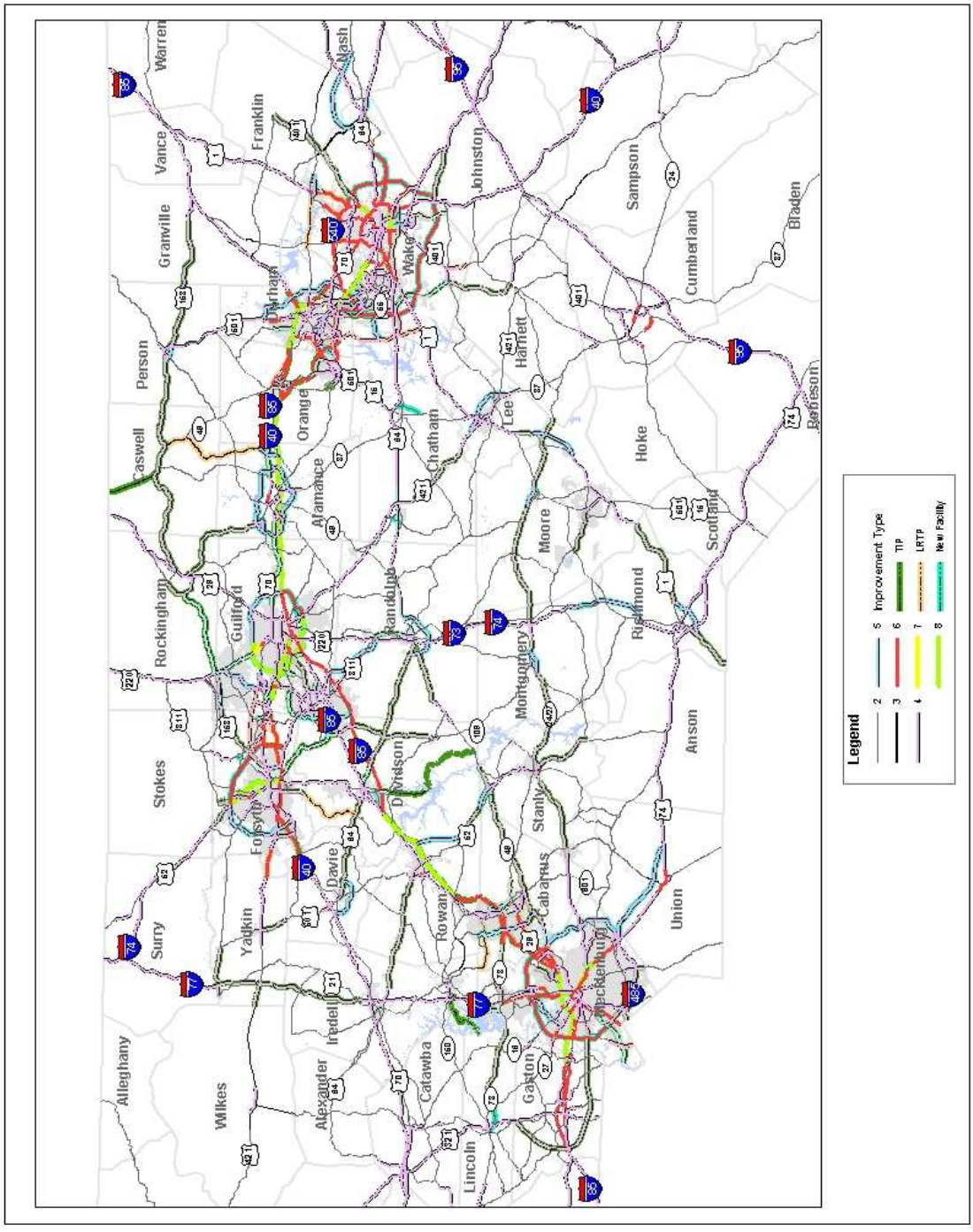
Some agencies did not designate regional significance ratings in their project listings. Projects from these agencies were evaluated based on their functional classification, extent, capacity increase, and their ability to distribute traffic over the network, before being added to the network. Additionally, a limited number of LTRP and TIP projects not designated as regionally significant were added to the highway network. Projects that provided reasonable alternative routings or that were targeted for facilities already on the base-year network were included. An example of such a project is the TIP project U-2537 in the High Point MPO region, which is a new thoroughfare from I-85 to the US-311 bypass (R-609). The facility

was deemed not significant by the MPO but was included because it provides an alternative to the future bypass, Additionally, it was already in the model network for providing connections to other improvement projects.

In all, 287 improvement projects were included in the 2030 highway network. The 287 TIP and LRTP improvement projects cover a significant portion of the study area's model network. NCDOT reviewed and modified the set of projects included, to ensure that the network had the appropriate level of detail. and that it included all appropriate projects.

The highway network was edited and validated to ensure that reliable flows were modeled on the highway network. Additionally, various checks were conducted to ensure that the highway network was fully connected and that there were no coding errors that affected path building between origins and destinations. For example, shortest time paths were built between key origin/destination pairs, such as Raleigh to Charlotte, and compared to actual travel times. Figure 2 below shows the roadway improvements included for the year 2030 travel demand forecasts.

Figure 2. Highway Improvements Included in Year 2030 Travel Demand Forecasts



4.0 Model Calibration

The 2002 model calibration was initiated once the zonal data (households and jobs) and the network data were assembled. The model calibration consisted of several steps:

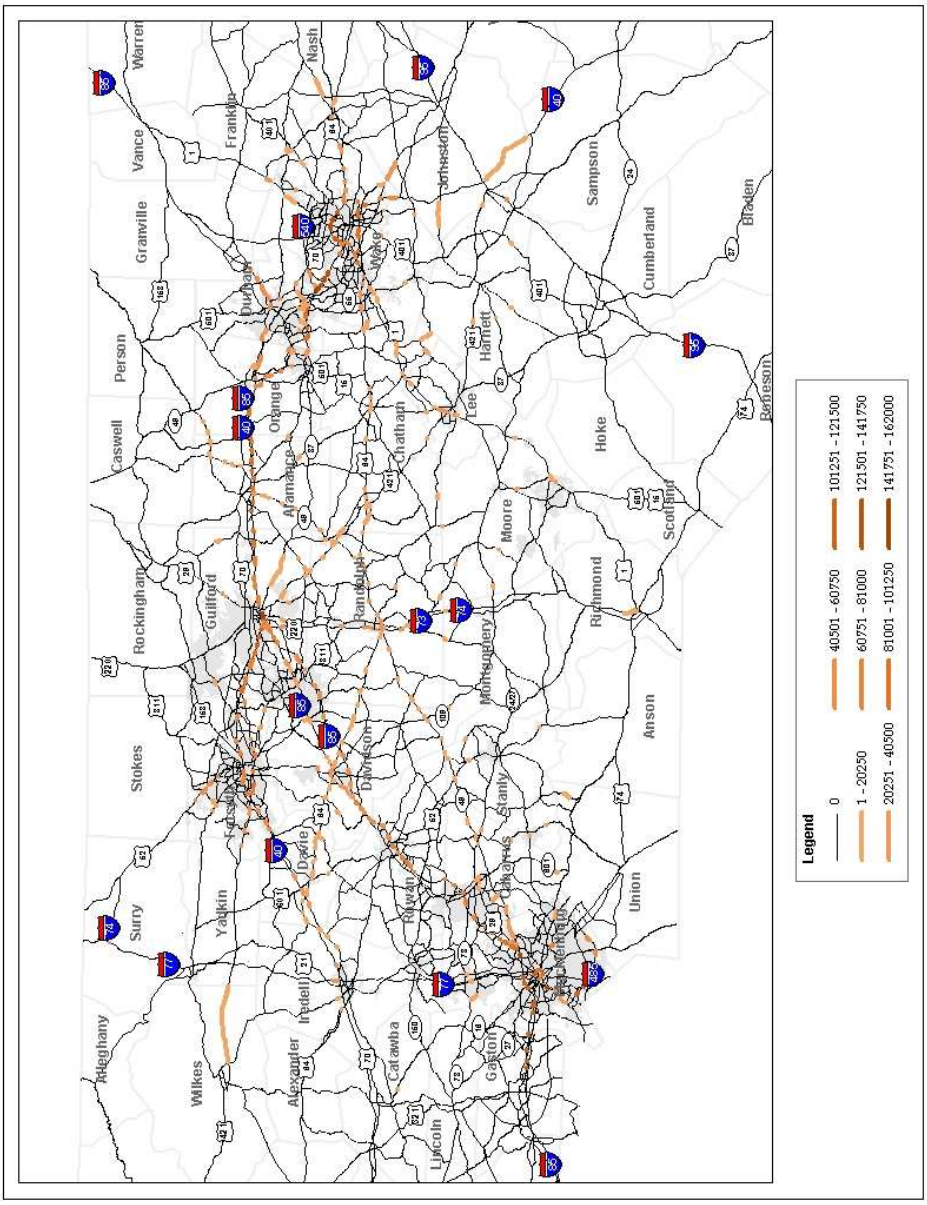
1. Run the four-step process and compare observed and simulated volumes in summary comparison tables and maps of simulated to observed volumes. Modify network attributes to improve the match to observed data. Correct any additional network coding errors.

The inspection of simulated to observed volumes revealed that there was a systematic oversimulation of traffic on portions of the interstate system. This required the addition of network detail to provide viable alternative routes for travel on the highway network. Second, the external-to-external trips were adjusted downward to ensure a match with observed traffic counts and also to improve the match to observed volumes on the freeways and expressways. Third, the speed and capacity lookup table was modified to encourage the distribution of travel on the arterial system. Lastly, traffic counts were added to the initial set of 400 in the 24-county area. The calibration effort was focused on achieving as good a match as possible to a 500-count subset of the 4,500-element statewide traffic count set. This subset covers key routes, such as US 64-NC 49, I-85,I-40, as shown on Figure 3 on the following page.

2. Estimate a 2002 travel demand matrix using the ODME (origin/destination matrix estimation) process of TransCAD. The ODME process adjusts a trip table so as to achieve as good a match to traffic counts as possible.

Initially, the traffic assignment process "preloaded" trucks and then performed an equilibrium assignment of autos. In this setup, the autos are assigned to the highway network while taking into consideration the congested truck travel times, but the truck volumes cannot be rerouted to faster paths on the highway network. The calibration results improved significantly when a multiclass assignment was used. The multiclass assignment assigns trucks and autos to the highway network separately, but allows each to find better routes so as to minimize their origin/destination travel times.

Figure 3. Location of Key Counts Used in Model Calibration



4.1 Calibration Results

Table 2 presents the initial and final results of the model calibration, in terms of the deviation from observed counts as root mean square error (RMSE) and percent volume difference, by functional classification at count locations corresponding to key corridors.. According to Federal guidelines, higher functional classification facilities such as interstate facilities should match ground counts to a higher degree than lower functional classification facilities. A second rule of thumb used by CS staff is to achieve an overall RMSE of 40 -50 percent for a large study area. Due to the application of the ODME process, all of the functional classification results for RMSE are well within generally acceptable levels, as is the overall result, at 15 percent. This is a significant improvement over the initial result, which was an RMSE of 35 percent. Table 3 presents RMSE results by volume range; here again, the tolerance level for errors increases as volumes decrease. There is a very acceptable match to counts at volumes of 20,000+ and, again, a significant improvement in the match to observed counts between the initial and final results.

Table 2. Comparison of Simulated versus Observed Counts by Functional Classification
US 64-NC 49 Travel Demand Model

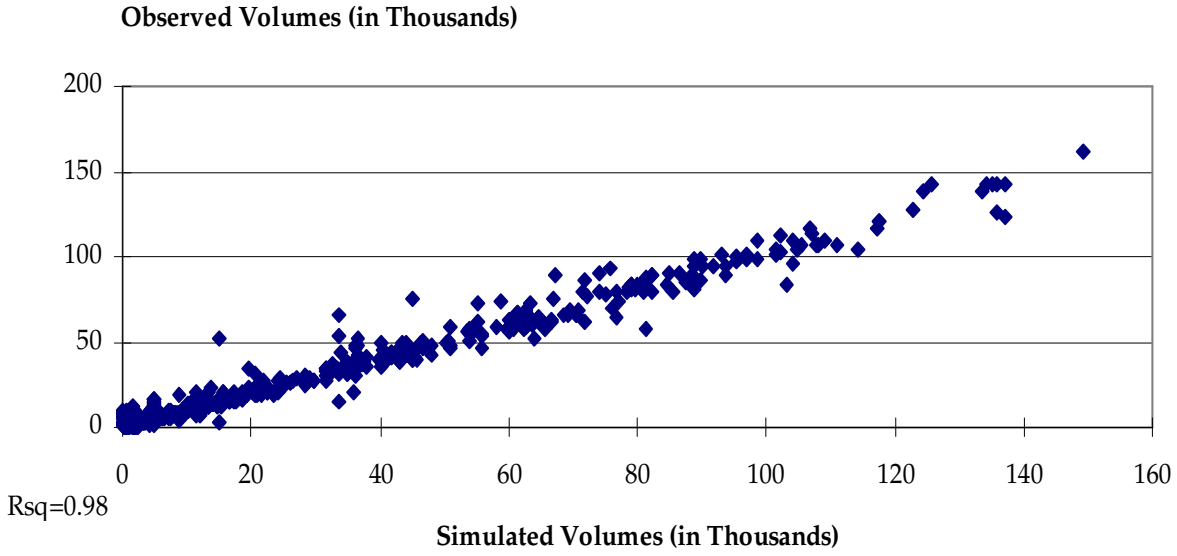
	Initial Results				Final Results			
Federal Functional Class	Number of Counts	Volume RMSE	Percent RMSE	Percent Volume Difference	Number of Counts	Volume RMSE	Percent RMSE	Percent Volume Difference
Rural								
Interstate	39	16,998	29.8	18.1	44	6,450	11.7	-1.2
Other Principal Arterial	67	6,305	39.9	14.6	78	2,640	16.7	-2.4
Minor Arterial	22	3,667	45.6	-11.8	40	3,466	40.3	-19.3
Major Collector	34	4,857	67.2	-0.1	67	2,566	44.6	-10
Minor Collector	5	6,041	36.5	-3.1	6	5,467	36	-35.6
Urban								
Interstate	112	22,819	27.3	13.1	114	7,997	9.6	-2.7
Other Freeway and Expressway	68	9,008	24.6	8.4	68	5,396	14.7	-1.9
Other Principal Arterial	29	12,400	44.1	5	40	8,106	28.8	-7.8
Minor Arterial	17	3,903	47.6	13.6	36	2,254	20	-2.4
Collector					3	7,168	61.3	-62.6
All	**393**	**14474.9**	**34.4**	**14.3**	**496**	**5,560.50**	**15.3**	**-3.2**

Table 3. Comparison of Simulated versus Observed Counts by Volume Range
US 64-NC 49 Travel Demand Model

	Initial Results			Final Results		
Volume Range	Number of Counts	RMSE	Percent RMSE	Number of Counts	RMSE	Percent RMSE
100,000	32	11,804	**10.0**	32	3,136	**2.6**
75,000-99,999	50	11,517	**13.3**	51	3,604	**4.2**
50,000-74,999	58	8,947	**14.7**	60	2,120	**3.5**
40,000-49,999	38	6,488	**14.6**	42	3,191	**7.2**
30,000-39,999	31	5,785	**16.8**	36	1,196	**3.5**
20,000-29,999	46	2,109	**9.1**	51	883	**3.8**
10,000-19,999	53	5,140	**33.9**	88	1,503	**10.2**
5,000-9,999	53	1,584	**21.3**	75	5,077	**68.7**
2,500-4,999	27	2,004	**57.3**	42	530	**14.8**
Under 2,500	11	2,598	**212.0**	28	413	**31.3**

Figure 4 below displays a scatterplot of simulated and observed daily traffic volumes from the model. A 100 percent agreement between simulated and observed volumes would appear as single line at a 45 percent angle between the southwest and northeast corners of the graph. The statistical measure of agreement is the correlation coefficient, which is 0.98 in this calibration. There is no rule of thumb known used to define an acceptable result for this measure but, in the experience of CS staff, results of more than 90 percent generally indicate a good measure of fit to observed data.

Figure 4. Simulated versus Observed Volumes



A set of internal and external screenlines[3] was developed as an additional calibration measure. Four external screenlines border the 24-county core area, and five screenlines made up of a number of cutlines comprise a set of internal screenlines. These screenlines capture travel between and among major activity centers in the core area and cut across principal arterials of interest to this study in at least one location and often in several locations. Table 4 presents the screenline results at the initial stages of the calibration effort. The comparison to the observed data in Table 5 shows that the adjustments have produced a reasonable match (within 10 percent) to in- and out-flows at internal and external points. A comparison of Tables 4 and 5 shows that substantial improvements in the match to ground counts has been achieved. The screenline locations are shown in Figure 5.

[3] Screenlines typically extend completely across an area of interest and extend from boundary cordon to boundary cordon. Cutlines extend across a single corridor are generally used to intercept travel along one axis.

Table 4. Comparison of Simulated versus Observed Screenlines

US 64-NC 49 Travel Demand Model – Initial Results

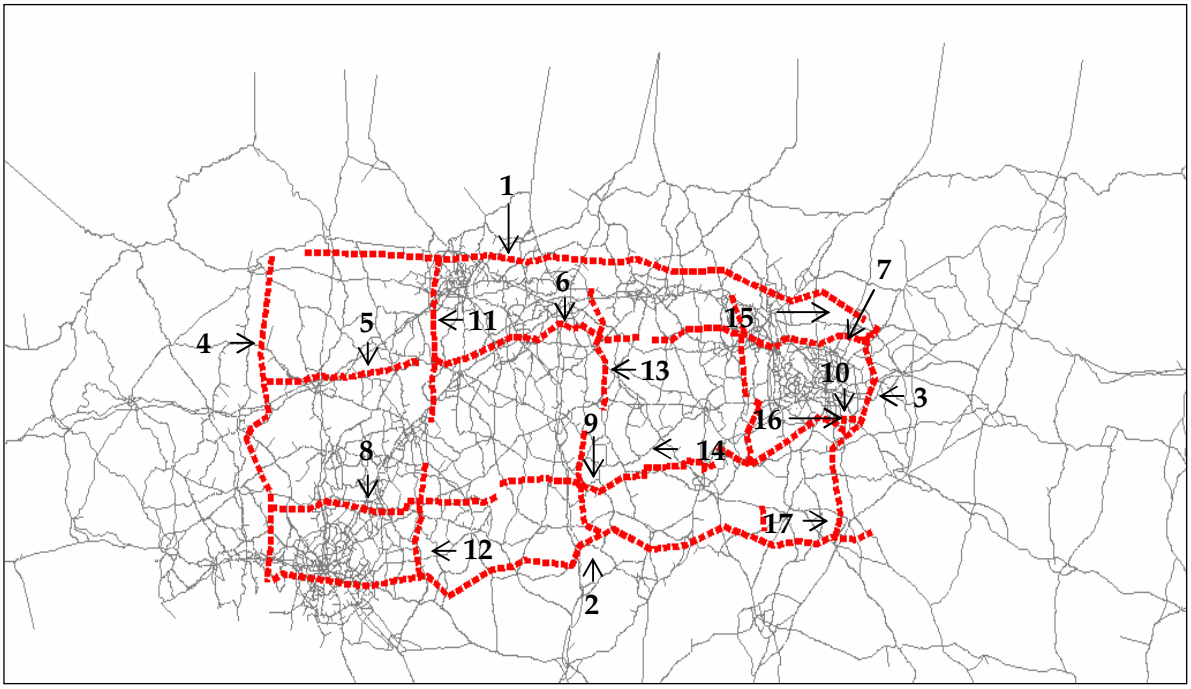
ID	Name	AB SIM	AB OBS	Ratio	BA SIM	BA OBS	Ratio	Total SIM	Total OBS	Ratio
	External									
1	North	75,233	60,050	1.25	70,900	60,050	1.18	146,133	120,100	1.22
2	South	190,574	173,920	1.10	192,190	173,920	1.11	382,764	347,840	1.10
3	East	70,809	42,750	1.66	65,043	42,750	1.52	120,650	85,500	1.41
4	West	17,726	14,600	1.21	19,009	14,600	1.30	36,735	29,200	1.26
	Internal									
5	EW north west	49,940	50,500	0.99	50,278	50,500	1.00	100,218	101,000	0.99
6	EW north central	84,892	81,840	1.04	88,535	81,840	1.08	173,427	163,680	1.06
7	EW north east	10,1675	147,600	0.69	102,359	147,600	0.69	204,034	295,200	0.69
	Total	**236,507**	**279,940**	**0.84**	**241,172**	**279,940**	**0.86**	**477,679**	**559,880**	**0.85**
8	EW south west	123,384	137,000	0.90	118,244	137,000	0.86	241,628	274,000	0.88
9	EW south central	20,904	22,270	0.94	22,524	22,270	1.01	43,428	44,540	0.98
10	EW south east	90,450	92,550	0.98	101,716	92,550	1.10	192,166	185,100	1.04
	Total	**234,738**	**25,1820**	**0.93**	**242,484**	**251,820**	**0.96**	**477,222**	**503,640**	**0.95**
11	NS west north	123,006	88,750	1.39	119,501	88,750	1.35	242,507	177,500	1.37
12	NS west south	40,889	18,455	2.22	38,338	18,455	2.08	79,227	36,910	2.15
	Total	**163,895**	**107,205**	**1.53**	**157,839**	**107,205**	**1.47**	**321,734**	**214,410**	**1.50**
13	NS center north	87,652	67,250	1.30	78,455	67,250	1.17	166,107	134,500	1.23
14	NS center south	5,917	6,400	0.92	5,159	6,400	0.81	11,076	12,800	0.87
	Total	**93,569**	**73,650**	**1.27**	**83,614**	**73,650**	**1.14**	**177,183**	**147,300**	**1.20**
15	NS east north	104,394	93,950	1.11	97,509	93,950	1.04	201,903	187,900	1.07
16	NS east central	9,393	15,150	0.62	9,128	15,150	0.60	18,521	30,300	0.61
17	NS east south	6,306	4,650	1.36	5,325	4,650	1.15	11,631	9,300	1.25
	Total	**120,093**	**113,750**	**1.06**	**111,962**	**113,750**	**0.98**	**232,055**	**227,500**	**1.02**
	Total	1,203,144	1,117,685	1.08	1,184,213	1,117,685	1.06	2,372,155	2,235,370	1.06

Table 5. Comparison of Simulated versus Observed Screenlines

US 64-NC 49 Travel Demand Model – Final Results

ID	Name	AB SIM	AB OBS	Ratio	BA SIM	BA OBS	Ratio	Total SIM	Total OBS	Ratio
	External									
1	North	**59,277**	**60,050**	**0.99**	**59,304**	**60,050**	**0.99**	**118,581**	**120,100**	**0.99**
2	South	**167,628**	**173,920**	**0.96**	**167,634**	**173,920**	**0.96**	**335,262**	**347,840**	**0.96**
3	East	**46,738**	**42,750**	**1.09**	**46,795**	**42,750**	**1.09**	**93,533**	**85,500**	**1.09**
4	West	**14,537**	**14,600**	**1.00**	**14,578**	**14,600**	**1.00**	**29,115**	**29,200**	**1.00**
5	EW north west	46,862	50,500	0.93	46,748	50,500	0.93	93,610	101,000	0.93
6	EW north central	79,077	81,840	0.97	78,683	81,840	0.96	157,760	163,680	0.96
7	EW north east	141,068	147,600	0.96	144,431	147,600	0.98	285,499	295,200	0.97
	Total	**267,007**	**279,940**	**0.95**	**269,862**	**279,940**	**0.96**	**536,869**	**559,880**	**0.96**
8	EW south west	134,833	137,000	0.98	135,042	137,000	0.99	269,875	274,000	0.98
9	EW south central	22,225	22,270	1.00	22,354	22,270	1.00	44,579	44,540	1.00
10	EW south east	89,416	92,550	0.97	89,960	92,550	0.97	179,376	185,100	0.97
	Total	**246,474**	**251,820**	**0.98**	**247,356**	**251,820**	**0.98**	**493,830**	**503,640**	**0.98**
11	NS west north	92,180	88,750	1.04	92,033	88,750	1.04	184,213	177,500	1.04
12	NS west south	17,373	18,455	0.94	17,452	18,455	0.95	34,825	36,910	0.94
	Total	**109,553**	**107,205**	**1.02**	**109,485**	**107,205**	**1.02**	**219,038**	**214,410**	**1.02**
13	NS center north	70,424	67,250	1.05	70,392	67,250	1.05	140,816	134,500	1.05
14	NS center south	6,605	6,400	1.03	6,549	6,400	1.02	13,154	12,800	1.03
	Total	**77,029**	**73,650**	**1.05**	**76,941**	**73,650**	**1.04**	**153,970**	**147,300**	**1.05**
16	NS east north	92,663	93,950	0.99	93,414	93,950	0.99	186,077	187,900	0.99
17	NS east central	16,141	15,150	1.07	16,128	15,150	1.06	32,269	30,300	1.06
18	NS east south	4,398	4,650	0.95	4,438	4,650	0.95	8,836	9,300	0.95
	Total	**113,202**	**113,750**	**1.00**	**113,980**	**113,750**	**1.00**	**227,182**	**227,500**	**1.00**
	Total	**1,101,445**	**1,117,685**	**0.99**	**1,105,935**	**1,117,685**	**0.99**	**2,207,380**	**2,235,370**	**0.99**

Figure 5. US 64-NC 49 Screenlines



5.0 Model Application

The 2030 model applications required the development of land use and highway network inputs as well as an application framework for the traffic assignment. Within the 24-county core area, 2025 county-level employment forecasts and tract-level household forecasts were obtained from Global Insight, an economic forecasting firm. These forecasts were extrapolated to 2030 using trends developed by Global Insight. These data were converted to TAZ-level forecasts using 2002 TAZ-to-county (employment) and TAZ-to-tract (households) proportions. Outside the core area, average growth is set equal to the levels in the core area.

Among all year 2030 scenarios, household and employment growth assumptions were held constant. With the exception of US 64 and NC 49, highway network speed and capacity assumptions were held constant as well.

The application framework refers to the development of the trip table for the application. The forecast trip table was developed by adding the increment of trips in 2030 to the 2030 ODME trip table. In other words:

1. Develop a 2002 trip table, using 2002 households and jobs;
2. Develop a 2030 trip table, using 2030 households and jobs;
3. Subtract the 2002 table from the 2030 table;

4. Add this difference to the 2002 ODME trip table; and
5. Assign this trip table to the highway network.

Appendix A

This appendix documents the post-2002 highway network projects used by the US 64-NC 49 Corridor Study transportation model. These inputs and their associated attributes are stored in a TransCAD database for the traffic assignment.

– Table A.1 NCDOT FY 2004-2009 Transportation Improvement Programs

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
I-2201	I-40-US 421 Guilford	SR 1850 (Squire Davis Road) to west of SR 1398 (Freeman Mill Road)	4-6	6-8	Lanes	2003
I-220*	I-40 Wake County	NC 147 (Exit 279) in Research Triangle Park to Bradshaw Freeway at Wade Avenue (Exit 289).	4-8	4-8	Lanes	2003
I-2304	I-85 Rowan- Davidson Counties	North of SR 2120 (Exit 81) in Rowan County to US 29-52-70/I-85 Business (Exit 87). (Project includes B-3833)	2-6	8	Lanes	2006
I-2402	Greensboro Bypass (Southern Loop) Guilford County	I-85 South of Greensboro to south of SR 3041 (Clapp Farm Road). Freeway on New Location.	2-4	6-8	New Location	2004
I-2511	I-85 Rowan County	US 29-601 Connector (Exit 68) to north of SR 2120 (Exit 81).	2-8	8	Completed	2004
I-2806	I-77 Iredell- Yadkin Counties	South of SR 1891 in Iredell County to south of SR 1125 in Yadkin County.	2-4	4	Rehabilitation	2003
I-2808	I-77 Yadkin- Surry Counties	South of SR 1125 (Mile Post 71) in Yadkin County to US 21 Bypass (Mile Post 83.5 in Surry County, Exit 83).	2-4	4	Rehabilitation	2005
I-0305*	I-40 Orange County	at Hillsborough to Durham County Line.	4-6	6	Lanes	2010
I-0306*	I-85 Durham County	Orange County Line to east of Midland Terrace Road on I-85, and east of Cheek Road on US 70 Bypass. .	2-6	6-8	Lanes	2004
I-3306	I-40 Orange- Durham Counties	I-85 in Orange County to NC 147 (Buck Dean Freeway) in Durham	4	6	Lanes	2004
I-3311	I-77 Mecklenburg County	5th Street in Charlotte to NC 73 (Sam Furr Road).	4	8	Lanes	2004
I-3802	I-95 Cabarrus -Rowan	NC 73 to US 29-601 Connector.	4	5-8	Lanes	2015
I-3803	I-85 Mecklenburg- Cabarrus Counties	US 29-NC 49 Connector in Mecklenburg County to NC 73 in Cabarrus County (Coordinates with U-3415)	4-8	8	Lanes	2004
I-4411	I-77 Iredell County	SR 1102 (Langtree Road). Convert grade separation to interchange	4	4	New interchange	2006
I-4721	I-85 Durham County	US 70 to Red Mill Rd	4	6	Lanes	2015

– Table A.1 NCDOT FY 2004-2009 Transportation Improvement Programs (continued)

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
I-911	I-40 Davie- Forsyth Counties	West of NC 801 (Exit 180) to west of SR 1122.	4-6	6	Lanes	2003
R-Unknown (2608?)	Garden Pkwy Gaston County	I-485 to US-321	2	4	New Location	2030
R-2000*	I-540, Northern Wake Freeway	NC 55 west of Morrisville to US 64	2	6	New Location	2004
R-210	US 1 Moore-Lee Counties	US1 Bypass, north of Lakeview to 4 Lanes at SR 1180 south of Sanford	2	4	New Location	2004
R-210*	US 1 Moore- Lee Counties	US 1 Bypass, north of Lakeview to four lanes at SR 1180 south of Sanford.	2	4	Lanes	2003
R-2107B*	NC 24-27 Montgomery County	US 220a to US 220 in Biscoe. Widen to Multi-Lanes.	2	4	Lanes	2008
R-211	I-485 (Charlotte Southern Outer Loop) Mecklenburg County	Charlotte Southern Outer Loop, west of 1-77 to US 74. Four lane freeway	4	4	New Location	2007
R-2123	I-485 Charlotte Eastern Outer Loop Mecklenburg County	US 74 East (Independence Boulevard) to I-85 North (New Freeway)	2-4	4	New Location	2008
R-2201	King- Tobaccoville Road (Main Street). Haywood County	RJR Entrance to SR 1115	2	5	Lanes	1998
R-2212	Carthage Bypass. Moore County	SR 1640 to SR 1653. Four lanes on new location	2	4	New Location	2009
R-2220*	US-64 Davidson- Randolph Counties	East of I-85 Business in Lexington to US 220	2-4	4-5	Lanes	2003
R-2231	New Facility Richmond- Montgomery Counties	South of SR 1448, south of Ellerbe to US 220a South of Emery. Four lanes divided on new location.	2	4	New Location	2004
R-2239*	US-421 Wilkes- Yadkin Counties	East of SR 1001 in Wilkesboro to I-77.	2	4	Lanes	2003
R-2246	Concord-Kannapolis, Westside Bypass Extension Cabarrus County	NC 49 to south of I-85.	2	4	Lanes	2009
R-2247	Winston-Salem Northern Beltway Forsyth County	I-40 to US 52. Four lane expressway on new location	2	4	New Location	2010
R-2247A	Winston-Salem Northern Beltway N/A	US 158 to I-40. Four lane expressway on new location.	2	4	New Location	2010
R-2248*	Charlotte Western Outer Loop Mecklenburg County	West of I-77 to I-85 North	2	6	New Location	2008
R-2300	NC 8 Davidson County	NC 49 to SR 2212 (Fairview Road).	2-5	2-5	Lanes	2005
R-2309	US 220 Guilford County	SR 2182 (Horsepen Creek Road) to US 220-NC 68 Connector (R-2413).	2-4	5	Lanes	2010
R-2320	US 52 Anson- Stanly Counties	US 74 in Wadesboro to NC 24-27 in Albemarle.	2-4	4	Lanes	2005
R-2413	US 220- NC 68 Guilford- Rockingham Counties	SR 2133 (Pleasant Ridge Road) to US 220-NC 68. Multi-Lane Connector, on New Location.	2	4	New Location	2010
R-2413*	US 220	SR 2133 (Pleasant Ridge Rd) to NC 86.	2-4	5	Lanes	2010
R-2417	Sanford Bypass Lee County	West of SR 1400 to NC 87 west of SR 1138.	2	4	New Location	2008

– Table A.1 NCDOT FY 2004-2009 Transportation Improvement Programs (continued)

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
R-2420	City Boulevard Extension, Mecklenburg County	Relocated Mallard Creek Road to US 29 – NC 49	2	4	Lanes	2004
R-2501	US 1 Richmond County	South Carolina state line to SR 1001. Widen to multi-lanes with bypass of Rockingham on new location.	2	4	Lanes	2010
R-2502	US 1 Richmond- Moore Counties	SR 1001 to existing four lanes in Moore County.	2	4	Lanes	2005
R-2527*	NC 24-27 Montgomery County	Multi-lanes east of Pee Dee River to the Troy Bypass. Widen to multi-lanes.	2	4	Lanes	2010
R-2528	NC 24-27 Montgomery- Moore Counties	From US 220 to Carthage Bypass in Moore County	2	4	Lanes	2010
R-2529	NC 24-27 Moore- Harnett Counties	Carthage Bypass to NC 87. Widen to multi-lanes.	2	4	Lanes	2004
R-2530*	NC 24-27 Stanly County	SR 1963 (St. Martin Road) in Albemarle to west of the Pee Dee River.	2-4	4	Lanes	2009
R-2533	NC 49 Cabarrus- Stanly Counties	Harrisburg to Yadkin River.	2-4	4-5	Lanes	2010
R-2535	SR 1174 Randolph County	West of Farmer to Proposed Asheboro Southern Bypass	2	4	Lanes	2010
R-2536	Us 64 Asheboro Southern Bypass, Randolph County	US 64 West to US64 East, 4 Lanes with interchanges	2	4	New Location	2009
R-2540	NC 55, Wake-Harnett Counties	US 421 to US 401	2	4	Lanes	2015
R-2547	Knightdale Bypass, Wake County	I-440 (Raleigh Beltline) to US 64 near SR 1003	2	6	New Location	2004
R-2552	Clayton Bypass. Wake- Johnston Counties	I-40 to US 70-70 Business. Freeway on new location	2	6	New Location	2006
R-2555	SR 2697 Mecklenburg Counties	NC 73 (Sam Furr Road) to east of SR 2195 (Torrence Chapel Rd.)	2-4	5	Lanes	2008
R-2560	NC 62 (Alamance Road) Alamance- Caswell- Rockingham Counties	SR 1430 (Ramada Road) to US 70 (Church Road).	2-4	4	Lanes	2005
R-2568	NC 109 Davidson- Forsyth Counties	South of I-85 Business in Thomasville to I-40/US 311 in Winston	2-5	5	Lanes	2005
R-2575	NC 86 Caswell- Person Counties	West of Yanceyville to SR 1159 (Thee Hester Road) West of Roxboro. Widen to multi-lanes.	2	4	Lanes	2005
R-2577*	US 158 Forsyth- Guilford Counties	North of US 421/I-40 Business in Winston-Salem to US 220. Widen to multi-lanes.	2-4	4	Lanes	2010
R-2580*	US 158 Guilford- Rockingham Counties	US 220 to US 29 Business (Freeway Drive).	2	5	Lanes	2007
R-2585	SR 1159 (Thee Hester Road) Person- Granville Counties	West of Roxboro to Oxford Outer Loop. Widen to multi-lanes with bypass of Roxboro on new location.	2	4	New Location	2010
R-2586	US 29 Rockingham- Caswell Counties	NC 14 to NC 86 west of Yanceyville.	2	4	Lanes	2005

– Table A.1 NCDOT FY 2004-2009 Transportation Improvement Programs (continued)

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
R-2606	Freeway on New Location Randolph Counties	South of SR 1920 to US 220 north of Asheboro.	2	4	New Location	2008
R-2610*	US 421 Chatham County	Four Lanes at Gulf Rd. to the Siler City Bypass.	2	4	Lanes	2004
R-2611	SR 2007 Guilford County	Colfax to NC 68.	2-4	5	Lanes	2009
R-2628	US 15-501 Chatham County	Pittsboro, NC 87 to US 64. Two Lanes on multi-lane right of way	2	2	New Location	2010
R-2632A	NC73	I-77 to SR 2693 (Davidson-Concord Road).	2	4	Lanes	2004
R-2635	Western Wake Freeway Wake County	US 1 (South) north to NC 55. Freeway	2	6	New Location	2008
R-2704	NC 67 Yadkin County	I-77 to SR 1355 (Messick Road). Widen to provide center turn lane	2-3	3	Lanes	2004
R-2705	Lincolnton Bypass Lincoln County	US 321 to NC 73 at SR 1356. Extend two lanes on new location.	2	2	New Location	2004
R-2706	Mecklenburg County	SR 1356 in Lincoln County to SR 2145	2	4	Lanes	2004
R-2709	Peters Creek Pkwy (NC 150), Forsyth County	From W. Clemmonsville Rd to Davidson Co.	2-4	4	Lanes	2025
R-2721	I-540 (Southern Wake Expressway), Wake County	From NC 55 Bypass to US 401 (South)	2	6	New Location	2025
R-2809	Wake Forest Bypass Wake County	West of SR 1923 (Thomson Mill Road) to East of SR 2053.	2	4	New Location	2007
R-2812	NC 211 Moore County	NC 73 in West End to Pinehurst traffic circle.	2	4	Lanes	2007
R-2814	US 401 Wake- Franklin Counties	North of SR 2044 (Ligon Mill Road) to NC 39 in Louisburg.	2-4	4	Lanes	2009
R-2825	N. Churton St. Orange County	I-40 to Eno River. Widen to multi-lanes and Widen bridge No. 240 over Southern Railroad.	2	4	Lanes	2005
R-2828	I-540 (Southern Wake Expressway), Wake County	US 401 (South) to I-40 (South)	2	6	New Location	2025
R-2829	I-540 (Eastern Wake Expressway), Wake County	I-40 (South) to US 64 Bypass	2	6	New Location	2025
R-2903	US 52 Stanly- Cabarrus- Rowan Counties	South of NC 49 at Richfield to I-85 north of Salisbury. Four lanes divided on new location. (Coordinated With I-2511)	2	4	New Location	2001
R-2904	NC 54 Durham County	SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard)	2-4	4-8	Lanes	2008
R-2905	NC 55 Wake County	SR 1448 (Bobbitt Road) to north of SR 1158 (Hughes Street).	2	5	Lanes	2005
R-2906	NC 55 Wake- Durham Counties	US 64 in Wake County to SR 1121 (Cornwallis Road) in Durham	2-4	4	Lanes	2007

– Table A.1 NCDOT FY 2004-2009 Transportation Improvement Programs (continued)

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
R-2907	NC 55 Wake County	SR 1108 (Wake Chapel Road) in Fuquay-Varina to SR 1114 (Ralph Stevens Road)	2	5	Lanes	2003
R-2910	US 70 Alamance-Guilford Counties	US 70 Bridge widening at St Marks Church Rd	2-4	5	Lanes	2025
R-2911	US 70 Iredell- Rowan Counties	SR 2318 in Statesville to US 601 in Salisbury. Widen to multi-lanes, Part on new location.	2-4	4	Lanes	2009
R-2918	SR 1829 (Strickland Rd) Ext. Wake County	US 70 to East of SR 1822 (Leesville Rd)	2	2	New Location	2010
R-3111	Mocksville Bypass Davie County	US 64 Bypass of Mocksville-	2	4	New Location	2015
R-3325	New Route Chatham County	Siler City Airport to US 421. Two lanes on new location.	2	2	New Location	2010
R-3329	New Route Mecklenburg- Union Counties	Charlotte Outer Loop to US 74 (Monroe Bypass). Multilane freeway	2	4	New Location	2010
R-3416	NC 67 Yadkin County	SR 1355 (Messick Road) to US 601 in Boonville.	2	4	Lanes	2006
R-3418	NC 86 Caswell County	From US 158 to Virginia State Line	2	3	Lanes	2005
R-3427	US 601 Yadkin County	Davie County Line to Yadkinville South city limits.	2	4	Lanes	2005
R-3441	US 52 Forsyth County	From Northern Beltway to Surry County	4	4	Upgrade	2025
R-3602	US 64, Davie-Davidson Counties	From US 601 South of Mocksville to US 52 in Lexington.	2-4	4	Lanes	2004
R-3833	SR 1100 Iredell County	SR 1177 (River Loop Road) to US 21.	2	3-4	Lanes	2007
R-609	US 311 Bypass Guilford- Forsyth- Randolph Counties	High Point "East Belt," South of SR 1920 East	2	4	Lanes	2005
R-623	Troy Bypass Montgomery County	SR 1138 to East of Little River. Four lanes, part on new location.	2	4	New Location	2009
R-942	US 15-501, Chatham- Orange Counties	Proposed Pittsboro Bypass to Chapel Hill Bypass	2-4	4	Lanes	2004
R-967*	NC 24-27 Stanly County	West City Limits of Locust to SR 1963 (St. Martin Road) in Albemarle.	2-4	4	Lanes	2005
U-2009	Westside Bypass Cabarrus County	South of I-85 to SR 1616 (Tuckaseegee Road)	2	5	New Location	2004
U-203	Little Rock Rd Mecklenburg County	I-85 to Charlotte-Douglas International Airport	2	4	New Location	2007
U-209*	US 74-NC 27 (Independence Boulevard) Mecklenburg County	Brookshire Freeway to NC24-27	6	6	HOV	2003
U-209B*	US 74 (Independence Boulevard), Mecklenburg County	NC 24-27 (Albemarle Road) to NC24-27	6	6	Lanes	2010
U-2102	NC 157 (Guess Road) Durham County	SR 1407 (Carver Street) to SR 1449 (Umstead Road)	2-4	5	Lanes	2005

– Table A.1 NCDOT FY 2004-2009 Transportation Improvement Programs (continued)

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
U-2200	US 220 Business Randolph County	Pritchard Street to SR 2261 (Old Liberty Road). Widen to Five Lanes.	2	5	Lanes	2018
U-2405	MLK Pkwy New Hanover-Pender-Onslow Counties	NC 55 to Cornwallis	2	4	New Location	2025
U-2406	Western Alamance Pkwy Alamance County	Westbrook Ave. to US 70	2	4	New Location	2005
U-2412	SR 4121 (Greensboro-High Point Road) Guilford County	Hilltop Road to proposed US 311 Bypass	2-4	4	Lanes	2009
U-2507	SR 2467 (Mallard Creek Road) Mecklenburg County	SR 2480 (Sugar Creek Rd) to SR 2472	2-4	4	Lanes	2006
U-2508	SR 2472 and SR 2833 (Mallard Creek Church Road), Mecklenburg County	I-85 TO NC 49 at SR 2939	2	4	Lanes partly new location	2004
U-2510A	NC 16 (Providence Road) Mecklenburg- Union Counties	Rea Road Extension in Union County to south of Charlotte Outer Loop	2	4	Lanes	2006
U-2512	NC 49 (York Road) Mecklenburg County	Buster Boyd Bridge at the South Carolina Line to north of Tyvola Road	2-4	4-5	Lanes	2003
U-2524	Western Loop Guilford County	North of I-85 to Lawndale Drive. Construct Freeway on new location.	2	4-8	New Location	2009
U-2525	Eastern Loop Guilford County	North of I-85 to Lawndale Drive. Construct freeway	2	4	New Location	2010
U-2537	Westside Thoroughfare Randolph- Davidson- Guilford Counties	I-85 to US 311 Bypass (R-609). multi-lane	2	5	New Location	2010
U-2545	New Route Davidson County	US 29-52-70/I-85 Business to SR 2212 (Fairview Road)	2	2	New Location	2010
U-2546	US 70 Alamance County	Haw River Bypass to Mebane City Limits.	2	4-5	Lanes	2014
U-2579	Winston-Salem Northern Beltway (Future I-74) Forsyth County	US 52 to I-40. Multi-Lane Freeway on New Location.	2	6	New Location	2010
U-2579A	Winston-Salem Northern Beltway (Future I-74) Forsythe County	US 52 to I-40. Multi-Lane Freeway on new location	2	6	New Location	2010
U-2581	US 70 Guilford County	SR 2581 (Penry Road) to SR 3056 (Rock Creek Dairy Road)	2-4	5	Lanes	2003
U-2717	SR 1113 (Kivett Drive) Guilford County	Pendleton Street to US 29-70.	2-4	5	Lanes	2005
U-2719	I-40 Wake County	US 1/64 to Wade Ave	2-4	4	Lanes	2015
U-2800	SR 2601 Forsyth County	SR 2601 to SR 1005. Part new location. Convert grade separation at I-40 Business to interchange	2	5	Lanes	2009

– Table A.1 NCDOT FY 2004-2009 Transportation Improvement Programs (continued)

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
U-2803	SR 1919 Orange County	SR 1919 to Bridge #88 in Orange County	2-4	4	Lanes	2005
U-2807	US 15/501 Durham-Orange Counties	Bypass to I-40	4-6	6	Lanes	2025
U-2815	Bryan Blvd Guilford County	Innam Rd to NC 68	2	4	New Location	2005
U-2815C	Bryan Boulevard, Guilford County	Inman Road to NC 68.	2	4	Relocate	2001
U-2823	US 70 (Glenwood Avenue) Wake County	West of SR 1664 (Duraleigh Road) to west of SR 1876 (Triangle Drive). Upgrade roadway to improve capacity	4	6	Capacity	2009
U-2826	US 52 Forsyth County	I-40 Bypass to proposed Western Loop interchange.	2-4	2-8	New Location	2007
U-2833	Dale Earnhardt Blvd Cabarrus County	Widening from I-85 interchange to NC 136	4	5	Lanes	2005
U-2901	NC 55 Wake County	US 1 to US 64	2	5	Lanes	2015
U-2905	St Marks Church Road Alamance County	SR 1146 (Kirkpatrick Road) to US 70. Multilanes	2	4	New Location	2004
U-2906	NC 62 (Alamance Road) Alamance County	SR 1430 (Ramada Road) to US 70 (Church Street).	2-4	5	Lanes	2005
U-2913	SR 1546 (Guilford College Road) Guilford County	SR 4121(High Point Road) to south of Hornaday Road	2-4	5	Lanes	2005
U-2923	SR 2747 (Clemmonsville Road) Forsyth County	SR 3011 (Old Salisbury Road) to South Main Street	4	4	Lanes	2007
U-2924	University Pkwy (SR 4000) Forsyth County	North Point Blvd (SR 3973) to Hanes Mill Road.	2-4	4	Lanes	2025
U-2930	US 21 Iredell County	Widening from US 64 to SR 1933 in Statesville	2-4	5	Lanes	1998
U-3100	SR 1009 (Hillsborough Road), Orange County	Lorraine Street to SR 1107	2	2	Widen	2010
U-3101	US 1-64 Wake County	US 64 to south of SR 1313 (Walnut Street).	4	6	Lanes	2006
U-3109	NC 119 Relocation Alamance County	I-85 to south of SR 1917.	2	4	New Location	2008
U-3110	New Route, Alamance County	US 70 to NC 100. Multi-Lanes, Part on new location.	2	4	New Location	2004
U-3111	Tryon Rd Ext Wake County	Old Garner Rd to Rock Quarry Rd	2-4	4	New Location	1998
U-3119	SR 1103 (Lewisville-Clemmons Road) Forsyth County	SR 1891(Peace Haven Road) To north of US 421.	2-4	4	Lanes	2007
U-3303	SR 1306 SR 1363 (Mebane Street) Alamance County	SR 1158 (Huffman Mill Road) to NC 54	2	4	Lanes	2007
U-3304	Grand Oaks Boulevard Extension Alamance County	SR 1146 (Kirkpatrick Road) to NC62	2	4	New Location	2008

– Table A.1 NCDOT FY 2004-2009 Transportation Improvement Programs (continued)

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
U-3306	SR 1733 (Weaver Dairy Road) Orange Hill	NC 86 to SR 1734 (Erwin Road)	2	5	Widen	2005
U-3308	NC 55 (Alston Avenue) Durham County	NC 147 (I.L. "Buck" Dean Freeway) to US 70-NC98.	2-4	4	Widen	2008
U-3309	SR 2028 (T.W. Alexander Drive) Durham County	SR 1121(Cornwallis Road) to SR 1959	2-4	4	Lanes	2008
U-3313	SR 1129 (Groometown Road) Guilford County	SR 1383 (Wiley Davis Road) to SR 1479	2-4	5	Lanes	2006
U-3326	Bus US 29 (Freeway Dr), Rockingham County	S. Scales St to Richardson Dr to NC 14	2-4	4	Lanes	2005
U-3343	SR 1002 (Aviation Parkway), Wake County	NC 54 to I-40.	2	4	Lanes	2003
U-3344	SR 3015 (Airport Boulevard), Wake County	NC 54 to I-40. Widen to multi-lanes	2-4	5	Lanes	2005
U-3407	Southern Alamance Pkwy Alamance County	NC 87 to Monroe Holt Rd.	2	4	New Location	2020
U-3445	SR 1007 (Mebane Oaks Road) Alamance County	I-85 to NC 119 (Fifth Street).	2	5	Lanes	2003
U-3447	NC 51, Mecklenburg County	South Carolina State Line to SR 3645 (Downs Circle).	2	4	Lanes	2007
U-3457	Broad St (NC 66) Forsyth County	Wallasey Rd (SR 2170) to Park St	2	3	Lanes	2025
U-3515	Davidson Highway Cabarrus County	Concord Parkway N. to ten miles west on Davidson Highway	2-4	6-8	Lanes	2005
U-3600	US 220 Business (North Fayetteville Street) Randolph County	SR 2261 (Old Liberty Road) to US 220 at US 311. Widen to Five Lanes	2-4	5	Lanes	2010
U-3603	NC 24-27 (Albemarle Road) Mecklenburg County	Pierson Drive to Reddman Road. .	4	5	Lanes	2005
U-3612	SR 1424 (Hilltop Road) Guilford County	SR 1546 (Guilford College Road) to Adams Farm Parkway	2	5	Lanes	2006
U-3615	SR 1003-SR 1820 (Skeet Club Road), Guilford County	US 311to NC 68 (Eastchester Drive)	2-4	5	Lanes	2009
U-3628	NC 24-27 Moore County	Courthouse west of NC 22 (Macneill Street) to US 15-501. Widen to three lanes.	2	3	Lanes	2009
U-3808	Elizabeth Brady Road Ext Orange County	South of US 70 Business to north of US 70	2	4	New Location	2009
U-4010	NC 98 (Holloway Street) Durham County	East of US 70 to east of Junction Rd	4	5	Lanes	2004
U-4011	SR 1959 (South Miami Boulevard) Durham County	South of SR 2112 (Methodist Street) to North of SR 1960.	4	5	Lanes	2008
U-4012	US 15-501 Durham County	North of Mt. Moriah Road to South of Garrett Road	2-6	6	Lanes	2005
U-4015	SR 1556 (Gallimore Dairy Road), Guilford County	NC 68 to SR 1008 (Market St.)	2	4	Lanes	2009

– Table A.1 NCDOT FY 2004-2009 Transportation Improvement Programs (continued)

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
U-4026	SR 1613-SR 1999 (Davis Drive) Wake- Durham County	SR 3014 (Morrisville-Carpenter Rd.) in Wake County to NC 54 in Durham County	2-4	4	Lanes	2004
U-4411	Randolph St (NC 109) " Davidson County	Royal Oaks St to W. Colonial Dr.	2	5	Lanes	2020
U-4720	US 70 Durham County	Widening from Lynn Rd to Wake Co. Line	4	6	Lanes	2015
U-4722	Northern Durham Pkwy Durham County	US 70 to I-85	2	4	New Location	2015
U-4723	Roxboro Rd (501 N) Durham County	Duke St to Goodwin Rd	4	4-6	Lanes	2025
U-4736	NC 109 Davidson County	Thomasville to Denton	2-4	4	Lanes	2005
U-71	East End Connector Durham County	NC 147 (Buck Dean Freeway) to NC 98.	2-4	6	Lanes	2010

– Table A.2 Long-Range Transportation Plan Projects in US 64-NC 49 Corridor

Project Name	LRTP Route	LRTP_From	LRTP_To	2002 Lane	2030 Lane	Work Type	Complete Year
Mecklinburg-Union MPO							
22	Fred Alexander Blvd.	NC 16	NC 27 (Freedom)	2	4	New Location	2010
35	I-77 HOV Project	I-277	I-485	6	6	HOV	2010
51	Lawyers Rd	Albermarle Rd	McAlpine Rd	2-4	4	Lanes	1998
57	NC 115	Harris Blvd	I-485	2	4	Lanes	2020
58	NC 115	Statesville Rd	Harris Blvd	2	6	Lanes	2010
59	NC 16	I-85	Hoskins Rd	2	4	Lanes	2010
66	NC 160	I-485	NC 49	2	4	Lanes	2020
67	NC 160 (West Blv)	US 521	I-485	2-4	4	Lanes	2010
71	NC 27 (Freedom Dr)	EdgeWood Dr	Fred D. Alexand	2-4	4-8	Lanes	2010
72	NC 49 (S. Tryon)	I-77	Yorkmont Rd	2-4	6	Lanes	2020
73	NC 49	US 29	I-485	2-4	6	Lanes	2020
74	City Blvd	US 29	I-85	2	6	New Location	2010
79	NC 51	Matthews Byps	Lawyers Rd	2	4	Lanes	2020
85	Old Concord Rd	Harris Blvd	Mallard Creek Blvd	2	4	Lanes	2010
115	Lawyers Rd	Little Rock Rd.	I-485	2-6	6	Lanes	2010
116	US 29/NC 49	I-277	I-277	4	6	Lanes	2010
118	US 521	Josh Birmingham	I-85	2	6	Lanes	2020
154	NC 27 (Mt Holly)	I-485	Belmeade Dr	2	4	Lanes	2020
155	Lawyers Rd	McAlpine Creek	NC 51	2	4	Lanes	2020
157-60;	US 74	Village Lake	I-485	2-6	6	Lanes	2020
409	US 21	Gilead Rd	Catawaba Ave	4	4	Lanes	1998
432	NC 27 (Mt Holly)	Ventner Ct	I-485	2	6	Lanes	2010
433	NC 27 (Freedom Dr)	Fred D. Alexande	Ventner Ct	2	4	Lanes	2010
450	NC 160	NC 49	I-485	2	4	Lanes	1998
454	US 21	Old Statesville	Statesville Rd	2	4	New Location	2020
High Point MPO							
AB	W. Lexington Ave	Western Throughway	Westchester Dr	2	5	Lanes	2020
AG	NC 109 Connector	NC 109	Western Throughway	2	5	New Location	2025
Capital Area MPO (Raleigh)							
CA_A12	Falls of Neuse Rd	Falls of Neuse Blvd	Raven Ridge Rd	2	6	Lanes	2005
CA_A131	NC96	NC98	Zebulon	2	2-3	Lanes	2025
CA_A142	Greenfield Pkwy	Timber Dr	US 70 East	2	4	New Location	2015
CA_A144	NC 50	Timber Dr	NC 42	2-3	3	Lanes	2015
CA_A146	NC 98 Bypass	NC 96	NC 97	2	4	New Location	2015
CA_A16	Rock Quarry Rd	Holloway Rd	Southgate Dr	2	4	Lanes	2015
CA_A167	Wendell Northern	US 64 Bus East	US 64 Bus West	2	2	Completed	2015
CA_A173	NC 751/New Hill	Chatham Co.	US 1 (South)	2	4	Lanes	2025
CA_A174	NC 751	Green Level Ch	NC 751	2	4	New Location	2015
CA_A178	Olive Chapel Rd	NC 751	NC 55	2	4	Lanes	2015
CA_A195	Creedmore Rd	Glenwood Ave	Strickland Rd	2-4	2-6	Lanes	1998

– Table A.2 Long-Range Transportation Plan Projects in US 64-NC 49 Corridor (continued)

Project Name	LRTP Route	LRTP_From	LRTP_To	2002 Lane	2030 Lane	Work Type	Complete Year
CA_A196	Lynn Rd	US 70	Duraleigh Rd	2	4	New Location	2015
CA_A198	Tryon Rd Extension	Old Garner Rd	Wilmington St	2	5	New Location	2015
CA_A201	Rock Quarry Rd	Auburn-Knightdale	I-40	2	4	Lanes	2025
CA_A219	McCrimmon Pkwy Extension	NC 54	New Western Thoroughfare	2	4	New Location	2025
CA_A221	NC 54	N. W. Maynard	S. of Cary Pkwy	2-4	4	Lanes	2015
CA_A222	NC 54	Cary Pkwy	Page-Hobson Rd	2	4	Lanes	2025
CA_A228	NC 50	Timber Dr	US 70	3	3	Lanes	2015
CA_A235	US 1A	US 1	NC 98 Bypass	2	5	Lanes	2025
CA_A237	NC 54	NW Maynard Rd	NE Maynard Rd	4	4	Completed	2015
CA_A30	Guess Road	Davis Dr	NC 55	2	4	New Location	2015
CA_A45	Tryon Rd	Dillard Dr	Lake Wheeler Rd	2-4	3-5	Lanes	1998
CA_A46	Tryon Rd	Lake Wheeler	Dillard Dr	2	5	Lanes	1998
CA_F11	US 1	I-540	NC 98	2-4	6	Lanes	2005
CA_F12	Triangle Prkway	I-540	NC 147	2	4-6	New Location	2025
CA_F16	I-440	I-40-US 1- US 64	Wade Ave	2-4	6	Lanes	2015
			Winston-Salem MPO				
B30	S. Stratford Rd	Bus. I-40	NC 67	3	3	Lanes	2025
B36	N. Main St	E. Mountain St	N. Main St	2	4	New Location	2025
C7	US 311 Connector	I-40	US 421 – Bus 40	2	4	New Location	2020
C11	N. Main St	NC 66	Smith Edwards Rd	2	3	Lanes	2025
C12	S. Straford Rd	NC 67	I-40	4	6	Lanes	2025
C15	Regional Airport	N. Beltway	Linville Springs	2	6	New Location	2020
C20	Bus I-40	Northen Beltway	Guilford Co	2-4	4	Lanes	2025
D3	Hopkins Rd	W. Mountain St	Old Winston St	2	4	Lanes	2025
D6	US 421	Lewisville-Clemm	Yadkin Co	4	6	Lanes	2025
D10	Regional Airport	Linville SpringRds	Guilford County	2	4	New Location	2025
D14	Walkertown Bypass	US 311	NC 66	2	2	New Location	2025
D15	I-40	US 311	Guilford Co	4	6	Lanes	2025
			Durham Chapel Hill MPO				
DCHC100		Watkins Rd	US 15/501	2	4	New Location	2015
DCHC101	NC 54	NC 54	Rizzo Conf. Dr	2	4	New Location	2005
DCHC109	US 15/501 Bypass	Pickett Rd	Morreene Rd	2-4	6	Lanes	2025
DCHC11	Churchton Connector	Old NC 86	NC 86	2	4	New Location	1998
DCHC112	US 70 Bypass	NC 86	I-85	2	4-6	Lanes	2015
DCHC12	Cornwallis Rd	Alexandria Dr	Alexander Dr	2-4	4	Lanes	2015
DCHC22	Fayetteville Pkwy	South Point	Woodcraft Pkwy	2	4	Lanes	2015
DCHC24	Garrett Rd	US 15/501	NC 751	2-4	3-4	Lanes	1998
DCHC4	Alexander	NC54	Cornwallis Rd	2-4	4	Lanes	2015
DCHC59	MLK Prkway	Old Chapel Hill	NC 55	2	4	New Location	2005
DCHC62	I-40	East End Connector	I-40	4	4-6	HOV	2024

– Table A.2 Long-Range Transportation Plan Projects in US 64-NC 49 Corridor (continued)

Project Name	LRTP Route	LRTP_From	LRTP_To	2002 Lane	2030 Lane	Work Type	Complete Year
DCHC63	NC 147	I-40	County Line	2	6	New Location	2025
DCHC64	NC 54	Burning Tree Rd	Barbie Chapel Rd	2-4	2-6	Lanes	2005
DCHC65	NC 54	Miami Blvd	Wake Co.	2	4	Lanes	2015
DCHC73	NC 751	US 64 MAB	Durham County	2-4	4	Lanes	2025
DCHC76	NC 86	Miami Blvd	Wake County	2	4	Lanes	2015
DCHC77	NC 86	US 70 Bypass	NC 57	2	4	Lanes	2015
DCHC98	SW Durham Rd	Rizzo Conf. Dr	I-40	2	2	New Location	2015
DCHC99	SW Durham Rd	Farrington Rd	Old Chapel Hill	2	2	New Location	2015
Greensboro MPO							
G_A11	NC 86	West Market Rd	Gallimore Dairy Rd.	2-4	6	Lanes	2004
G_A12	Elm-Eugene St	Southern Urban Loop	Vandalia Rd	2	5	Lanes	2004
G_B23	Vandalia Rd	Pleasant Garden Rd	Wiley Lewis Rd	2	3	New Location	2025
G_B28	Battleground Ave	Cotswald Rd	Westridge Rd	4-6	7	Lanes	2025
G_B9	Vandalia Rd	Elm-Eugene St.	Pleasant Garden Rd	2	5	Lanes	2025
G_C2	Airport Pkwy	NC 68	Pleasant Ridge Rd	2	4	New Location	2021
G_C5	US 158 Bypass	New location Stokesdale	New location Stokesdale	2	5	New Location	2025
Burlington-Graham MPO							
9_BG	Northern Alamance Pkwy	Cherry Ln	Graham-Hopedale Rd	2	4	New Location	2020
O_BG	NC 87	Thomasville Rd	MPO Boundary	2-4	4	Lanes	1998
14_BG	Northern Alamance	Apple St	Lower Hopedale	2	4	New Location	2025
FF_BG	NC 87	Cherry Lane	Cheek Lane	2	4	New Location	2025
24_BG	North Alamance Prky	Durham St Ext	Glencoe Rd	2	4	New Location	2025
Northwest Piedmont MPO							
NPPrio1	US 601	I-40	SR 1408 (Cana Rd)	2-4	4	Lanes	2012
Piedmont Triad MPO							
7_RPONT	US 158; NC 86	E. of Yanceyville	NC 119 &Mebane	2-3	3	Lanes	2005
9_RPONT	NC 150	Forsythe County Line	US 64	2	3	Lanes	2005
Triangle J Council of Governments							
1_TJ	US 70 Bypass	Orange/Durham Co.	US 79/I-85 Connector	2	4	Lanes	2012
Cabarrus-S. Rowan MPO							
CR_7	Cabarrus Ave	US 29	NC 136	2-4	4	Lanes	2025
CR_8	Church St	US 29	Todd Rd	2-4	5	Lanes	2025
CR_9	Church St	Douglas Ave	Cabarrus Ave	2	3	Lanes	2025

CR_11	NC 73	Gold Hill Rd	US 64/MAB	2	5	Lanes	2025
Cabarrus-S. Rowan MPO							
CR_12	NC 73	US 29	US64/MAB	2	5	Lanes	2025
CR_13	NC 136	US 64/MAB	Loop Road	2	3	Lanes	2025
CR_14	NC 136	Dale Earhardt Bl	NC 73	2	5	Lanes	2025
CR_16	Union St	NC 136	US 601	2	5	Lanes	2025
CR_17	Concord Pky N	NC 136	MPO limits	2-6	0-7	Lanes	2025
CR_23	US 601	US 29	S. Union St	2	4	Lanes	2025

Appendix B

Appendix B lists the default speeds and capacities used by the travel demand model.

Table B.1 Default Network Speeds and Capacities

	Facility Type	Speed	Hourly Capacity
Rural	Interstate	65	1950
	Other Principal Arterial	50	1800
	Minor Arterial	45	1400
	Major Collector	45	1240
	Minor Collector	35	1120
	Local	30	900
Urban	Interstate	1850	55
	Principal	1750	45
	Principal Arterial/Other	1450	40
	Minor Arterial	1375	35
	Minor Collector	1000	30
	Local	1000	25