Capital Area Metropolitan Planning Organization

Triangle Parkway Extension Hot-Spot Study

City of Raleigh, NC

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1. INTRODUCTION

The purpose of the study was to analyze two possible extension alternatives for Triangle Parkway to meet the travel demand of the region. One option was to extend it in an "H" pattern to connect McCrimmon Parkway at Town Hall drive. This alternative is part of CAMPO's approved Metropolitan Transportation Plan (MTP). The second alternative is an "X" pattern extension connecting to realigned Davis Drive. This study also focused on analyzing the impacts on the transportation network in the RTP and Morrisville area surrounding the Triangle Parkway Road extension into Morrisville. Davis Drive, McCrimmon Parkway, Morrisville Carpenter Road, Town Hall Drive and NC-54 are significant arterial and collector facilities providing access and connectivity for local traffic to/from the area to other areas in the Triangle region. Therefore, model runs were performed to access current and future travel demand patterns and traffic impact on these facilities.

The project was discussed with the project steering committee comprising of members from Capital Area Metropolitan Planning Organization (CAMPO), Town of Morrisville, NC Turnpike Authority, NCDOT and Research Triangle Park. A kick-off meeting was organized with the committee members to discuss the alternatives to be evaluated. Other meetings were organized to discuss and review the results of the analysis. The current adopted Triangle Regional Model (TRMv5) developed by the TRM Service Bureau was used.

Analysis was performed to achieve the following goals:

- Evaluate the existing travel conditions on each roadway in the study area
- Identify the feasibility of Triangle Parkway extension
- Identify feasible extension scenarios that address projected future year capacity deficiencies in the study area
- Identify potential impacts to the natural and human environment related to future transportation improvements in the study area
- Provide recommendations for future transportation improvements to meet current and future projected travel deficiencies and demands.
- Provide recommendations on the probable cost of construction for tested alternatives.

Various no-build and build alternatives were analyzed, performance measures, level of service, delay, intersection operational delays and cost of construction were studied for each build alternative.

Figure 1-1 illustrates the extent of the study area that was used for the analysis and **Figure 1-2** shows the alignments for build alternatives. The study area included NC-55 on the west, I-40 on the east, NC-54 to the north and Morrisville Parkway on the South.

Figure 1-1: Study Area Map

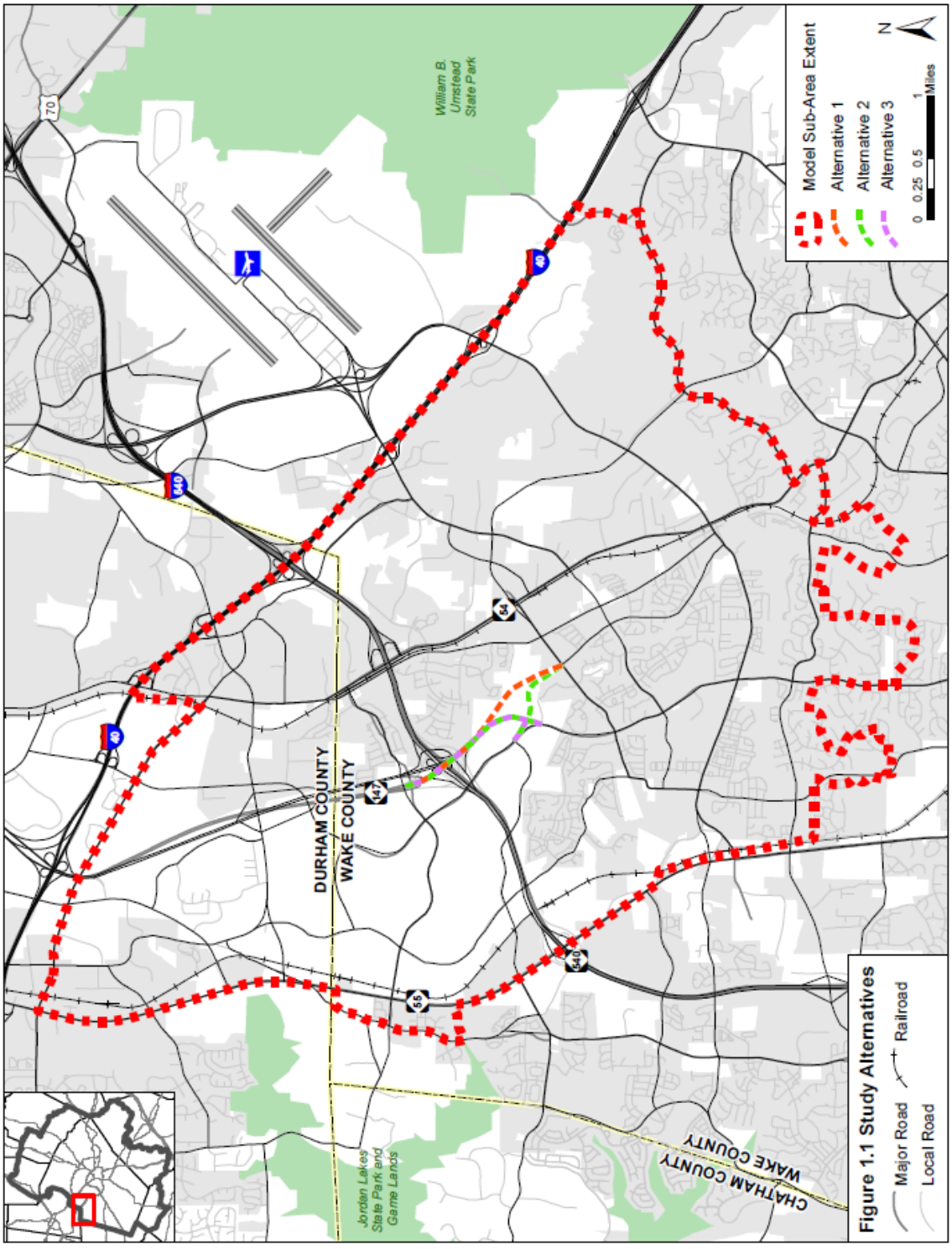
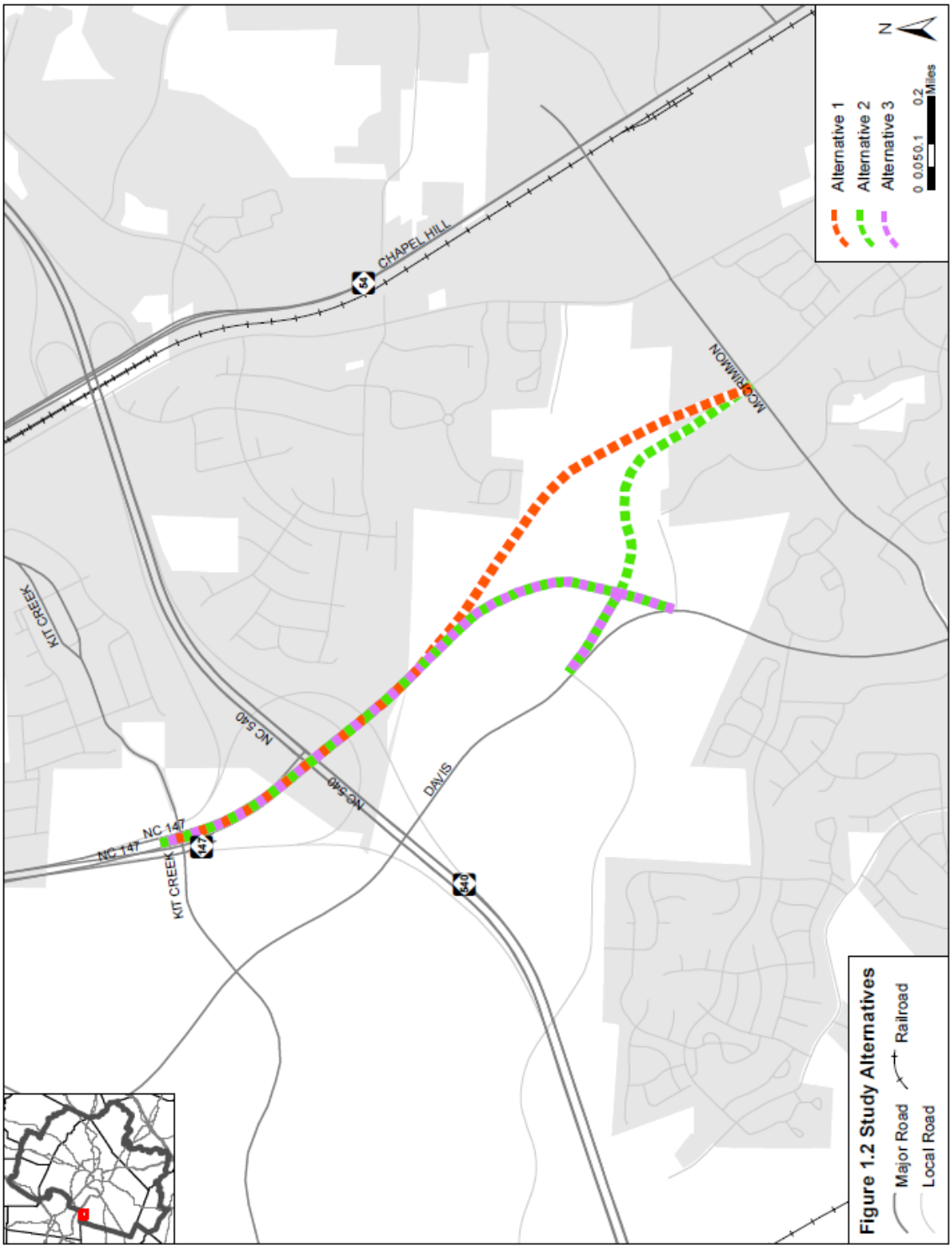


Figure 1-2 –Build Alternative Alignment



2. ALTERNATIVE ANALYSIS

An inventory of the transportation system improvements were studied and used to determine future levels of service (LOS) in the study area as well as associated current and long-term deficiencies. Using the connectivity options available for extending Triangle Parkway, a range of extension alternatives was prepared. The alternatives modeled and analyzed under this study were:

a. *No Build/MTP Alternative without Extension*– includes no improvements to roadways in the study area as represented in the current 2040 CAMPO Metropolitan Transportation Plan (MTP).

b. *Existing CTP/Alternative 1* – Extend Triangle Parkway from NC-540 to McCrimmon Parkway as a toll facility. The toll rates used for the build scenarios were consistent with the toll proposed by turnpike authority i.e. 15c per mile for mainline parkway.

c. *Alternative 2* – Triangle Parkway from NC-540 to Davis Drive with an at-grade intersection. The extension was modeled as a toll facility and the toll rates used for the build scenarios were consistent with the toll proposed by turnpike authority i.e. 15c per mile for mainline parkway. Additional modifications were made to the network to accommodate this extension and provide better connectivity:
   - Davis Drive was realigned to provide a through movement to northbound traffic on Triangle Parkway extension and left turn for traffic to continue on Davis Drive towards RTP.
   - Town Hall Drive extension between McCrimmon Parkway and Davis Drive & Triangle Parkway extensions. This was coded as a 35 mph 4-lane collector facility.

d. *Alternative 3* –Triangle Parkway from NC-540 to Davis Drive with an at-grade intersection. The extension was modeled as a toll facility and the toll rates used for the build scenarios were consistent with the toll proposed by turnpike authority i.e. 15c per mile for mainline parkway. Additional modifications were made to the network to accommodate this extension and provide better connectivity:
   - Davis Drive was realigned so provide a through movement to northbound traffic on Triangle Parkway extension and left turn for traffic to continue on Davis Drive.

Alternative 3 is same alignment as Alternative 2 but without the town hall drive extension.

TRMv5 model runs were performed for the No-Build alternative to forecast travel demand, traffic volumes and future deficiencies in the study area for each improvement alternative. For the future year, the 2040 MTP network was used. Based on the modeling for each alternative, daily volume maps (Appendix 1) and LOS maps were prepared for both AM and PM peak hour (Appendix 2). Volume difference maps were also created to analyze the shift of traffic due to improvements between the MTP and each alternative (Appendix 3). For specific locations in each alternative, select link analysis were performed on certain roadway segments to get information on origin and destination for trips using a particular link (Appendix 4).

The performance measures listed below were compared between each alternative (Appendix 5).

a. Percent of AM and PM peak hour congested vehicle miles traveled (VMT) in the study area;
b. Percent of AM and PM peak hour congested vehicle hours traveled (VHT) in the study area;;
c. AM and PM congested Lane-Miles/Route-Miles by facility type in the study area;
d. Total hours of delay: daily (study area);

Intersection turning movement diagrams were also prepared for various intersections in the study area for each alternative. Refer to Appendix 6 for the intersection diagrams.

2.1 SUMMARY AND FINDINGS

A summary of transportation analysis results for each alternative is presented below in terms of pros, cons, and general findings. Impacts on social and environmental factors are discussed in a later section.

2.1.1 EXISTING CTP/ ALTERNATIVE 1 – EXTENSION TO TOWN HALL DRIVE

Pros:

- Slightly improves peak hour LOS on NC-54 between NC-540 and McCrimmon Parkway by reducing daily volumes from 43,000 – 65,000 vehicles per day (vpd) in No-Build to 37,000 – 51,000 vpd. The total daily volume is reduced by 6,000-14,000 (vpd) an approximate reduction of 20-25% vpd;

- Reduces daily volumes on Davis Drive between Hopson Road and McCrimmon Parkway by approximately 11,000 vpd from 35,000 -46,500 vpd in No-Build to 22,600 – 35,800 vpd in alternative 1;

- Minor reduction in traffic on Church Street from 3,200 - 14,500 vpd in No-Build to 1,900 - 13,800 vpd in Alternative 1. The traffic reduces in the range of 600 – 1,300 vpd but it helps the LOS improvement from a congested facility to below congested level;

- Reduces daily volumes at intersections of:

    o NC 54 /McCrimmon Parkway
    o Davis Drive/Hopson Road

Cons:

- Increases daily volumes on McCrimmon Parkway from 24,700 – 19,900 vpd in No-Build to 18,900 -33,400 vpd. While the traffic at NC-54 intersection reduces by 5,000 vpd, at the Davis Drive end it increases by 13,000-15,000 vpd reducing the LOS;

- Increases daily volumes on existing Town hall drive by 12,000 - 14,000 vpd between McCrimmon Parkway and Airport Blvd from 1,500 vpd in No-Build to 15,500 vpd in alternative 1;

- Provides no significant improvement in LOS (AM and PM) on Davis Drive south of McCrimmon Parkway;

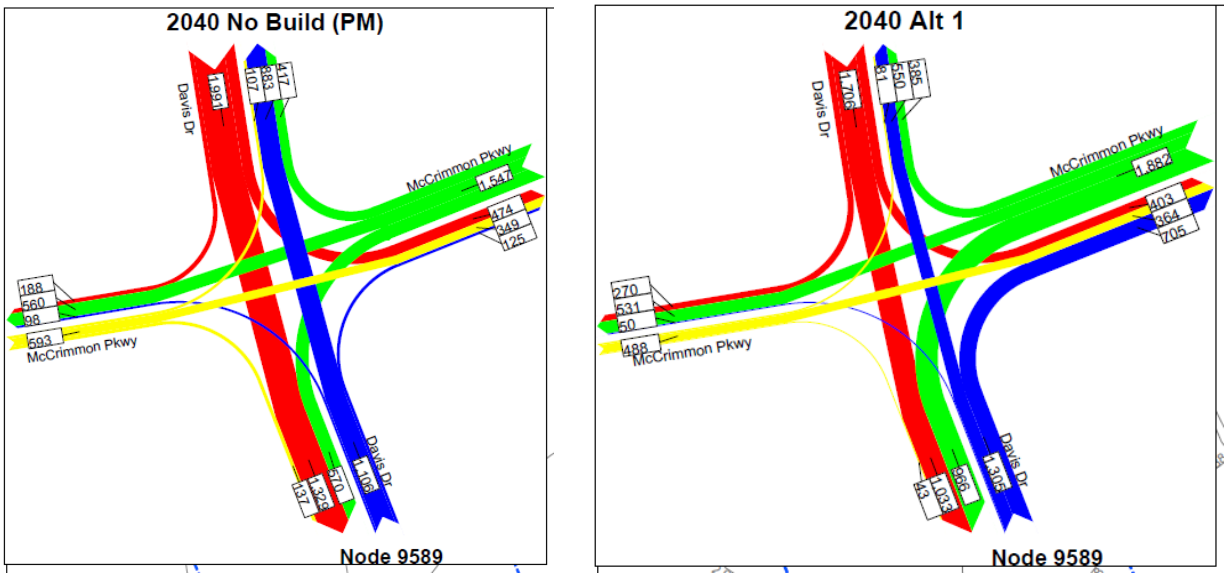
- Increase congestion to left turn movements at Davis Drive and McCrimmon Parkway by adding additional 400 vehicles to left movement in peak hour. See **Figure 2-1** for comparison between No-Build and Alt 1 turning movement;

- Increase congestion to left and right turn movements at Town Hall Drive and McCrimmon Parkway by adding additional 300 trips to left and 1,300 to the right turn movement in peak hour. Through movement to Town Hall Drive from Triangle Parkway extension is in the magnitude of 1,000 – 1,200 vehicles in PM peak hour.

General Findings:

This alternative results in localized improvements to traffic congestion on NC-54 and Davis Drive between NC-540 and Airport Blvd. This improves traffic flows at the intersections along NC-54 and Church but increases congestion on McCrimmon Parkway and Town Hall Drive. Other intersections analyzed in this alternative with no change compared to No-Build were NC-54 and Church Street, Church Street and McCrimmon, Church Street and Airport Blvd, Airport Blvd and Davis Drive and Perimeter Park and NC-54.

Figure 2-1: PM Peak Hour Movement at Davis Drive and McCrimmon Parkway



2.1.2 ALTERNATIVE 2 - TRIANGLE PARKWAY EXTENSION TO DAVIS DRIVE WITH TOWN HALL EXTENSION

Pros:

- Slightly improves peak hour LOS on NC-54 between NC-540 and McCrimmon Parkway by reducing daily volumes from 43,000 – 65,000 vpd in No-Build to 37,000 – 50,000 vpd. The total daily volume is reduced by 6,000-15,000 (vpd) an approximate reduction of 20-25% vpd;

- Considerable reduction in daily volumes on Davis Drive between Hopson Road and Little Drive by approximately 26,000 vpd from 35,000 -46,500 vpd in No-Build to 17,600 – 21,000 vpd in alternative 2;

- Minor reduction in traffic on Church Street from 3,200 - 14,500 vpd in No-Build to 1,800 - 14,300 vpd in alternative 2. The traffic reduces in the range of 200 – 1,300 vpd having no impact on the LOS improvement;

- Reduces traffic on NC-55 by 6,000 vpd from 43,000 – 46,000 vpd in No-Build to 41,200 – 39,000 in alternative 2 without having any substantial impact on the LOS improvement;

- Reduces daily volumes at intersections of:

    - NC 54 /McCrimmon Parkway
    - Davis Drive/Hopson Road
    - Davis Drive/McCrimmon Parkway

Cons:

- Increases daily volumes on Davis Drive south of Little Drive by adding 6,000 vpd reducing the LOS. The traffic on this section of Davis Drive increases from 34,600 in No-Build to 40,000 in alternative 2. ;

- Increases daily volumes on Davis Drive south of McCrimmon Parkway by adding 4,000 - 6,000 vpd bringing the total daily volume to 33,000 – 43,000 vpd reducing the LOS;

- Increases daily volumes on existing Town Hall drive by 10,000-13,000 vpd between McCrimmon Parkway and Airport Blvd from 1,500 in No-Build;

- Daily volumes on Town Hall extension is approximately 20,000 vpd as it provides direct access from the Triangle Parkway Extension to Morrisville area. This facility is reaching congestion in the peak conditions;

- Provides no significant improvement in LOS (AM and PM) on Davis Drive south of McCrimmon Parkway;

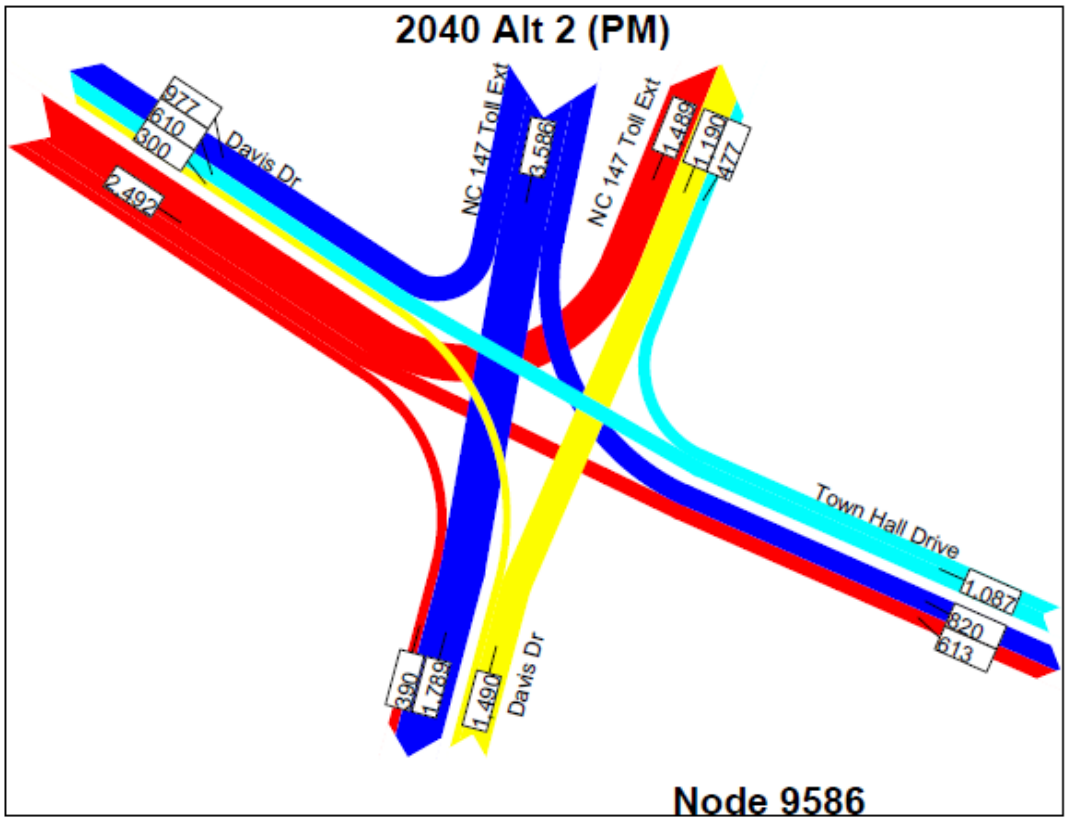
- Increase congestion to left/right turn movements at Davis Drive towards RTP and Triangle parkway extension by adding additional 1,500 vehicles to left movement in peak hour. **See Figure 2-2** for comparison between No-Build and Alt 2 turning movement;

- Increase congestion to left and right turn movements at Town Hall Drive and McCrimmon Parkway by adding additional 400 trips to left turn movement from Town Hall Extension in the peak hour. Through movement to Town Hall Drive from Triangle Parkway extension is in the magnitude of 1,000 – 1,200 vehicles in PM peak hour.

General Findings:

This alternative results in localized improvements to traffic congestion on NC-54 and Davis Drive between NC-540 and Airport Blvd. This improves traffic flows at the intersections along McCrimmon Parkway, NC-54 and Church but increases congestion on Davis Drive, Town Hall drive extension and Town Hall Drive. Other intersections analyzed in this alternative with no change compared to No-Build were NC-54 and Church Street, Church Street and McCrimmon, Church Street and Airport Blvd, Airport Blvd and Davis Drive and Perimeter Park and NC-54. The traffic from RTP has a north south movement with traffic origin/destination points being Cary, Apex, Holly Springs and Fuquay-Varina. This alternative provides a direct access to these locations via straight connection through Davis Drive. This alternative also provides direct freeway access to the mixed-use TAZ in the northwest quadrant of Davis Drive and extension intersection. Both left and right turn movement at this intersection is high during both AM and PM peak hours for movement from this TAZ to RTP and easy access to I-40.

Figure 2-2: PM Peak Hour Movement at Davis Drive and Triangle Parkway Extension



2.1.3 ALTERNATIVE 3 – TRIANGLE PARKWAY EXTENSION TO DAVIS DRIVE W/O TOWN HALL EXTENSION

Pros:

- Slightly improves peak hour LOS on NC-54 between NC-540 and McCrimmon Parkway by reducing daily volumes from 43,000 – 65,000 vpd in No-Build to 41,000 – 55,000 vpd. The total daily volume is reduced by 2,000-10,000 (vpd) an approximate reduction of 10-15% vpd;

- Considerable reduction in daily volumes on Davis Drive between Hopson Road and Little Drive by approximately 26,000 vpd from 35,000 -46,500 vpd in No-Build to 17,600 – 21,000 vpd in alternative 2;

- Reduces traffic on Church Street by 400 – 1,200 vpd from 3,100 – 14,400 in No-Build to 1,900 – 14,000 with minor LOS improvement;

- Reduces traffic on NC-55 from 42,000 - 46,500 vpd in No-Build to 40,000 – 44,000 vpd in alternative 3, a reduction of 2,000 vpd without having any substantial impact on the LOS improvement;

- Reduces daily volumes on existing Town Hall drive by 10,000-13,000 vpd between McCrimmon Parkway and Airport Blvd compared to Alternative 2 bringing it to the No-Build levels;

- Increase congestion to left/right turn movements at Davis Drive towards RTP and Triangle parkway extension by adding additional 1,150 vehicles to left movement in peak hour. See **Figure 2-3** for comparison between No-Build and Alt 3 turning movement. The movement at this intersection is better in this alternative compared to Alternative 2;

- Reduces daily volumes at intersections of:

    - NC 54 /McCrimmon Parkway
    - Davis Drive/Hopson Road
    - Davis Drive/McCrimmon Parkway

Cons:

- Increases daily volumes on Davis Drive south of Little Drive by adding 4,000 vpd making the total daily volume to 38,600 reducing the LOS;

- Increases daily volumes on Davis Drive south of McCrimmon Parkway by adding 6,000 - 8,000 vpd to 29,500 – 33,000 vpd from No-Build thus reducing the LOS;

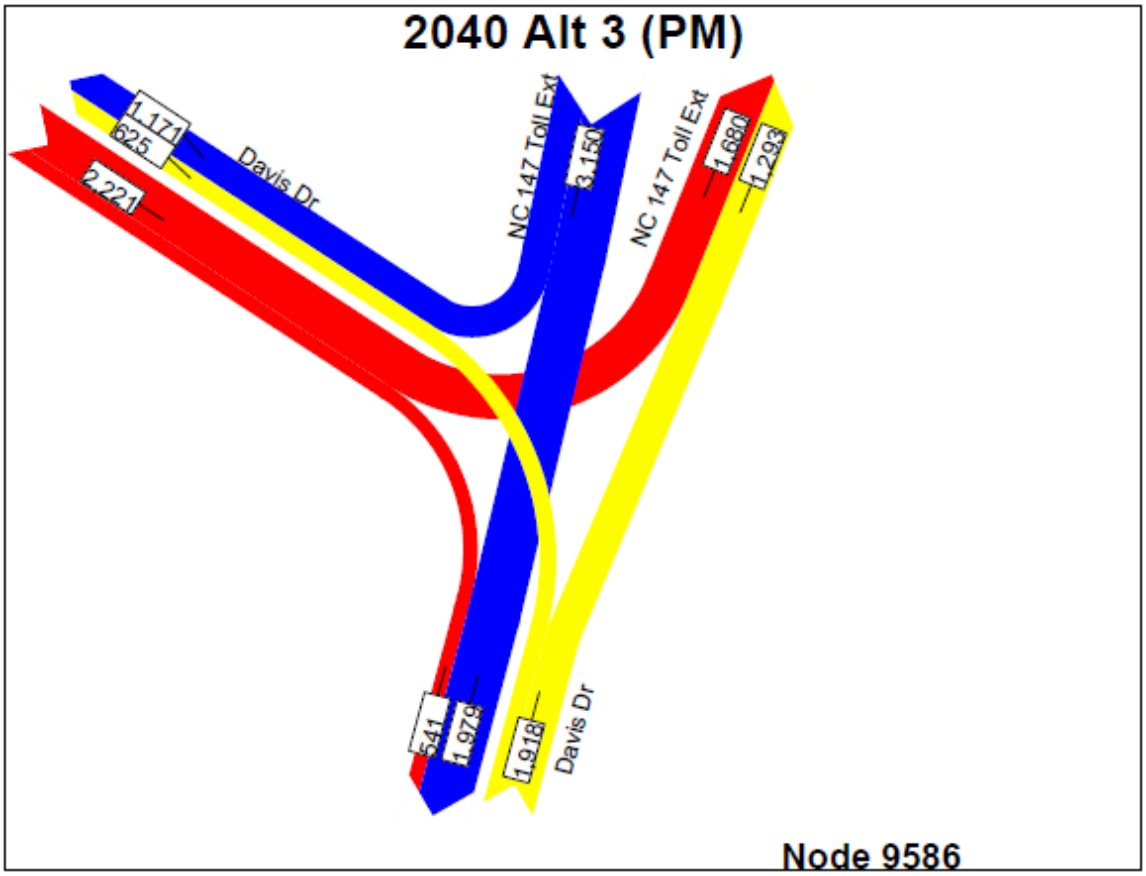
- Provides no significant improvement in LOS (AM and PM) on Davis Drive south of McCrimmon Parkway;

General Findings:

This alternative results in localized improvements to traffic congestion on NC-54 and Davis Drive between NC-540 and Airport Blvd. This improves traffic flows at the intersections along

McCrimmon Parkway, NC-54 and Church but increases congestion on Davis Drive compared to all other alternatives. Other intersections analyzed in this alternative with no change compared to No-Build were NC-54 and Church Street, Church Street and McCrimmon, Church Street and Airport Blvd, Airport Blvd and Davis Drive and Perimeter Park and NC-54. The traffic from RTP has a north south movement with traffic origin/destination points being Cary, Apex, Holly Springs and Fuquay-Varina. This alternative provides a direct access to these locations via straight connection through Davis Drive. While alternative 3 increase congestion on sections of David Drive but the congestion is better than alternative 2. Town Hall drive also functions at the No-Build levels without any congestion.

Figure 2-3: PM Peak Hour Movement at Davis Drive and Triangle Parkway Extension



3. ENVIRONMENTAL IMPACTS

A qualitative screening was performed to assess the potential environmental impacts of the roadway project alternatives. This analysis consisted of overlaying project alignments/locations onto a series of maps depicting sensitive natural and community resources. Any proposed project determined to encroach on a sensitive area was identified. Although all transportation projects impact the environment, some projects, such as new roadway construction, may have a significantly higher potential impact. A roadway widening is assumed to be less disruptive to the

natural environment than a comparable roadway project on a new alignment. On the other hand, widening may be more disruptive than a new facility in terms of community impacts, depending on available right-of-way, sight distances, type of adjacent development, and other factors. Refer to the Appendix section for details of environmental impact by alternatives.

Potential project impacts (if any) are classified on a qualitative scale from "N/A" to "Major" depending upon their proximity to the GIS dataset features. This determination is based on a combination of objective and subjective criteria. Alternatives 1-3 are new roadway alignments and therefore the maximum possible rank is "Major." The following guidelines were used to rate possible impacts in this screening process:

- No Impact/ Does Not Apply: New alignment / widening is greater than ¼ mile distance from the feature and is not expected to pose any future impact.

- Minor Impacts: New alignment / widening is located near or crosses a single (small) feature, or is located upstream within the same local watershed (drainage area).

- Moderate Impacts: New alignment / widening share a boundary with, or involve, multiple crossings of environmentally sensitive features. This is the maximum allowable rank for a roadway widening project.

- Major Impacts: New roadway alignment that crosses several environmentally sensitive features. This is the maximum allowable ranking for a new roadway alignment project.

Environmental features have been grouped into five categories based upon similar data sources, and clarity of the mapping products. The five categories selected are: (1) Hydrologic; (2) Environmental; (3) Recreation; (4) Historic and Cultural; and (5) Socio-economic. Refer

Table 3-2 for the matrix of impacts of build alternatives on these categories.

3.1 DESCRIPTION OF ENVIRONMENTAL IMPACT

This analysis is used to evaluate project alternatives against one another and identify any "fatal" flaws, or environmental impacts that were considered potentially too severe to justify the project. The information obtained from this analysis allows proposed roadway alignments to be adjusted or refined to minimize possible environmental impacts. This screening process allows early identification of likely impacts and areas of uncertainty that will need to be investigated in detail for future studies.

3.1.1 HYDROLOGIC FACTORS

Based on the latest GIS information available from NCDENR – Division of Water Quality (DWQ), alternatives 1-3 will cross Kit Creek, which flows from east to west through the middle of both extension alignments. Alternative 1 may possibly cross the creek in two locations, depending upon the final alignment. Kit Creek is classified by the DWQ as a WS-V water supply, nutrient sensitive (NSW), and protected for class C human uses such as fishing, boating, and wading. The 2012 water quality rating for this stream is 3C (not impaired), and is not a part of the EPA's impaired waters list.

Based on available hydrology datasets from Wake County, there are six additional tributaries of Kit Creek that are potential stream crossings in addition to the Kit Creek crossing. Alternative 1 could potentially cross five tributaries, while alternative 2 could potentially cross up to nine tributaries. Alternative 3 could potentially cross six tributaries. These tributaries would all need to be field-verified by the DWQ to confirm their existence and the total number of crossings. It is possible that some of these digitized features are simply drainage ditches, and would therefore not qualify as intermittent streams. It is also possible that these tributaries have been previously altered by development in the area, and they no longer exist as displayed within the GIS database (release date Oct 2011).

Kit Creek and its tributaries are within the Cape Fear River Basin (Haw River sub basin). Rain and storm water runoff in this area drains into Jordan Lake, and eventually into the Cape Fear River. The intersection of McCrimmon Parkway and Town Hall Drive represents the hydrologic boundary between the Cape Fear and Neuse River Basins (Crabtree Creek sub-basin). Crabtree Creek and its tributaries drain into the Neuse River, and flow generally parallel to the Cape Fear towards the Atlantic Ocean. All alternatives (1-3) will tie into existing roadways at this intersection, and therefore construction activities will be located within two different river basins.

Based on available US Fish & Wildlife Service datasets, alternatives 1-3 will cross several wetland feature locations. Soil types designated as possibly hydric are also found in multiple locations along Kit Creek and its tributaries within the project study area. Wetland delineations should be

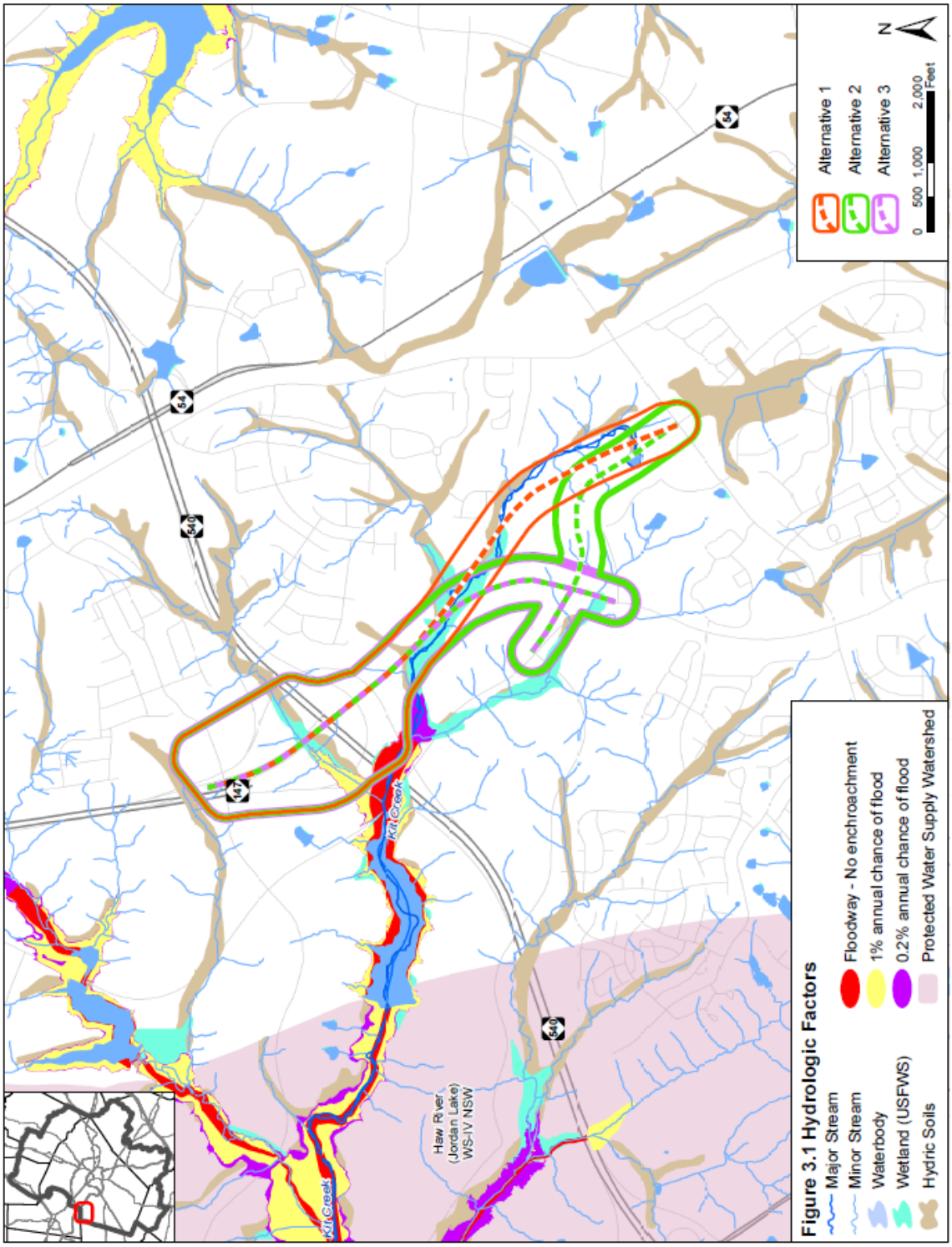
conducted by a future study of the desired alternative(s), and mitigation strategies will be evaluated at that time.

A small portion of the 100-year and 500-year floodplain boundaries are located very near the existing interchange of NC-540 and NC-147. Alternatives 1-3 will tie into these roadways with new ramps. These designated areas of floodplain are likely to be avoided, minimized, and/or mitigated by shifting the final roadway alignment. It is also possible that the construction of this interchange has previously altered the boundary of these floodplains and the available GIS datasets have not been revised.

Downstream of the project (along Kit Creek) lays the outer-most boundary of the Haw River / Jordan Lake Water Supply Watershed. All alternatives are located upstream of this protected water supply, and therefore not subject to the NC Division of Water Quality water supply watershed regulations.

A pair of targeted local watersheds, as designated by the NC Ecosystem Enhancement Program (EEP), covers the entire project study area (all alternatives). The EEP is charged with (very broadly) identifying entire watershed areas that would benefit from water quality improvement. The targeted local watersheds are then prioritized and an individual local watershed plan is created. Based on the most recent GIS datasets from the EEP (June 2012), a local watershed plan has not been established for this area. The hydrologic factors map (**Figure 3-1**) excludes these watershed boundaries because they are very large and cover the entire map area. The unique 12-digit hydrologic unit code (HUC) used to identify these two watersheds are: Northeast Creek (Cape Fear) 030300020610 and Upper Crabtree Creek (Neuse) 030202010803. For more information on this program or the watershed boundaries see http://portal.ncdenr.org/web/eep/watershed-planning-home.

Figure 3-1: Hydrologic Factors



3.1.2 ENVIRONMENTAL FACTORS

Prime soil formations (for agricultural activities) are present across all alternatives and therefore each was assigned the maximum rank possible. These features are not shown on **Figure 3-2** because they are too detailed, and obscure other features. The USDA may exempt the entire study area from future agricultural regulation because it is within the Raleigh urbanized area according to the Census 2010 dataset.

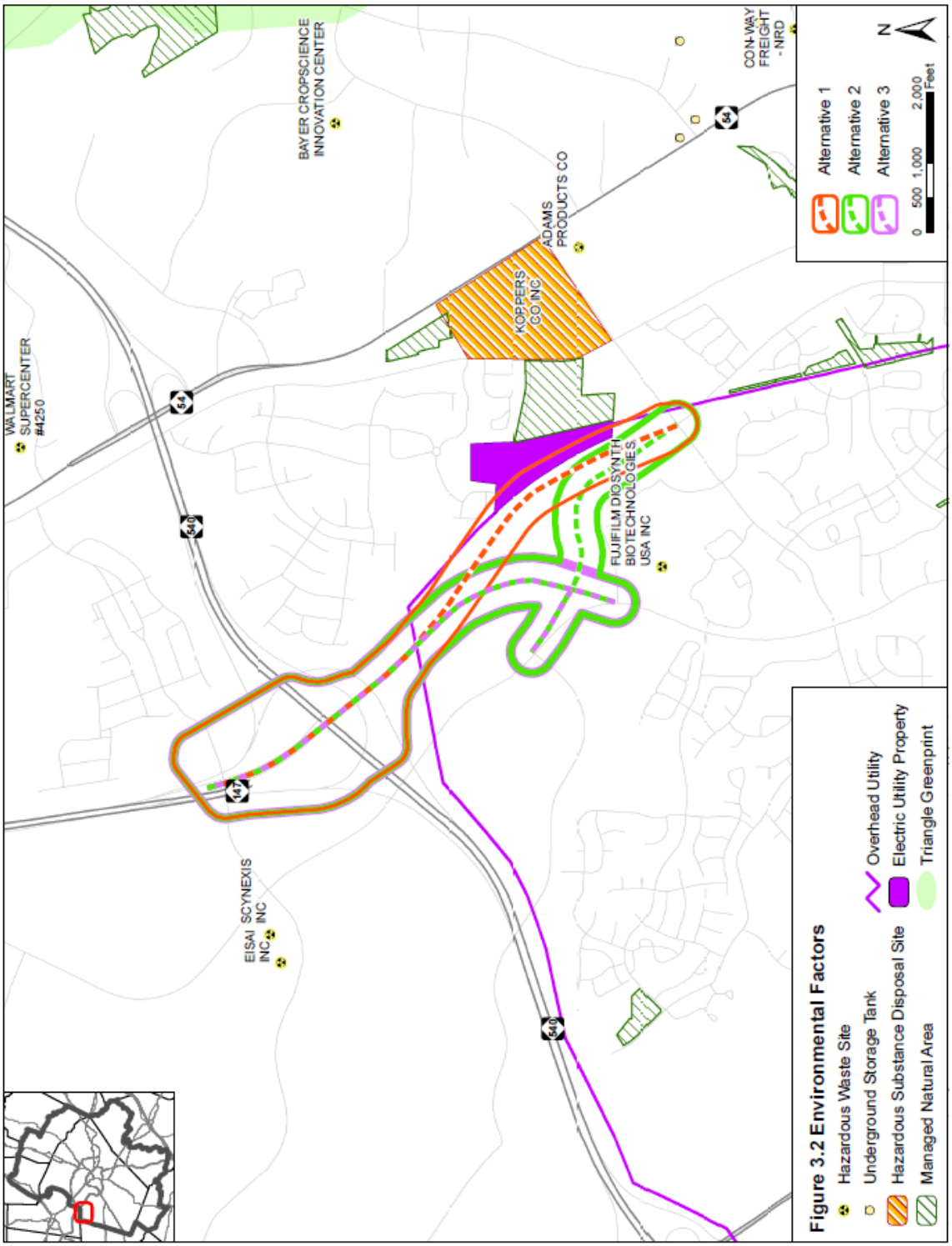
The Division of Waste Management (DWM) identifies a single hazardous waste site (Fujifilm Diosynth Biotechnologies – 6051 George Watts Hill Dr) that is not expected to be directly impacted by alternatives 2 and 3. A 'Minor' degree of impact is indicated on Table 2 simply because of its proximity to the possible roadway tie-in with Davis Drive.

A hazardous substance disposal site is located 0.25 miles north east of the intersection of Town Hall Drive and McCrimmon Parkway, where both alternatives 1 and 2 will connect. This site is listed as "Koppers Company Inc." (NCD code 003200383) and was formerly a Superfund cleanup site, and the property was official removed from the National Priority List in 1997. The property has since been subdivided according to the Wake County parcel database. For additional information: http://www.epa.gov/region4/superfund/sites/npl/northcarolina/kopnc.html.

There are visible Duke Energy Progress overhead electrical utility lines that connect substations to the northwest and south of the project study area. For the purposes of this study it is assumed that the minimum height of these utility lines will not be impacted by this roadway project through the use of best management practices.

The Town of Morrisville is currently developing "RTP Park" on an adjacent parcel of land to both alternatives 1 and 2. Located at 5800 Cricket Patch Way, parcel ID (0746620689), RTP Park will consist of a multi-purpose athletic field, tennis courts, playgrounds, and a multi-use trail. The park is expected to be completed by early 2016.

Figure 3-2 - Environmental Factors

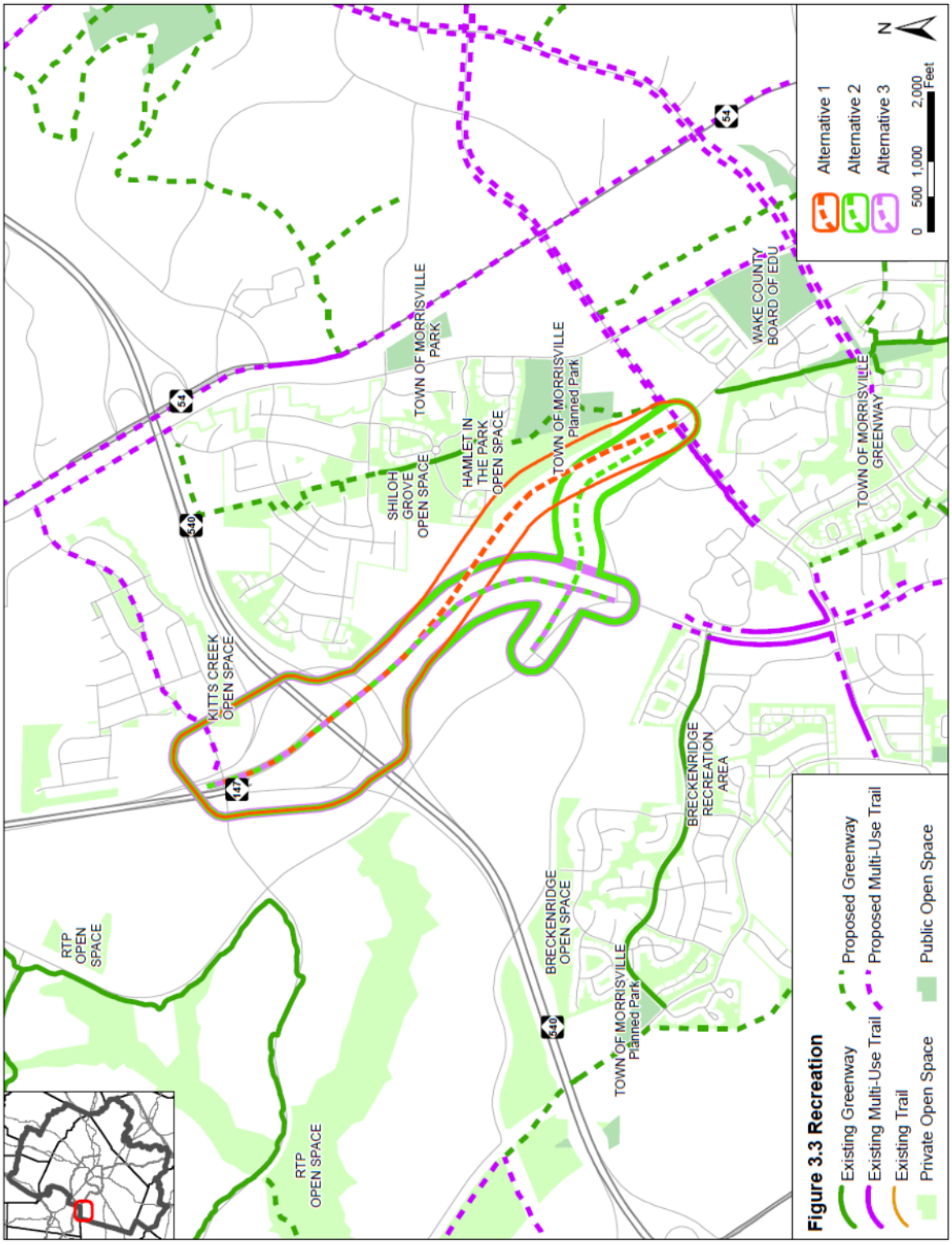


3.1.3 RECREATION FACTORS

As seen in

Figure 3-3, alternatives 1 and 2 cross the boundaries of open space (public and private) and planned greenway or multi-use trail datasets, as provided by the Wake County GIS website. Open spaces identified by these datasets have already been identified as managed natural areas. Proposed greenway trails, however, are illustrative in nature and placeholders for development. There are existing multi-use trails along Davis Drive and McCrimmon Parkway with proposed extensions along both roadways that would connect to either project alternative. A proposed greenway trail (Shiloh Greenway), portions of which are under construction (2014), is located to the east of Town Center Drive along both public and private open space properties. Coordinating with all adjacent municipalities (Town of Morrisville, Research Triangle Park, Town of Cary, and City of Raleigh, as well as Wake County Parks, Recreation and Open Space department) would ensure that these proposed greenway trail connections are constructed simultaneously and seamlessly to avoid retrofitting in the future.

Figure 3-3 – Recreation Factors

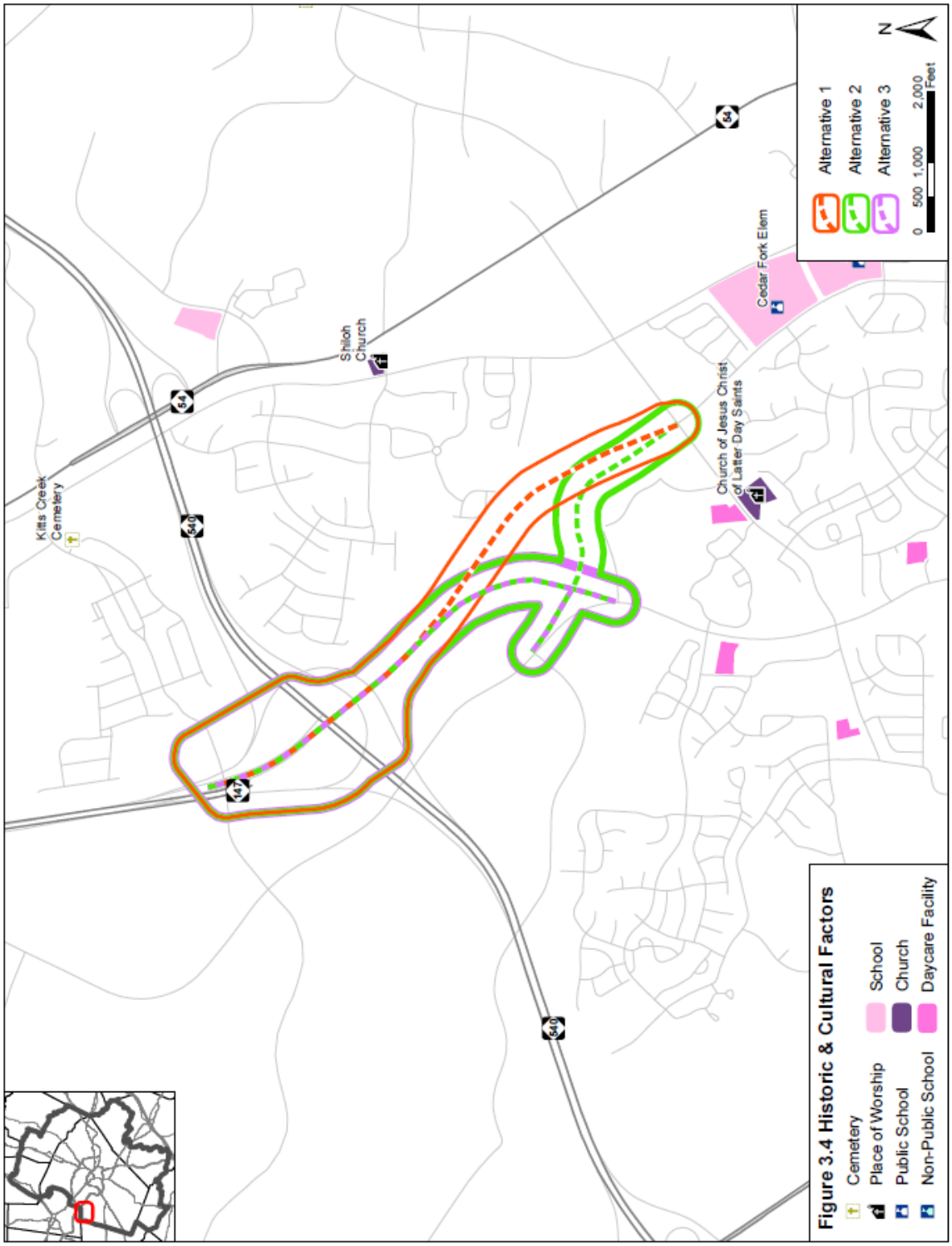


3.1.4 HISTORIC & CULTURAL FACTORS

There are four properties located near the project end point (roadway tie-in) for all three alternatives that may be minimally impacted during construction (Refer **Figure 3-4**). Mitigation efforts to control noise and construction debris will likely limit or eliminate a majority of possible impact. The first property is a church located at 6011 McCrimmon Parkway, which has been recently constructed as seen on (some) aerial imagery. The second property is a Kids-R-Kids daycare facility across the street (north side), at 6010 McCrimmon Parkway. Property number three is another daycare facility (the Goddard School) located at 4027 Davis Drive, which would only be potentially impacted by alternatives 2 and 3. The final property is Cedar Fork Elementary School located at 1050 Town Hall Drive. These four properties are between 0.25-0.3 miles from the possible roadway tie-in locations, and the likely impact would be visual and noise related (not physical).

There are no properties listed on the National Register of Historic Properties or NC State Study List near the project study area.

Figure 3-4 – Historic and Cultural Factors



3.1.5 SOCIO-ECONOMIC FACTORS

This environmental screening analysis compared ACS 5-year estimates (2007-11) joined to Census 2010 geography at the block group level. These resources represent the most recent available datasets, and are widely accepted as containing the lowest margin of error. The three socio-economic categories compared were (1) Limited English proficiency (**Figure 3-5**); (2) Poverty population (**Figure 3-6**); and (3) Minority population (**Figure 3-7**), in accordance with the NCDOT Community Studies group recommendations.

Limited English proficiency (Table B16004) is calculated as the sum of individuals who have identified themselves as speaking English: (a) well; (b) not well; and (c) not at all. Poverty population (Table C17002) is calculated as the sum of individuals who identified themselves as earning: (a) under 0.5 and (b) between 0.5 and .99 of the computed poverty line categories. Minority population (Table P1) is calculated as the sum of individuals who identified themselves as a category other than white-alone; this includes the two-or-more races category, however excludes the Hispanic population category.

The aggregate sum per block group for each category is then divided by its respective estimated total population from each individual category and not the total population of the block group. The reason for this being the sample size for LEP, minority, and poverty categories are all unique, and smaller than the sample size for estimated total population (Census 2010). Dividing by a larger total population would skew results to smaller percentages and greater margins of error.

Table 3-1: Aggregated Demography for Limited English proficiency

LEP	Total Adult Pop	Primary Language Group of Persons Who Speak English Less than Very Well							
		Spanish		Other Indo-Euro		Asian/Pacific		Other	
		#	%	#	%	#	%	#	%
371830536071	5,425	101	1.9%	258	4.8%	203	3.7%	0	0.0%
371830536021	3,765	24	0.6%	157	4.2%	243	6.5%	0	0.0%
371830536081	2,206	0	0.0%	20	0.9%	108	4.9%	0	0.0%
DSA	**11,396**	**125**	**1.1%**	**435**	**3.8%**	**554**	**4.9%**	**0**	**0.0%**

Source: US Census Bureau, American Community Survey 5-year Estimates (2006-2010), Table B16004, "Age by Language Spoken at Home for the Population 5+ Yrs"

The project study area is essentially contained within a single block group (tract 536.08 block group 1), however the roadway tie-ins at Davis Drive and Town Hall Drive cross into adjacent block groups. For this reason there are a total of three block groups within the aggregated

demographic study area (DSA – See **Table 3-1**). Alternatives 1-3 cross into block groups with LEP populations of 10.4 and 11.3%, and has therefore been assigned an impact rank of "Minimum."

All three DSA block groups report less than 10% of population living in poverty (0.9, 1.3, and 2.7%), and therefore Alternatives 1-3 are assigned "N/A".

The spatial pattern for minority population is more varied than LEP or Poverty. Estimated minority population is between 48% and 55% for all three block groups, which assigns an impact rank of "Moderate".

The Town of Morrisville Transportation Plan (2009) reported a total minority population of 34% using 2004 data. The Census 2010 estimate of minority population for the entire Town of Morrisville is 46%. The DSA for this project (by comparison) represents a larger (cumulative) percentage of minorities (56.1%) than the Town average.

Figure 3-5 – Limited English Proficiency

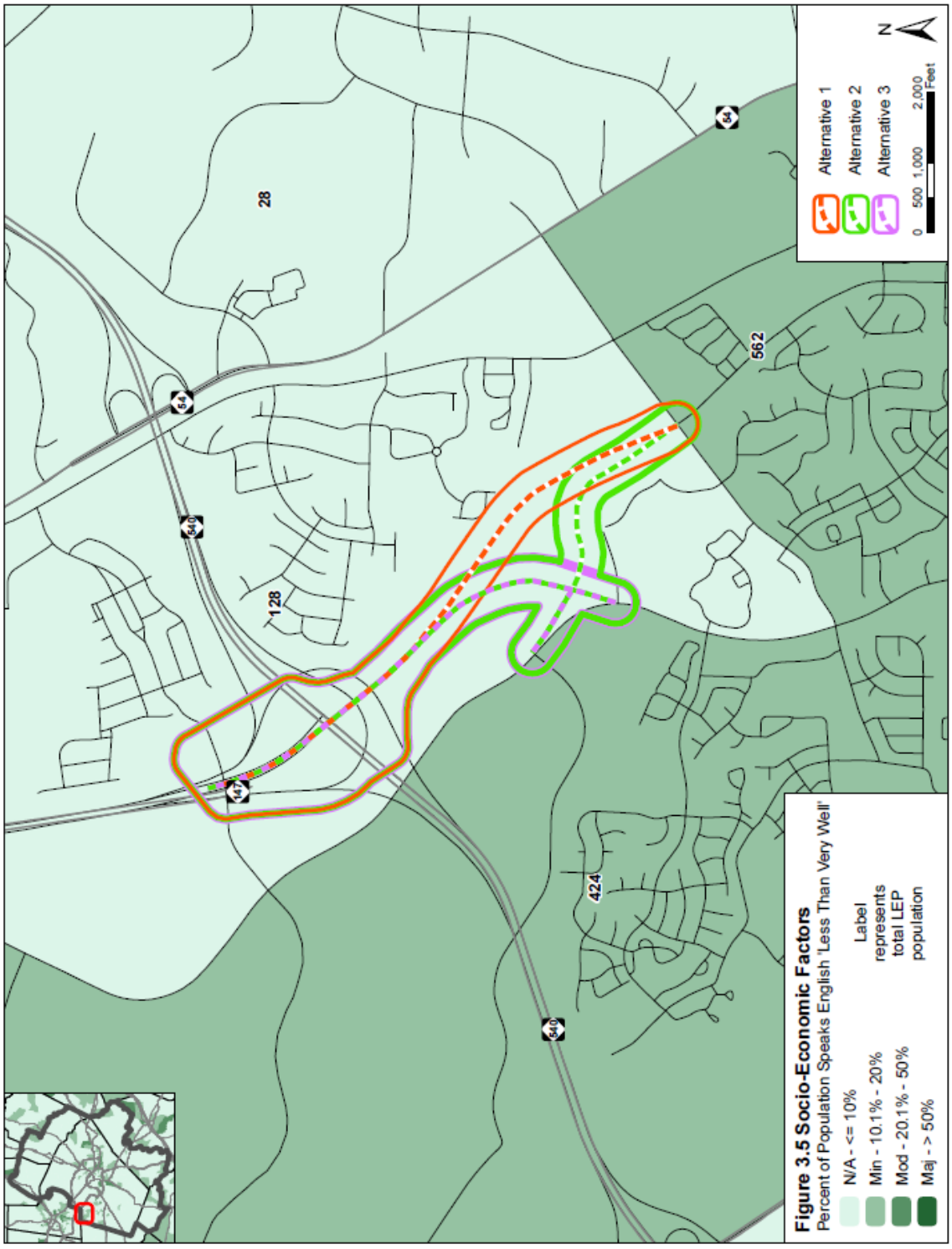


Figure 3-6 – Population in Poverty

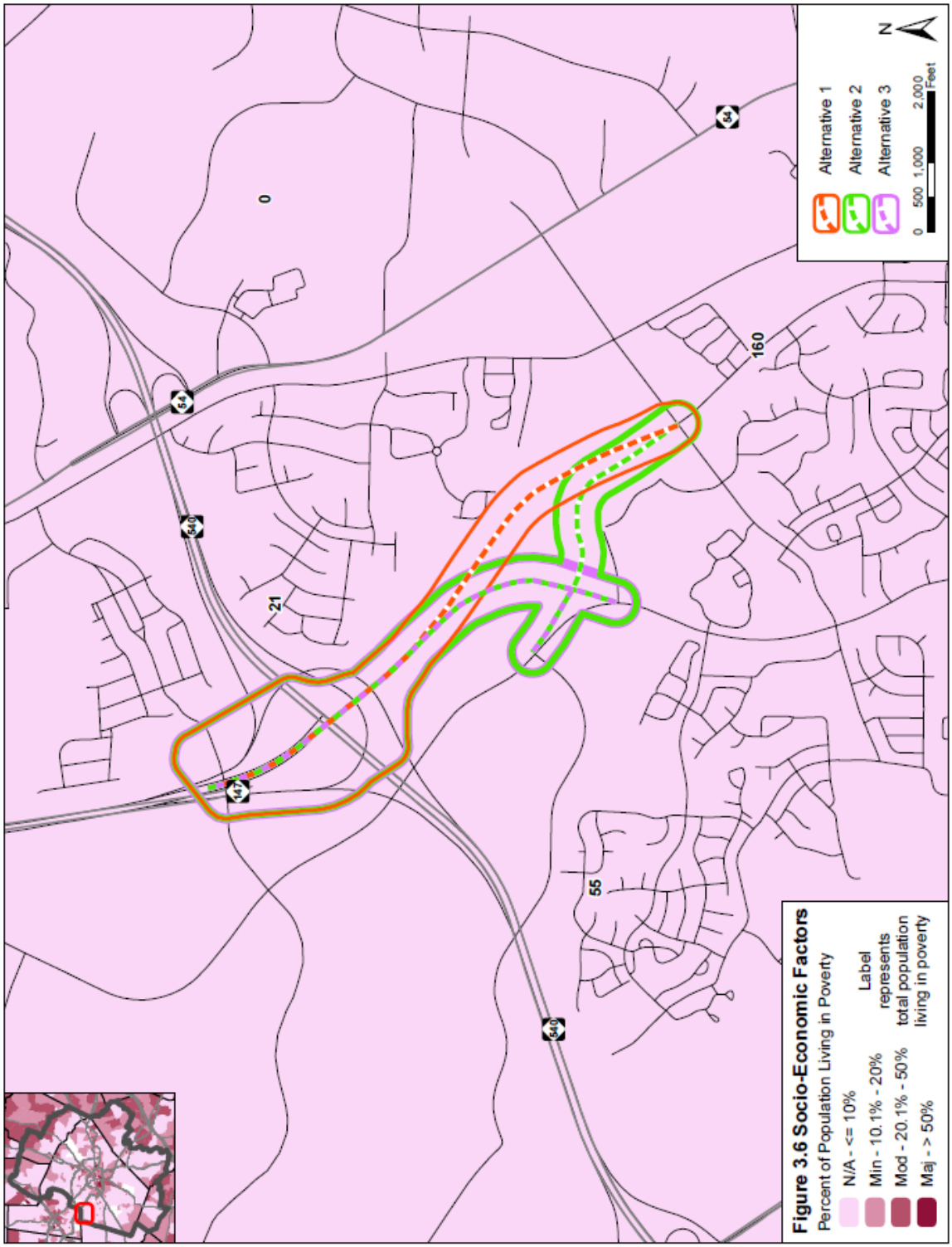


Figure 3-7 –Minority Population

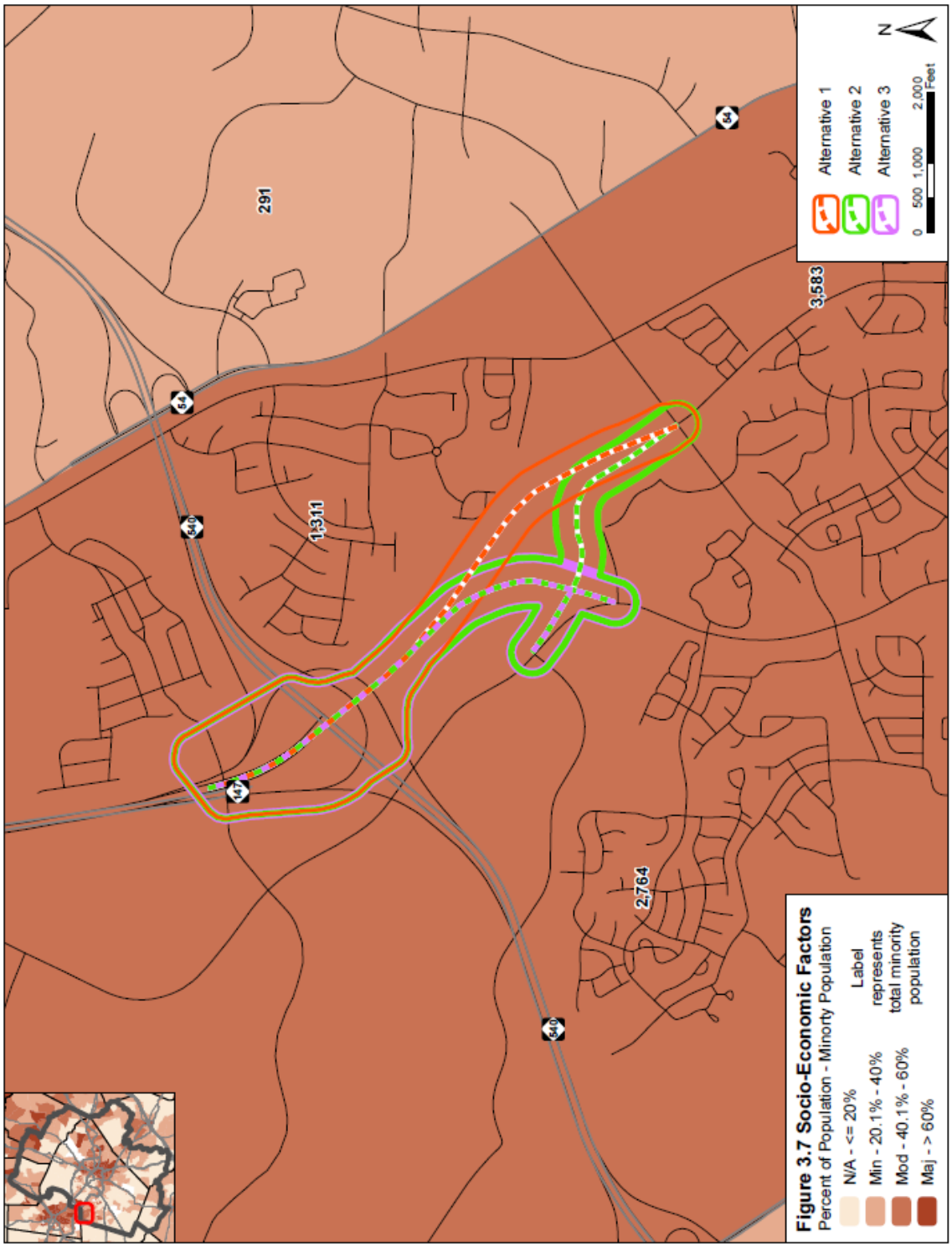
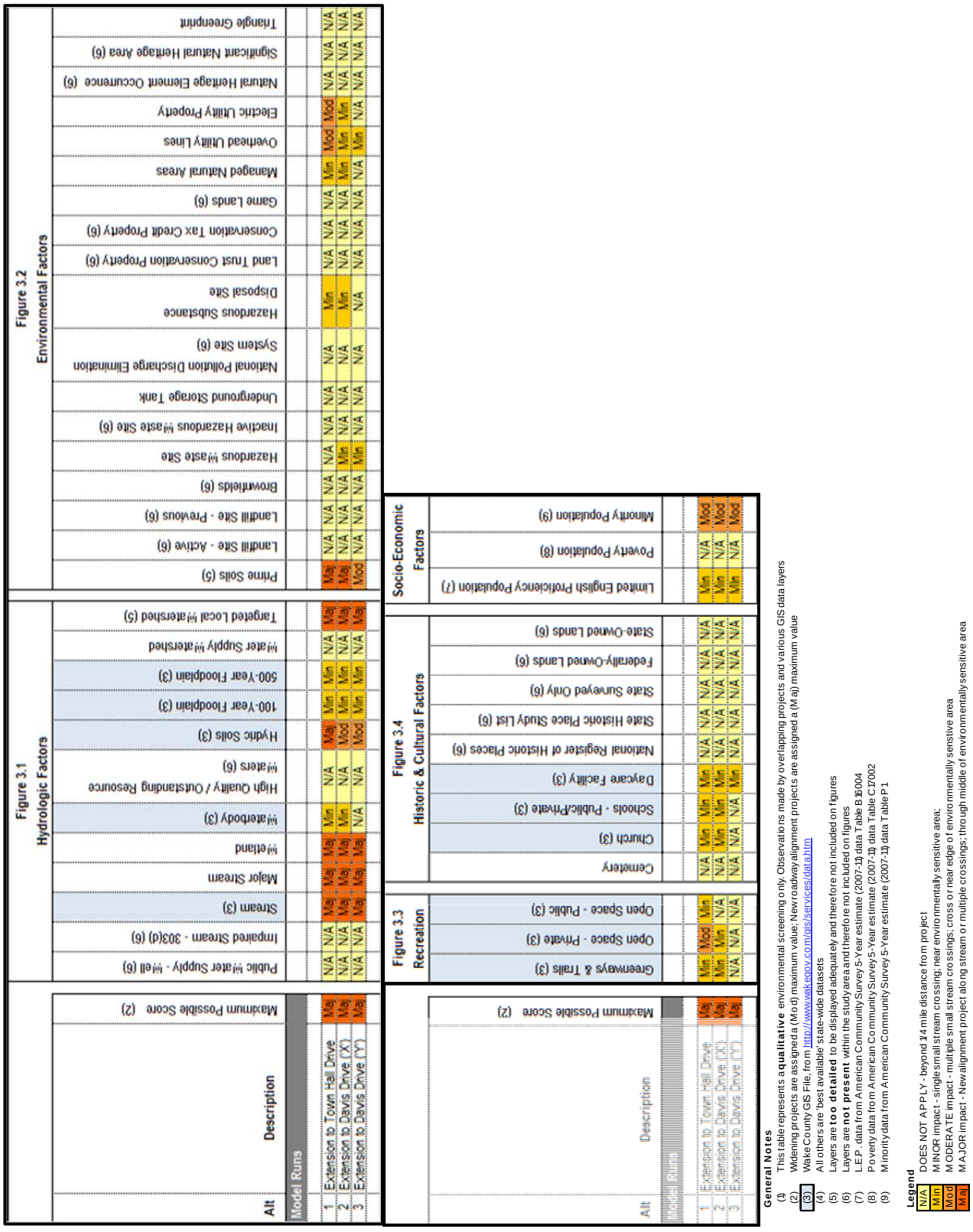


Table 3-2 – Environmental Impact Screening



Alt	Description	Maximum Possible Score (Z)	Public Water Supply - Well (6)	Impaired Stream - 303(d) (6)	Stream (3)	Major Stream	Wetland	Waterbody (3)	High Quality / Outstanding Resource Waters (6)	Hydric Soils (3)	100-Year Floodplain (3)	500-Year Floodplain (3)	Water Supply Watershed	Targeted Local Watershed (5)	Prime Soils (5)	Landfill Site - Active (6)	Landfill Site - Previous (6)	Brownfields (6)	Hazardous Waste Site	Inactive Hazardous Waste Site (6)	Underground Storage Tank	National Pollution Discharge Elimination System Site (6)	Hazardous Substance Disposal Site	Land Trust Conservation Property (6)	Conservation Tax Credit Property (6)	Game Lands (6)	Managed Natural Areas	Overhead Utility Lines	Electric Utility Property	Natural Heritage Element Occurrence (6)	Significant Natural Heritage Area (6)	Triangle Greenprint
Model Runs																																
1	Extension to Town Hall Drive	Maj	N/A	N/A	Maj	Maj	Maj	Min	N/A	Maj	Min	Min	N/A	Maj	Maj	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Min	N/A	N/A	N/A	Min	Mod	Mod	N/A	N/A	N/A
2	Extension to Davis Drive (X)	Maj	N/A	N/A	Maj	Maj	Maj	Min	N/A	Mod	Min	Min	N/A	Maj	Maj	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Min	Min	Min	N/A	N/A	N/A
3	Extension to Davis Drive (Y)	Maj	N/A	N/A	Maj	Maj	Maj	N/A	N/A	Mod	Min	Min	N/A	Maj	Maj	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Min	N/A	N/A	N/A	N/A

Alt	Description	Maximum Possible Score (Z)	Greenways & Trails (3)	Open Space - Private (3)	Open Space - Public (3)	Cemetery	Church (3)	Schools - Public/Private (3)	Daycare Facility (3)	National Register of Historic Places (6)	State Historic Place Study List (6)	State Surveyed Only (6)	Federally-Owned Lands (6)	State-Owned Lands (6)	Limited English Proficiency Population (7)	Poverty Population (8)	Minority Population (9)
Model Runs																	
1	Extension to Town Hall Drive	Maj	Min	Mod	Min	N/A	Min	Min	Min	N/A	N/A	N/A	N/A	N/A	Min	N/A	Mod
2	Extension to Davis Drive (X)	Maj	Min	Min	N/A	N/A	Min	Min	Min	N/A	N/A	N/A	N/A	N/A	Min	N/A	Mod
3	Extension to Davis Drive (Y)	Maj	N/A	N/A	N/A	N/A	N/A	N/A	Min	N/A	N/A	N/A	N/A	N/A	Min	N/A	Mod

General Notes

(1) This table represents a **qualitative** environmental screening only. Observations made by overlapping projects and various GIS data layers

(2) Widening projects are assigned a (Mod) maximum value; New roadway alignment projects are assigned a (Maj) maximum value

(3) Wake County GIS File, from http://www.wakegov.com/gis/services/data.htm

(4) All others are 'best available' state-wide datasets

(5) Layers are **too detailed** to be displayed adequately and therefore not included on figures

(6) Layers are **not present** within the study area and therefore not included on figures

(7) L.E.P. data from American Community Survey 5-Year estimate (2007-1p) data Table B16004

(8) Poverty data from American Community Survey 5-Year estimate (2007-1p) data Table C17002

(9) Minority data from American Community Survey 5-Year estimate (2007-1p) data Table P 1

Legend

N/A	DOES NOT APPLY - beyond 1/4 mile distance from project
Min	MINOR impact - single small stream crossing; near environmentally sensitive area;
Mod	MODERATE impact - multiple small stream crossings; cross or near edge of environmentally senstive area
Maj	MAJOR impact - New alignment project along stream or multiple crossings; through middle of environmentally sensitive area

4. COST OF CONSTRUCTION

The results of Tasks 1 were used to develop the potential typical section, alignment, and traffic control for proposed new roadways in each of the build alternatives. An opinion of probable construction costs for each alternative was developed which included the roadway, drainage infrastructure, and temporary and final traffic control, but did not include right-of-way acquisition and utility coordination and adjustment. Refer to Appendix 7 for an estimate of the cost of construction for each of the build and No-Build scenario. No-build scenario assumed the widening of Davis Drive to a 6-lane facility between Hopson and McCrimmon Parkway. **Table 4-1** provides a summary of construction costs for various alternatives

Table 4-1 - Summary of Construction Cost

Alternatives	Segments	Estimated Cost
Alternative 1 - Extension to McCrimmon Parkway	Triangle Parkway Extension	**$33,500,000**
Alternative 2 - Extension to Davis Drive with Town Hall Extension	Realignment of Davis Drive	4,300,000
	Town Hall Drive Extension	3,000,000
	Triangle Parkway Extension	30,900,000
	Total for Alternative 2	**38,200,000**
Alternative 3 – Extension to Davis Drive without Town Hall Extension	Realignment of Davis Drive	4,300,000
	Triangle Parkway Extension	30,900,000
	Total for alternative 3	**35,200,000**
No-Build	**Davis Drive Widening**	**29,700,000**

5. CONCLUSION/SUMMARY

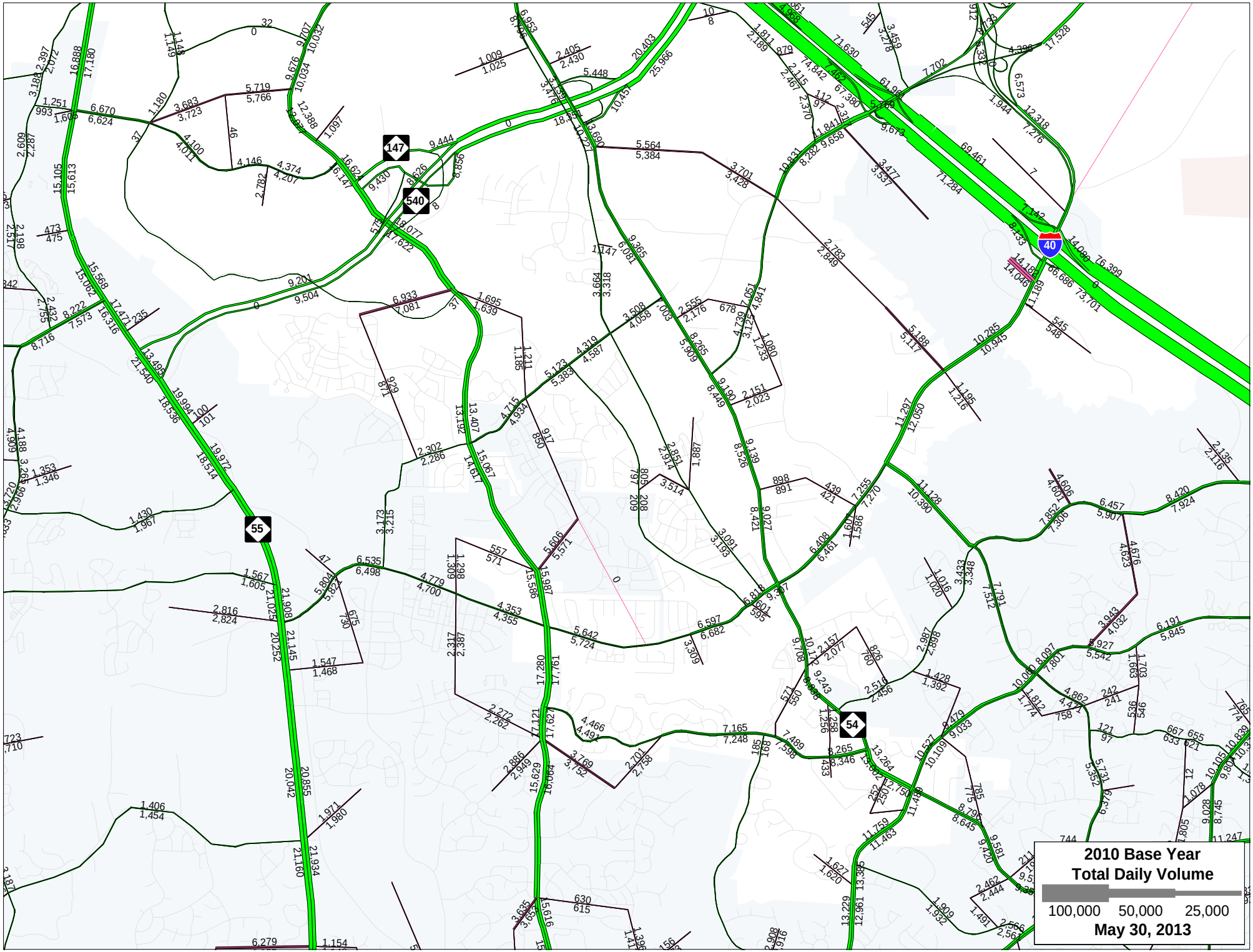
The effects of network changes are localized only improving peak hour LOS on the major and minor arterials in the vicinity of the study area. Overall the toll volume on all facilities in the region increase for all the build scenarios from 4 million toll trips in No-Build to 4.4 – 4.5 million in the build alternative. Maximum increase in toll volume is on Triangle Parkway, 540 Tri Ex and I-40 managed lanes lose the most toll traffic. Triangle Parkway extension relieves congestion in the study are in all build alternatives but maximum hours of delay savings on arterial and local facilities is in alternative 3.

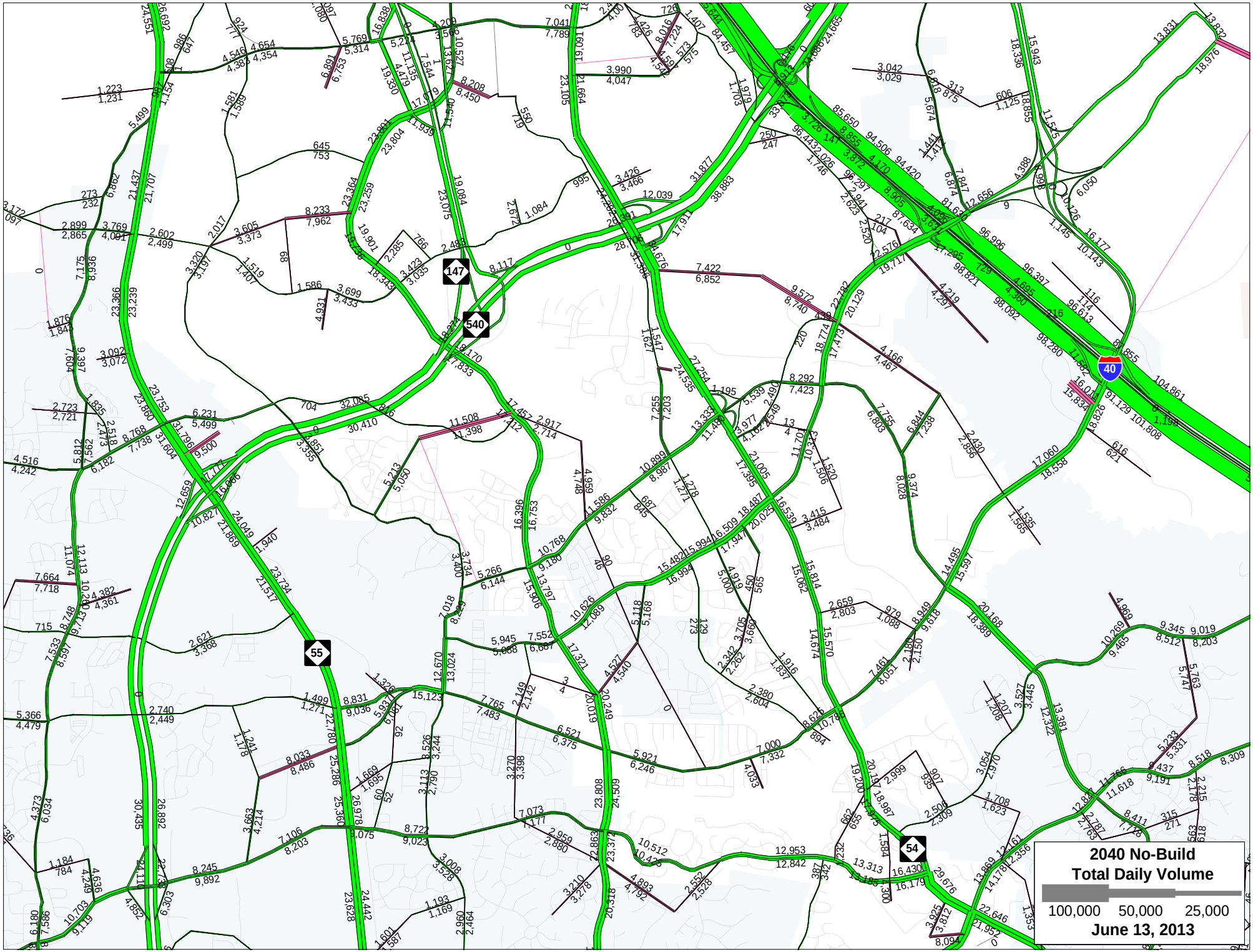
A more detailed analysis of volume and LOS improvements is required to study the impact outside of the study area. From the travel demand perspective in the triangle region; alternative 2 and 3 should be studied in more detail to finalize the impact of extending Triangle parkway to Davis Drive to relieve future congestion on the roadways in the study area, and also a wider

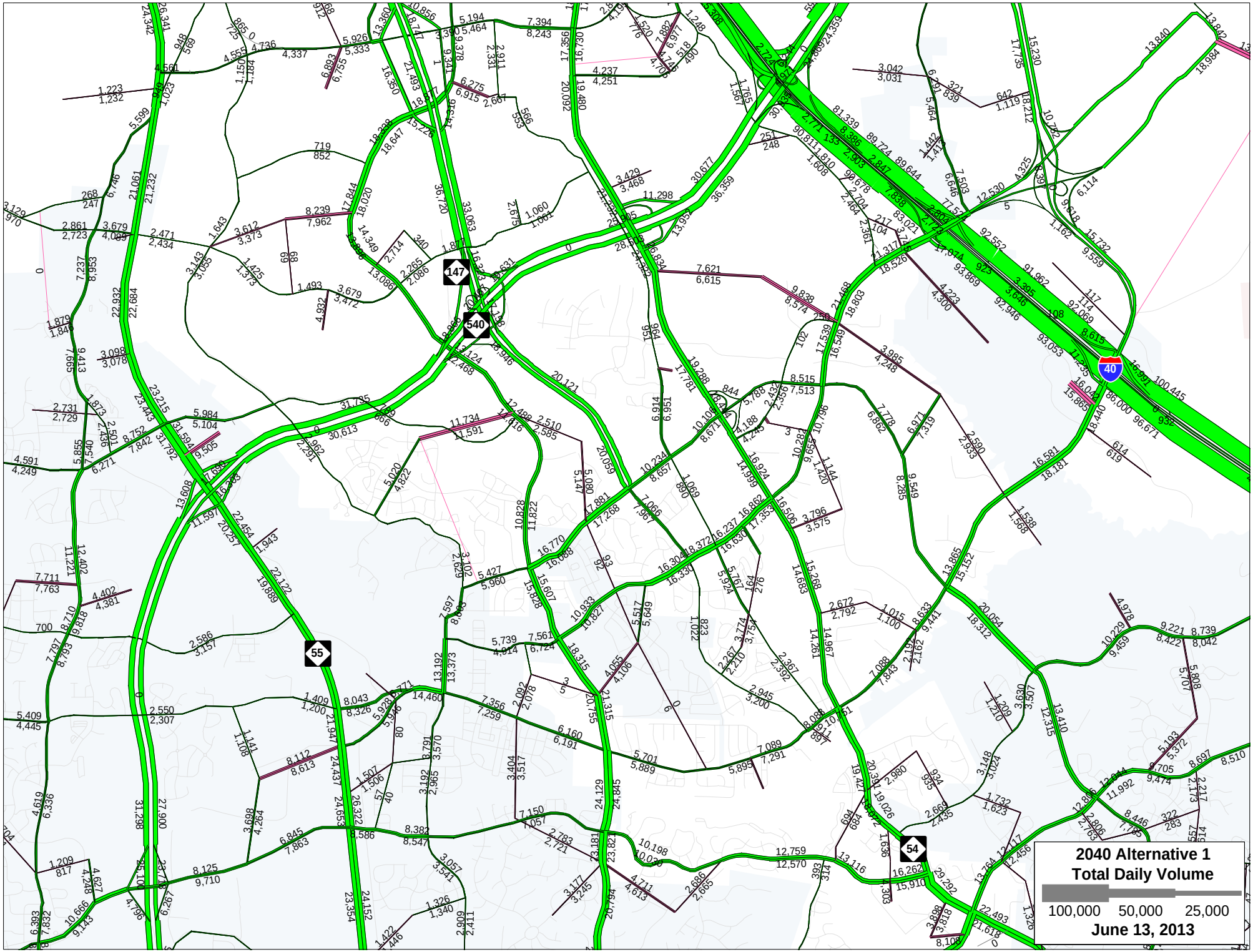
area. A more detailed study would involve splitting the TAZ in the vicinity of the project to get a better understanding of traffic movements, realign the centroid connectors to provide better loading of traffic, test various ramp designs to access the extension from Davis Drive. The RTP foundation have reserved the right of way for alternative 1 but may consider either alternative 2 or 3 with more detailed traffic and roadway design analysis. Hence a detailed operational and design analysis of various ramp configuration at Davis Drive for the preferred alternative will be required to alleviate congestion and signal queuing. The detail study will also include an impact of extensions alignments on existing land parcels and the associated marketability/usability of the parcels after the extension of the parkway is constructed.

The social and environmental impacts evaluated in this study represent broad level GIS-based examination. A detailed impact analysis will be required at a later stage once the preferred alternatives are shortlisted.

APPENDIX 1 - DAILY VOLUME MAPS


2010 Base Year
Total Daily Volume
100,000 50,000 25,000
May 30, 2013


147
540
40
55
54
2040 No-Build
Total Daily Volume
100,000 50,000 25,000
June 13, 2013


147
540
40
55
54
2040 Alternative 1
Total Daily Volume
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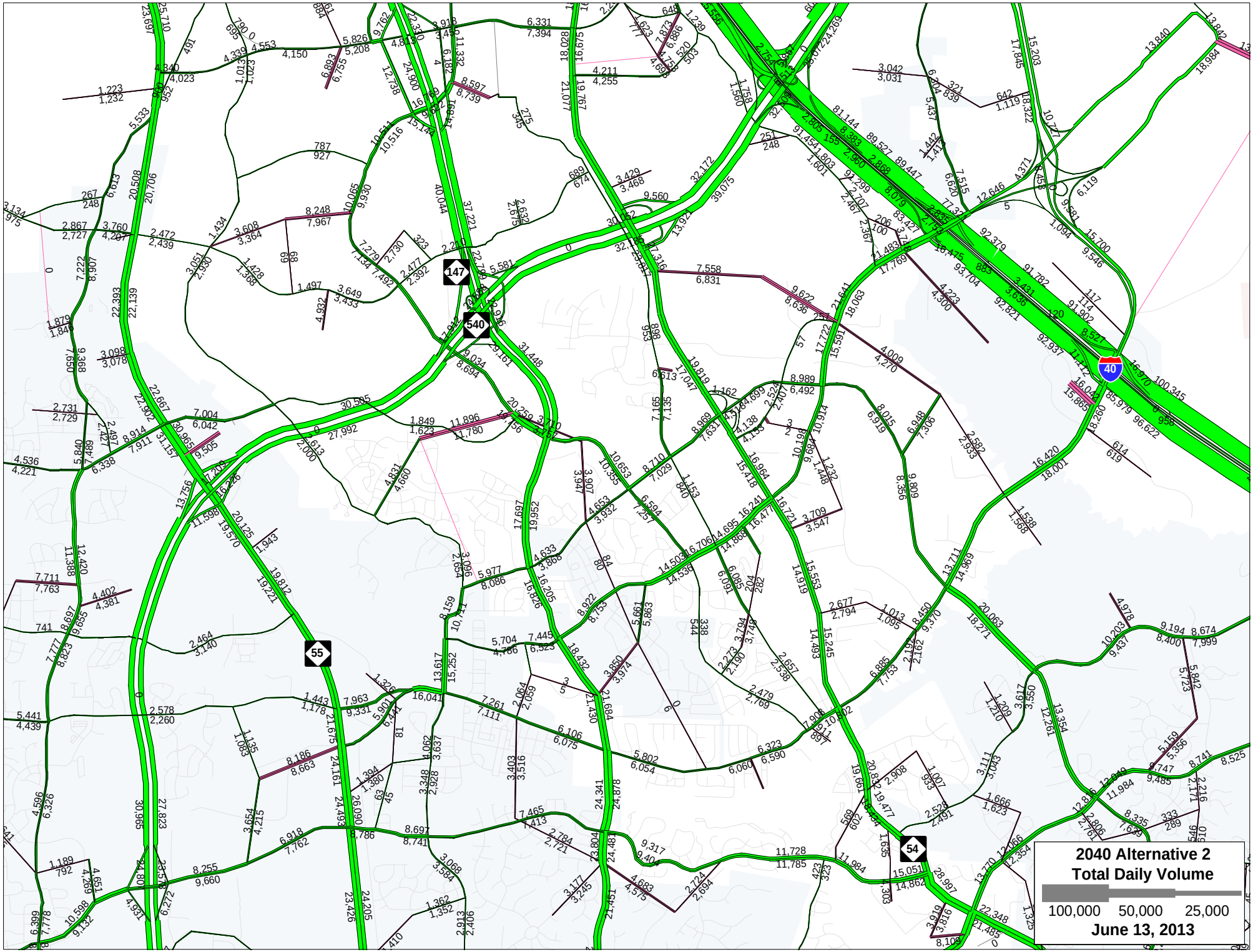
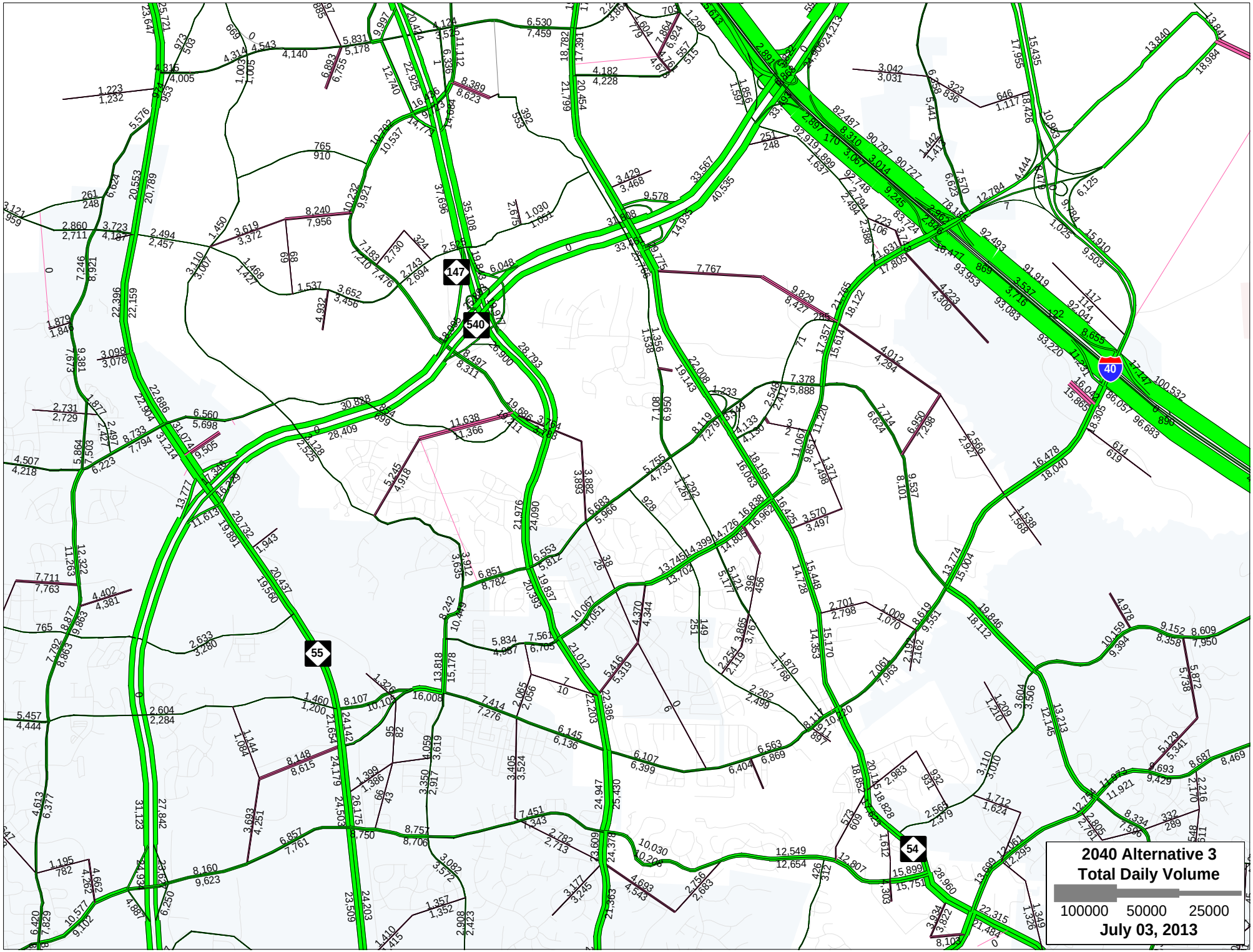
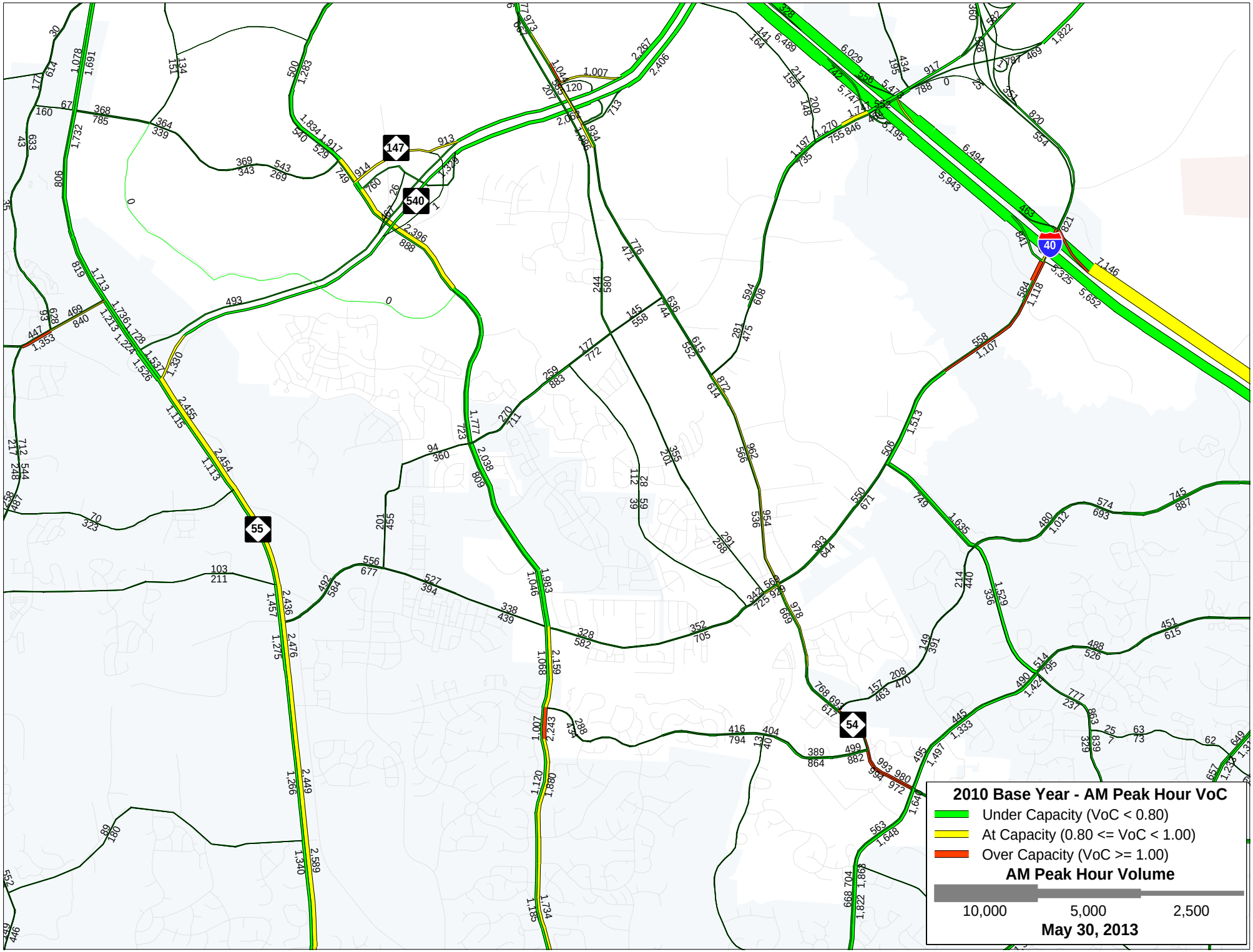
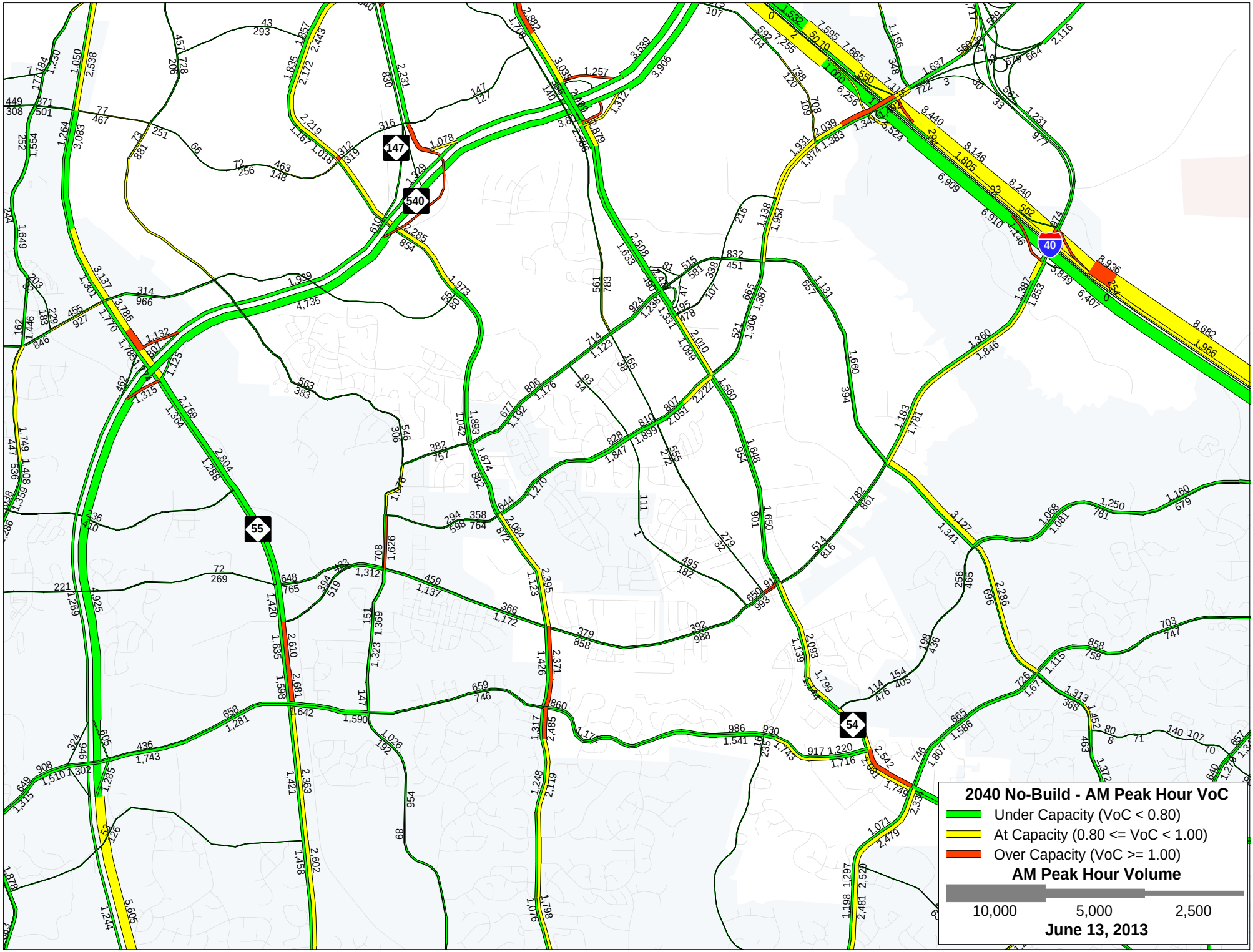
June 13, 2013

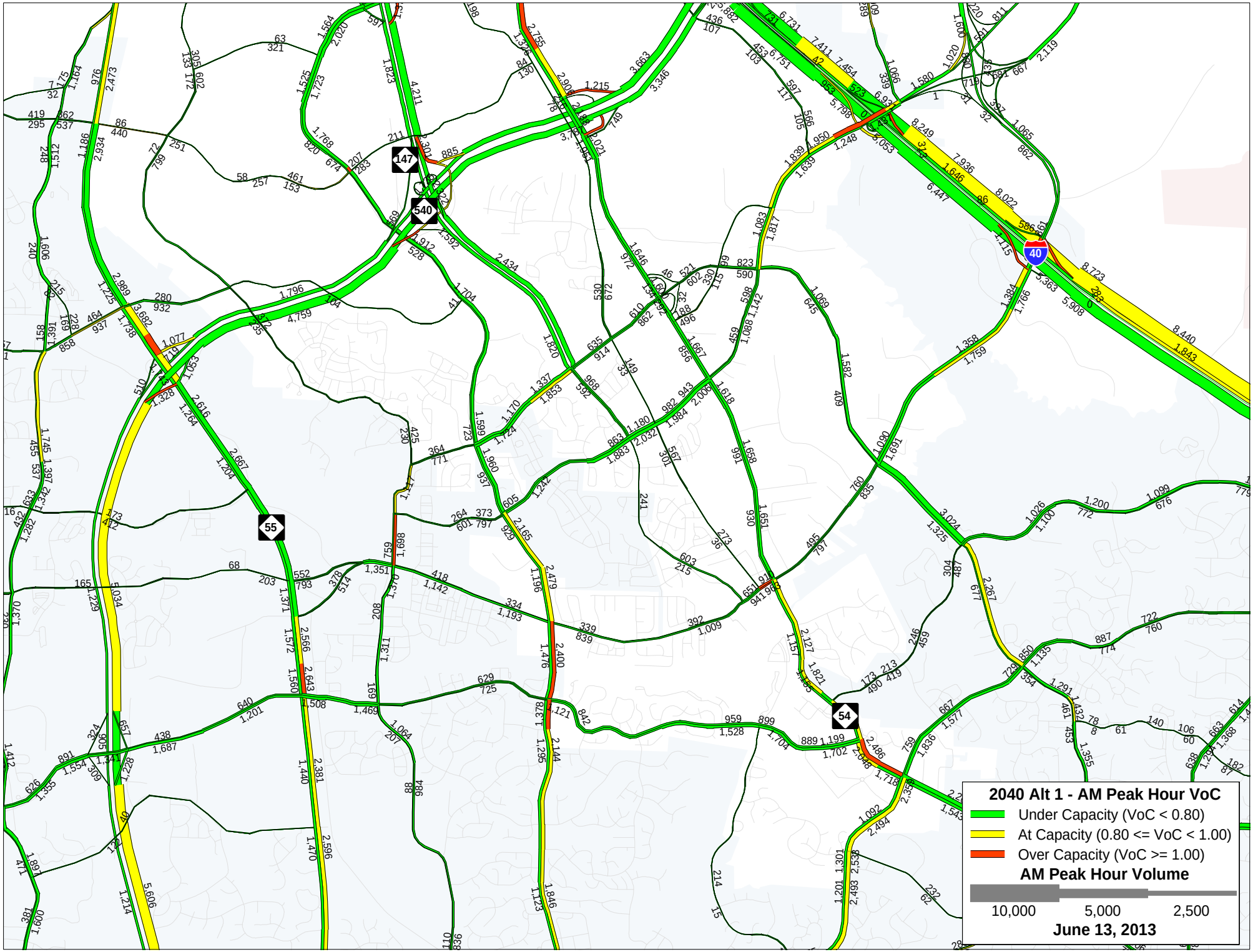

2040 Alternative 2
Total Daily Volume
100,000 50,000 25,000
June 13, 2013
147
540
55
54
40

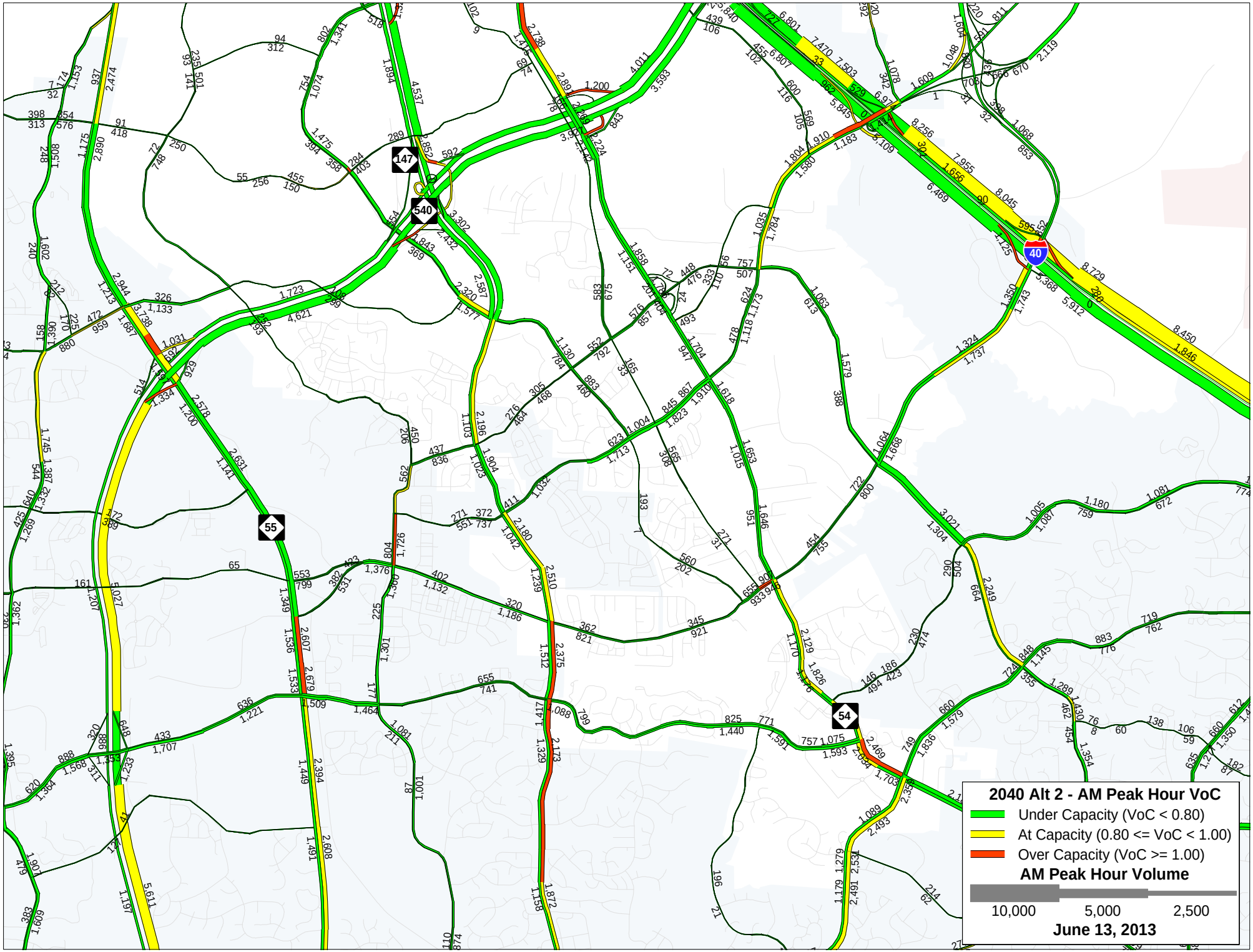

2040 Alternative 3
Total Daily Volume
100000 50000 25000
July 03, 2013
147
540
55
54
40

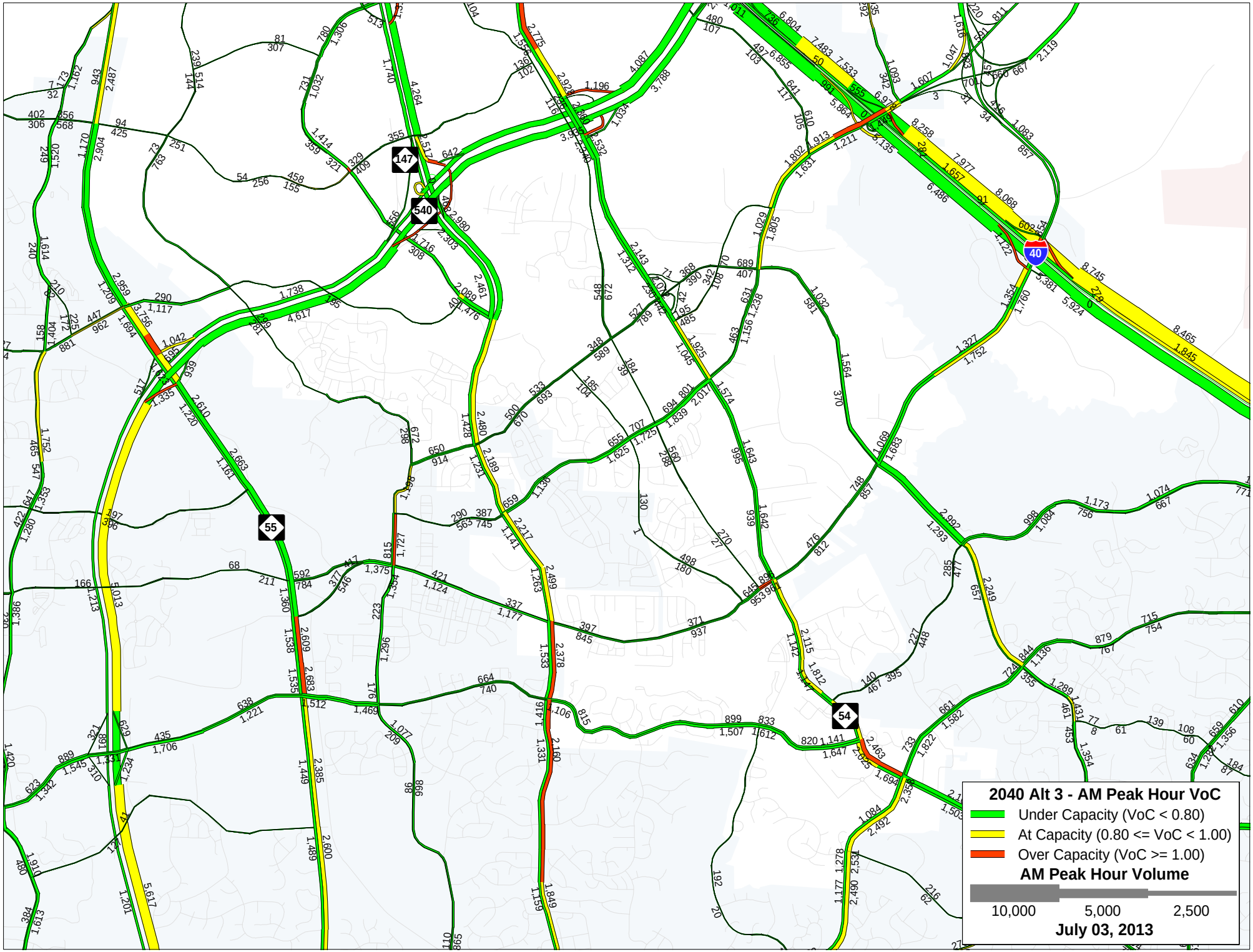
APPENDIX 2 - AM AND PM PEAK HOUR LEVEL OF SERVICE

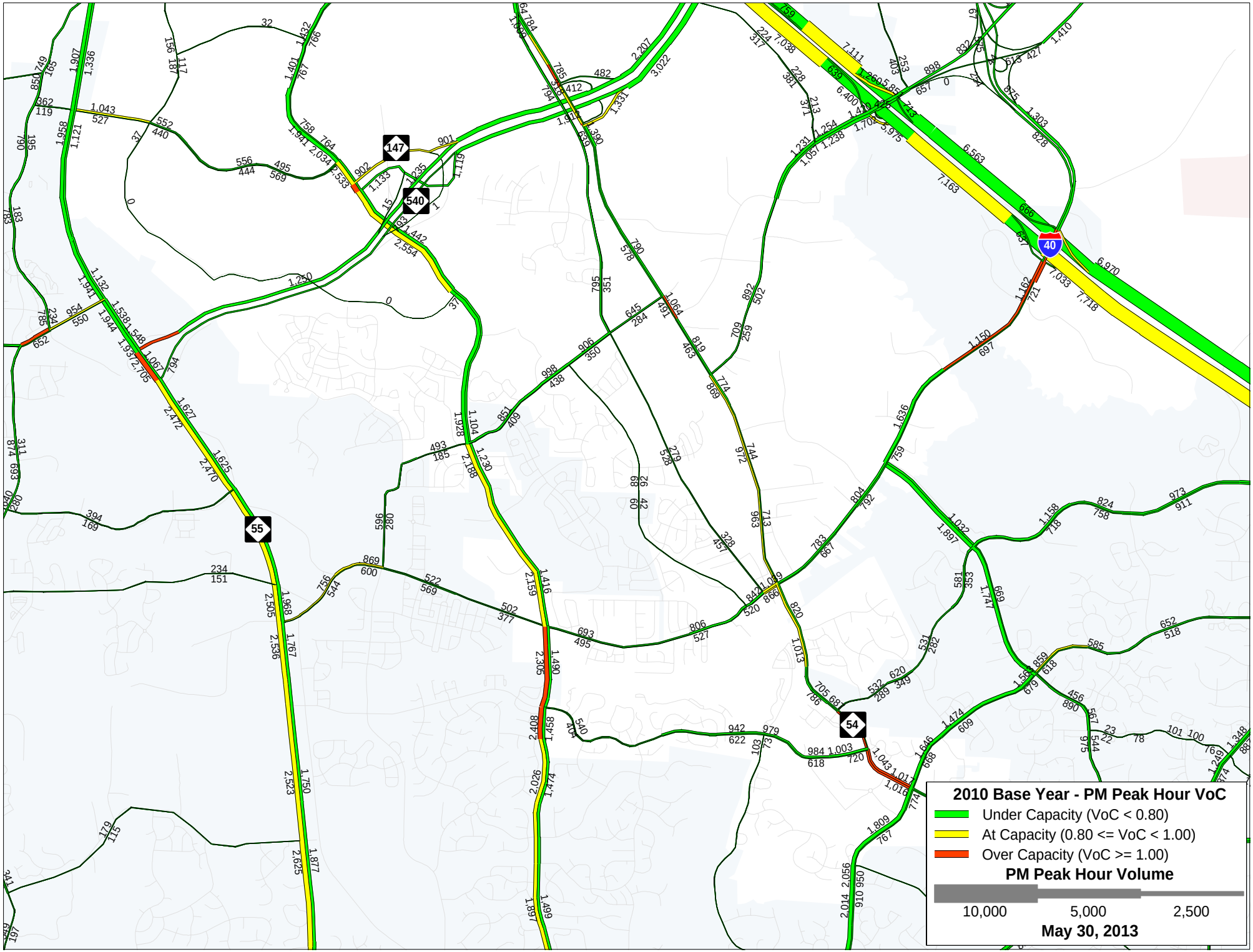

2010 Base Year - AM Peak Hour VoC
Under Capacity (VoC < 0.80)
At Capacity (0.80 <= VoC < 1.00)
Over Capacity (VoC >= 1.00)
AM Peak Hour Volume
10,000
5,000
2,500
May 30, 2013
147
540
55
54
40

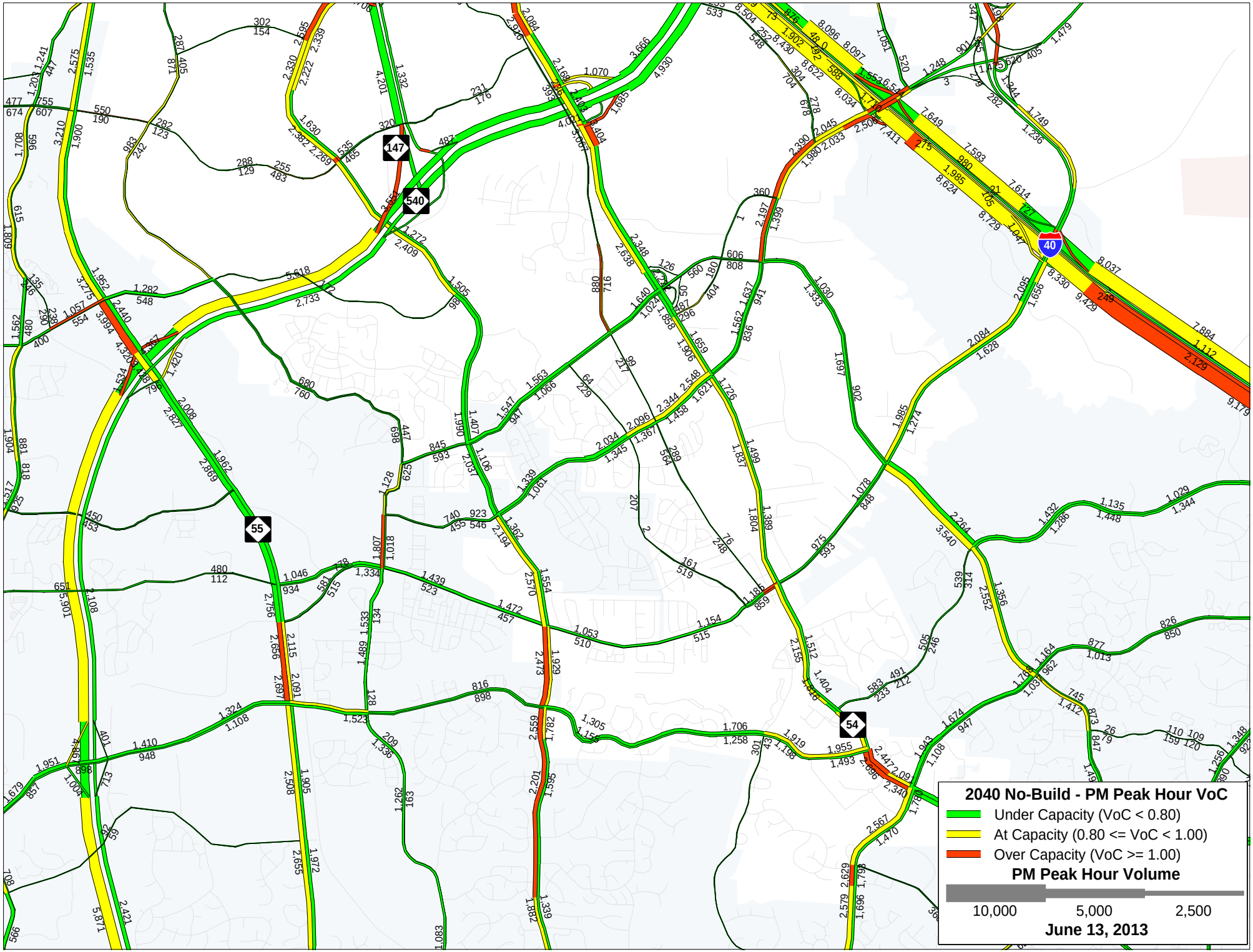

2040 No-Build - AM Peak Hour VoC
Under Capacity (VoC < 0.80)
At Capacity (0.80 <= VoC < 1.00)
Over Capacity (VoC >= 1.00)
AM Peak Hour Volume
10,000
5,000
2,500
June 13, 2013
147
540
40
55
54

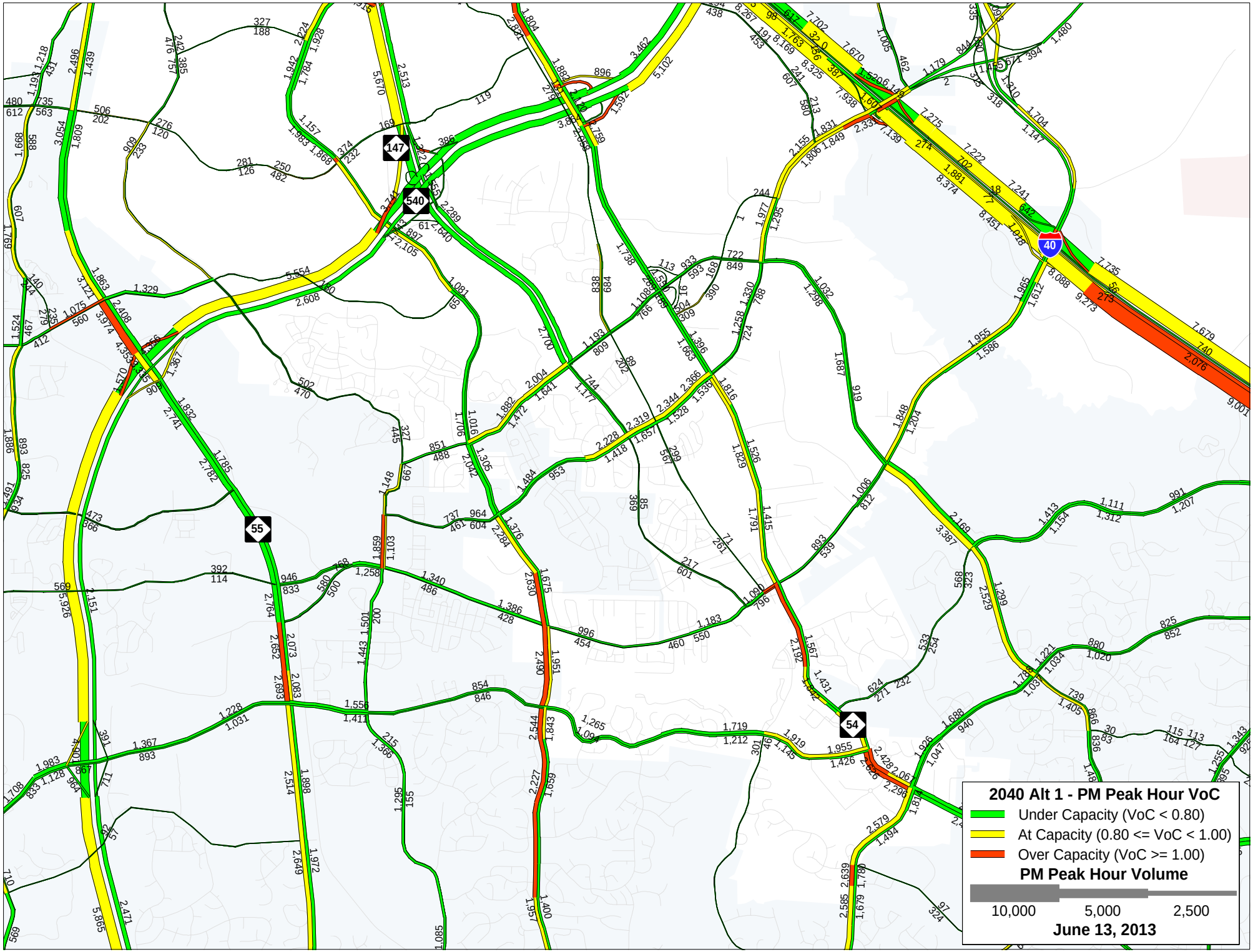

147
540
40
55
54
2040 Alt 1 - AM Peak Hour VoC
Under Capacity (VoC < 0.80)
At Capacity (0.80 <= VoC < 1.00)
Over Capacity (VoC >= 1.00)
AM Peak Hour Volume
10,000
5,000
2,500
June 13, 2013

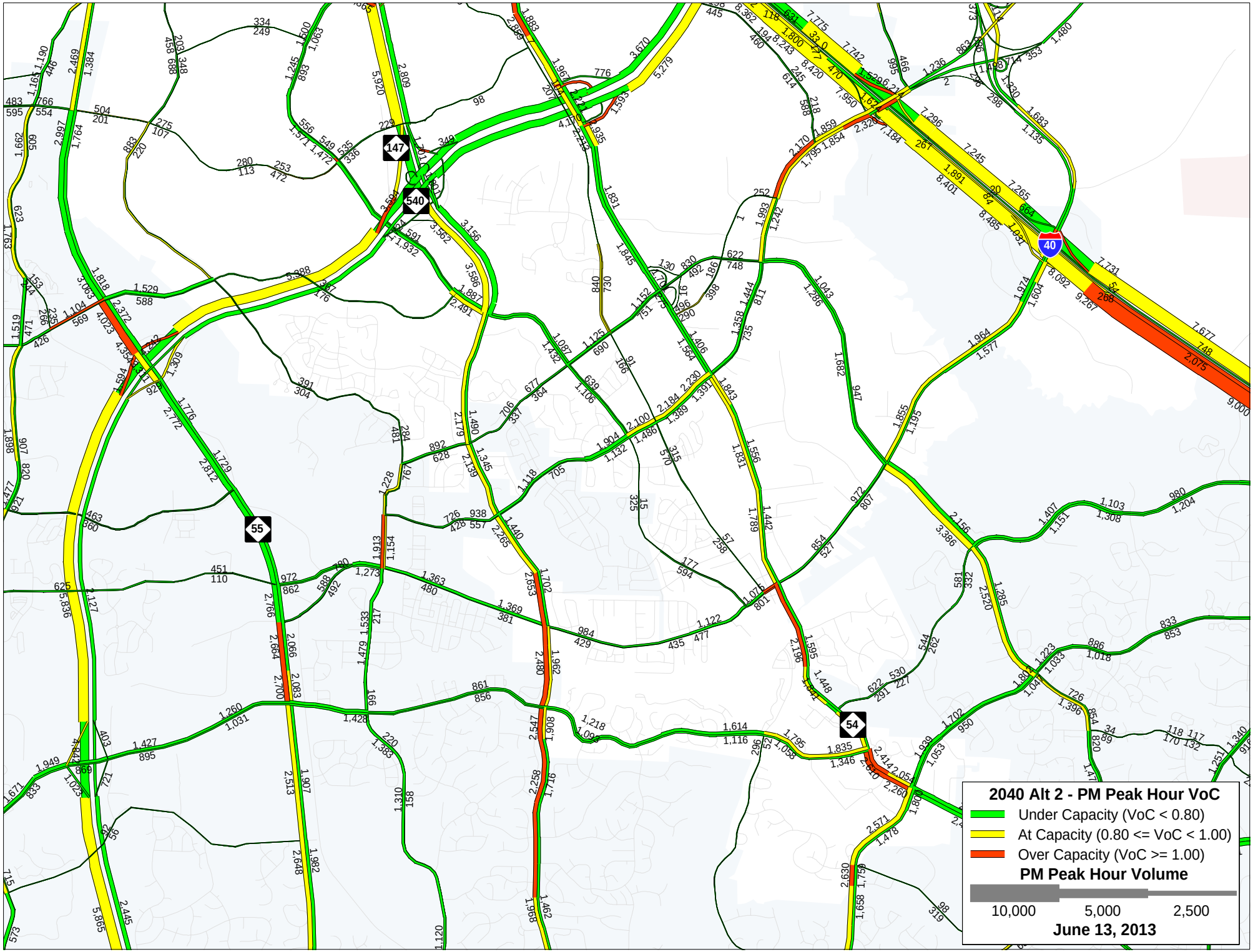

2040 Alt 2 - AM Peak Hour VoC
Under Capacity (VoC < 0.80)
At Capacity (0.80 <= VoC < 1.00)
Over Capacity (VoC >= 1.00)
AM Peak Hour Volume
10,000
5,000
2,500
June 13, 2013
147
540
40
55
54

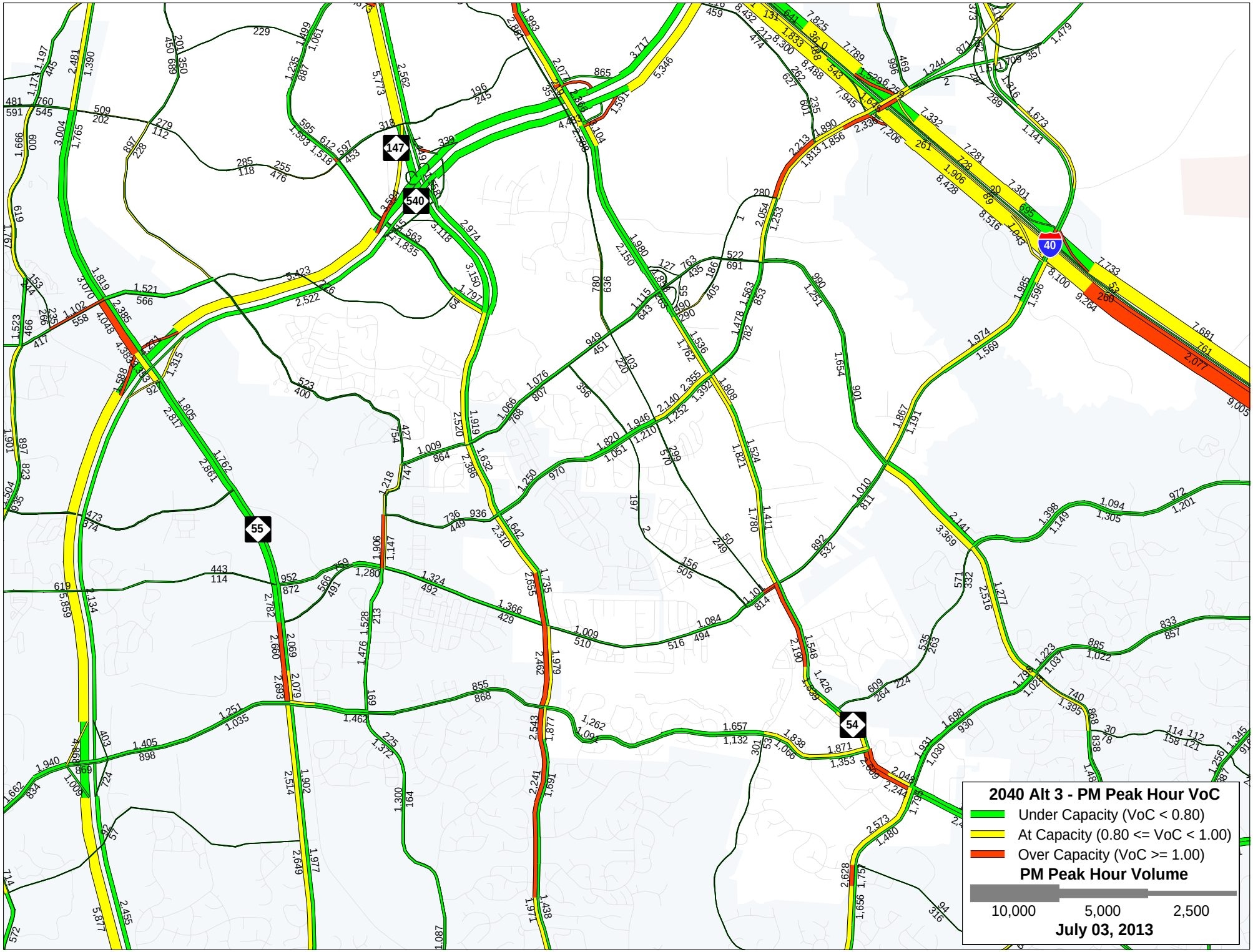

2040 Alt 3 - AM Peak Hour VoC
Under Capacity (VoC < 0.80)
At Capacity (0.80 <= VoC < 1.00)
Over Capacity (VoC >= 1.00)
AM Peak Hour Volume
10,000
5,000
2,500
July 03, 2013
147
540
40
55
54


2010 Base Year - PM Peak Hour VoC
Under Capacity (VoC < 0.80)
At Capacity (0.80 <= VoC < 1.00)
Over Capacity (VoC >= 1.00)
PM Peak Hour Volume
10,000
5,000
2,500
May 30, 2013
147
540
55
40
54

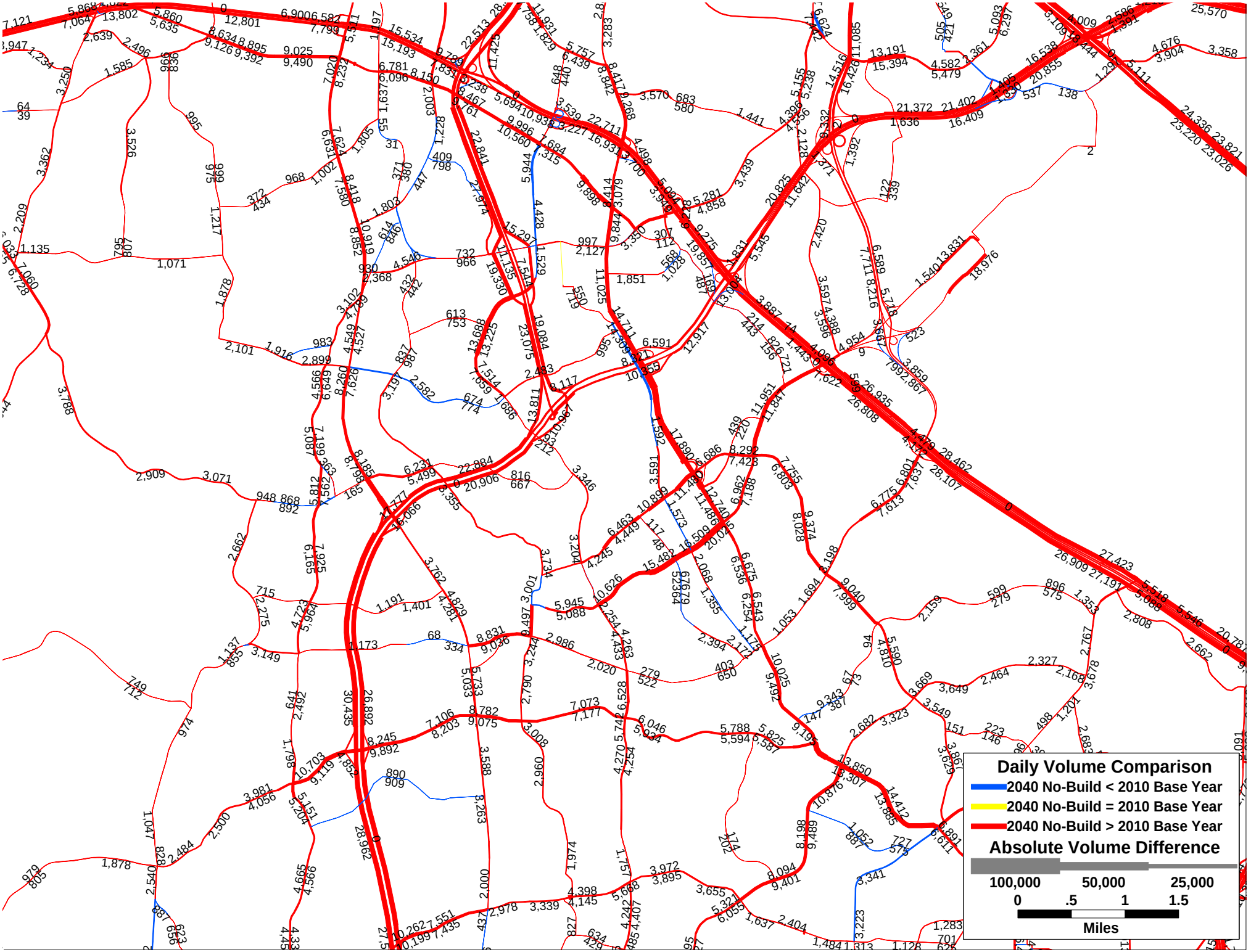

2040 No-Build - PM Peak Hour VoC
Under Capacity (VoC < 0.80)
At Capacity (0.80 <= VoC < 1.00)
Over Capacity (VoC >= 1.00)
PM Peak Hour Volume
10,000
5,000
2,500
June 13, 2013
147
540
40
55
54

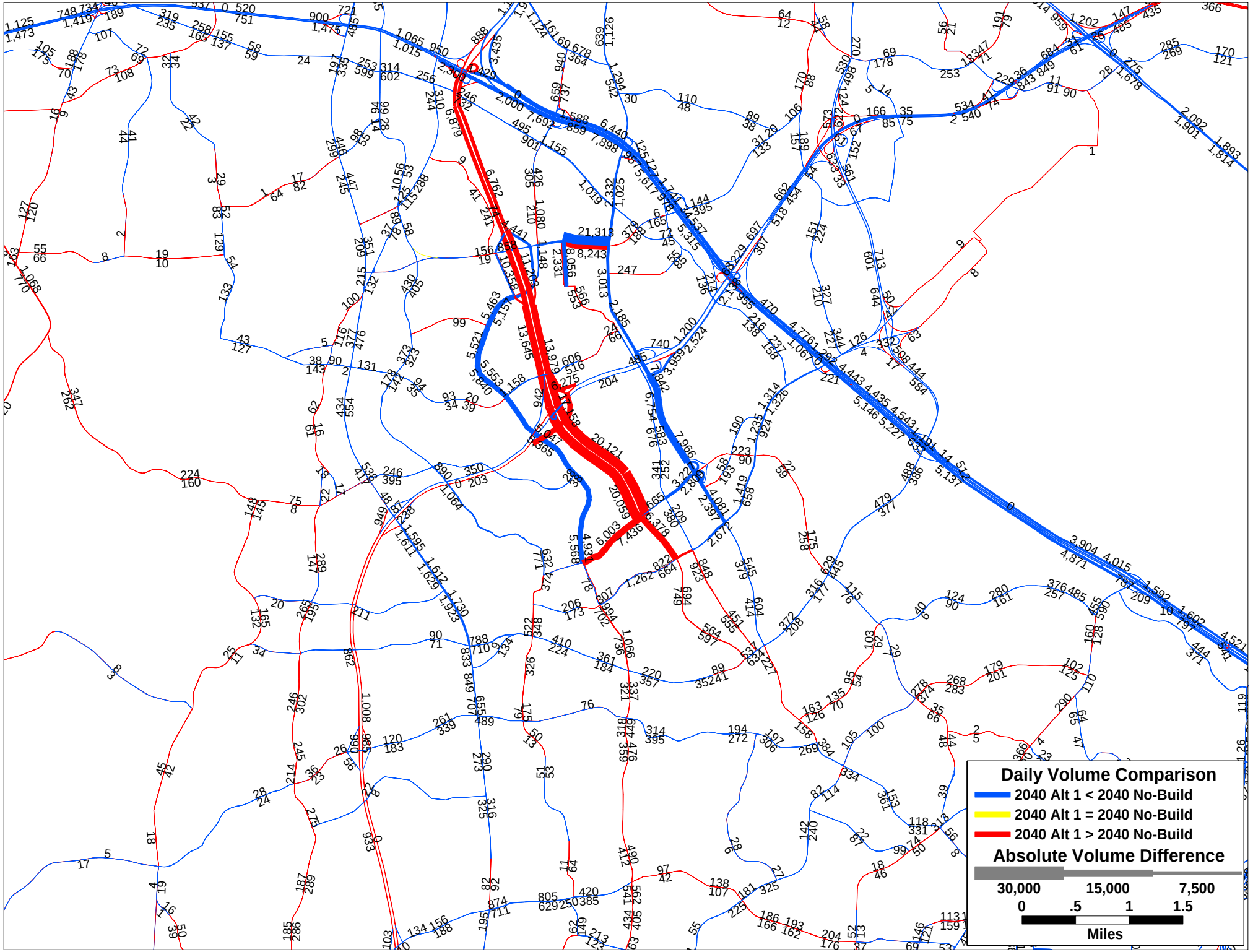

2040 Alt 1 - PM Peak Hour VoC
Under Capacity (VoC < 0.80)
At Capacity (0.80 <= VoC < 1.00)
Over Capacity (VoC >= 1.00)
PM Peak Hour Volume
10,000
5,000
2,500
June 13, 2013
147
540
40
55
54

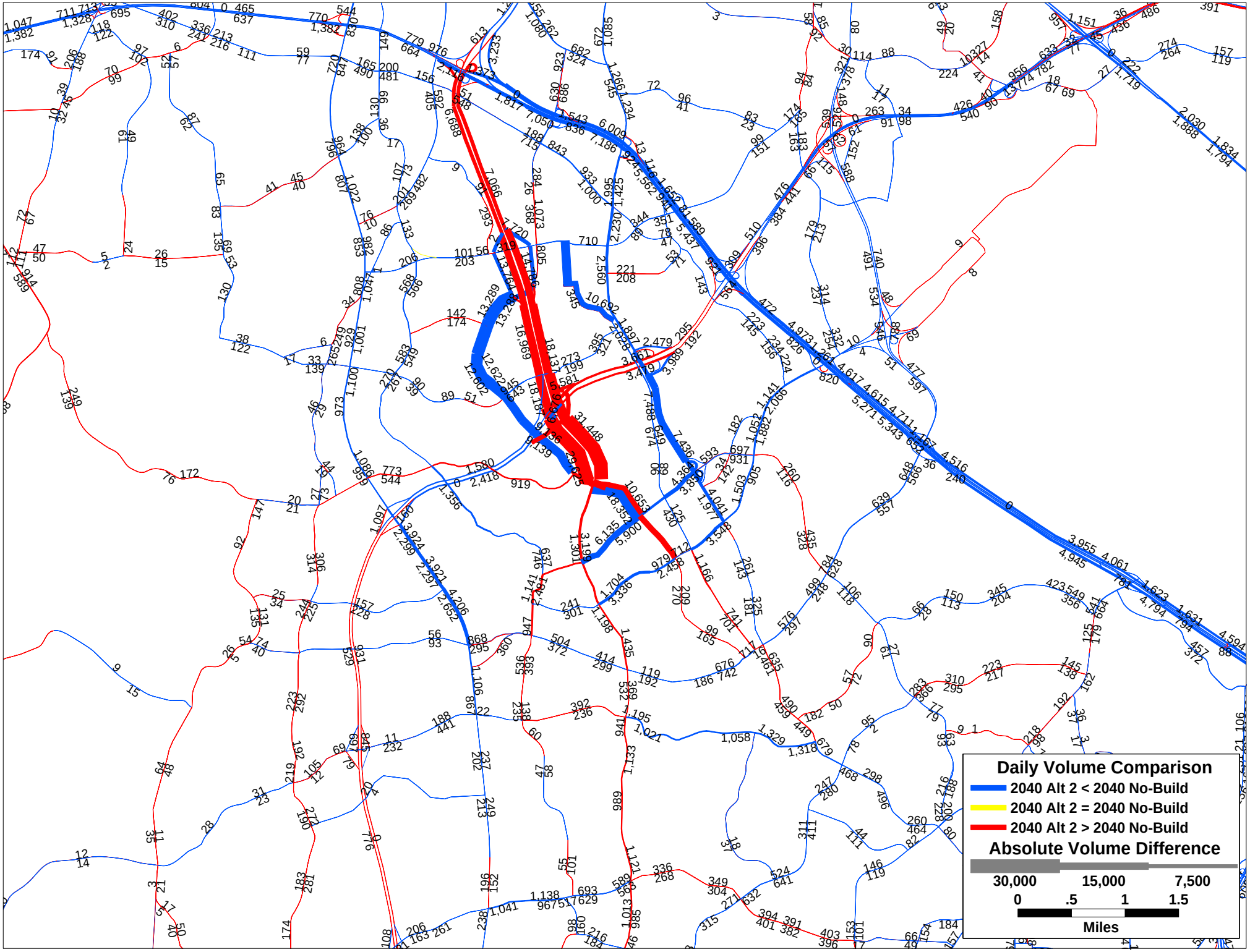

2040 Alt 2 - PM Peak Hour VoC
Under Capacity (VoC < 0.80)
At Capacity (0.80 <= VoC < 1.00)
Over Capacity (VoC >= 1.00)
PM Peak Hour Volume
10,000
5,000
2,500
June 13, 2013
147
540
55
40
54

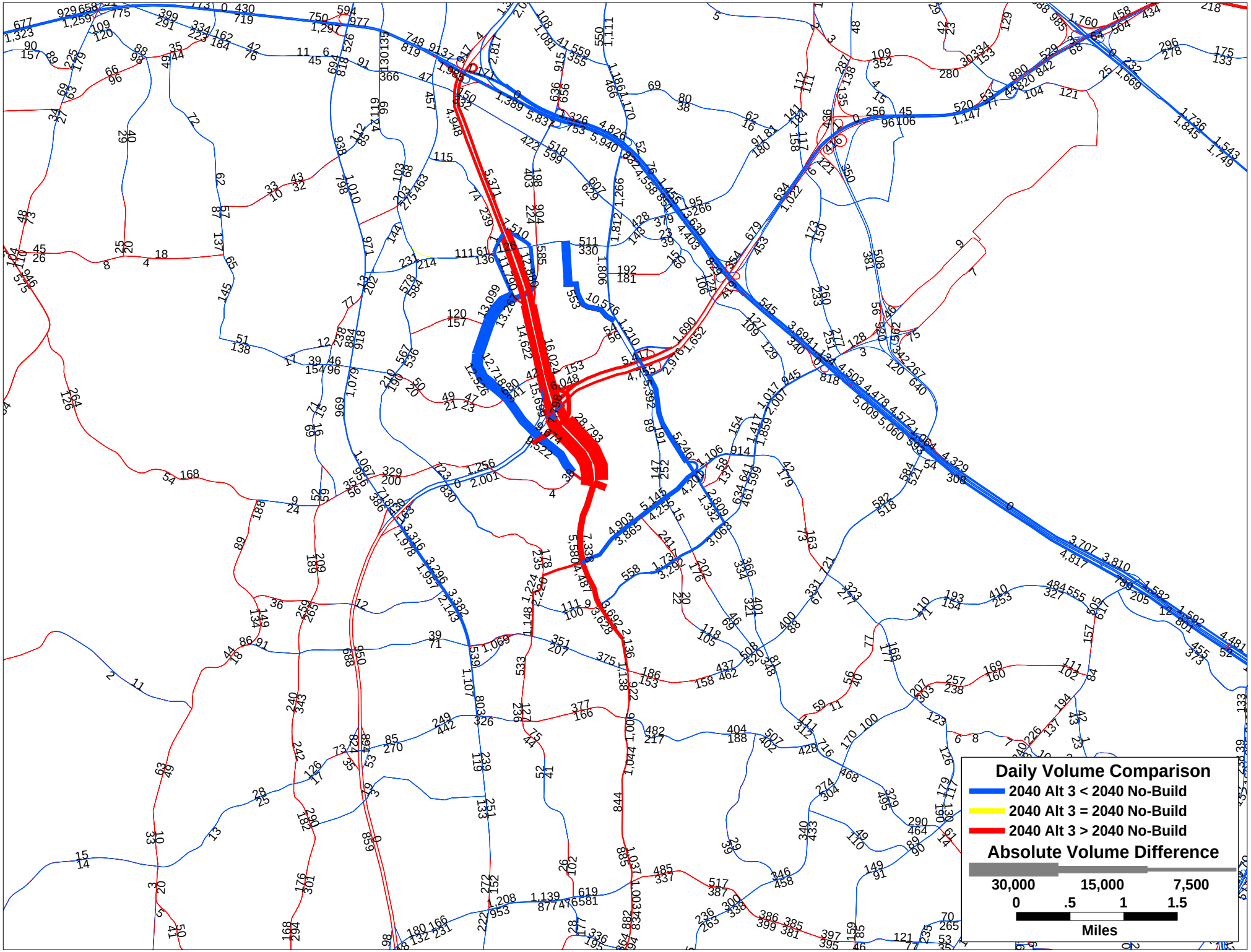

2040 Alt 3 - PM Peak Hour VoC
Under Capacity (VoC < 0.80)
At Capacity (0.80 <= VoC < 1.00)
Over Capacity (VoC >= 1.00)
PM Peak Hour Volume
10,000
5,000
2,500
July 03, 2013
147
540
55
40
54

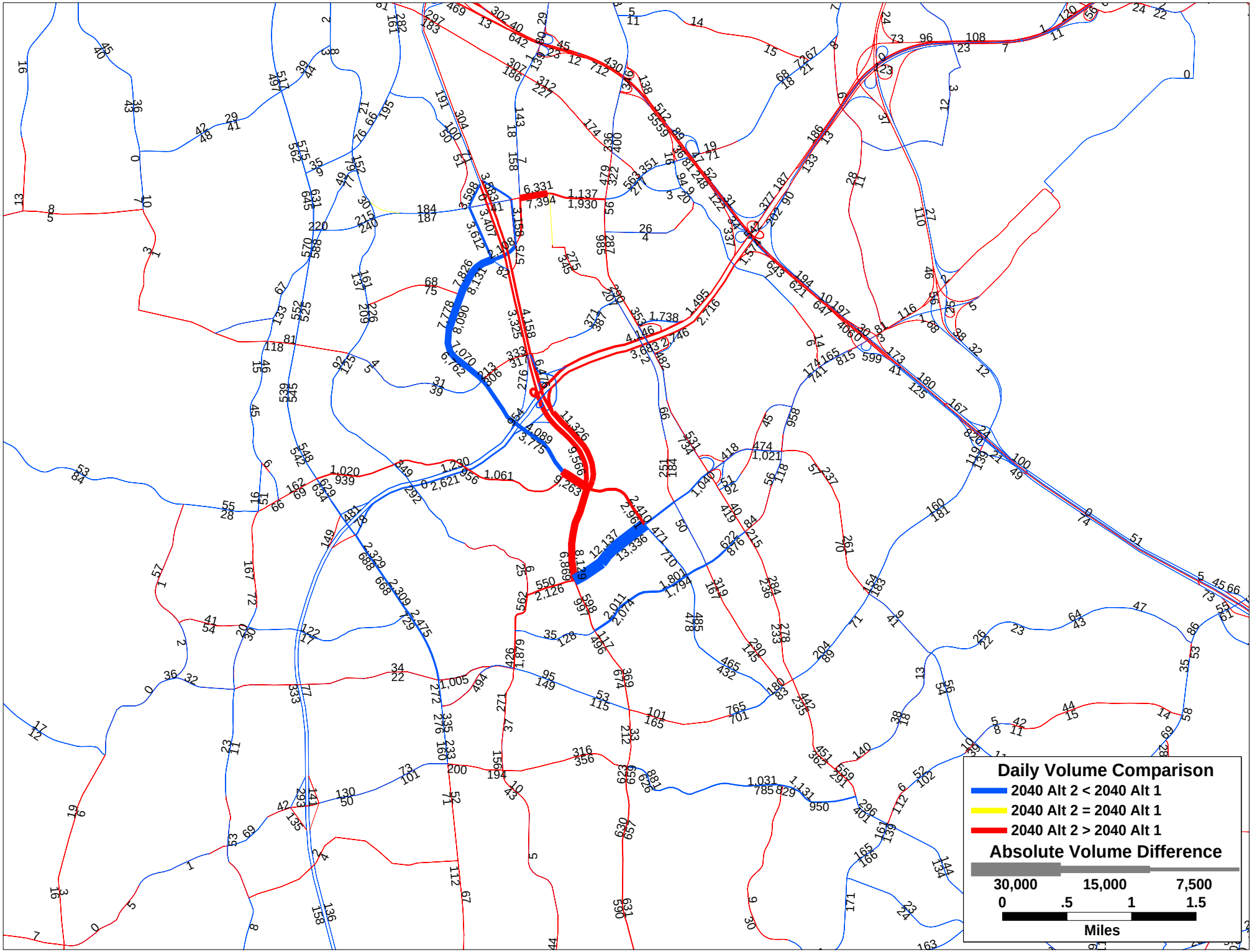
APPENDIX 3 - DIFFERENCE IN DAILY TRAFFIC VOLUME

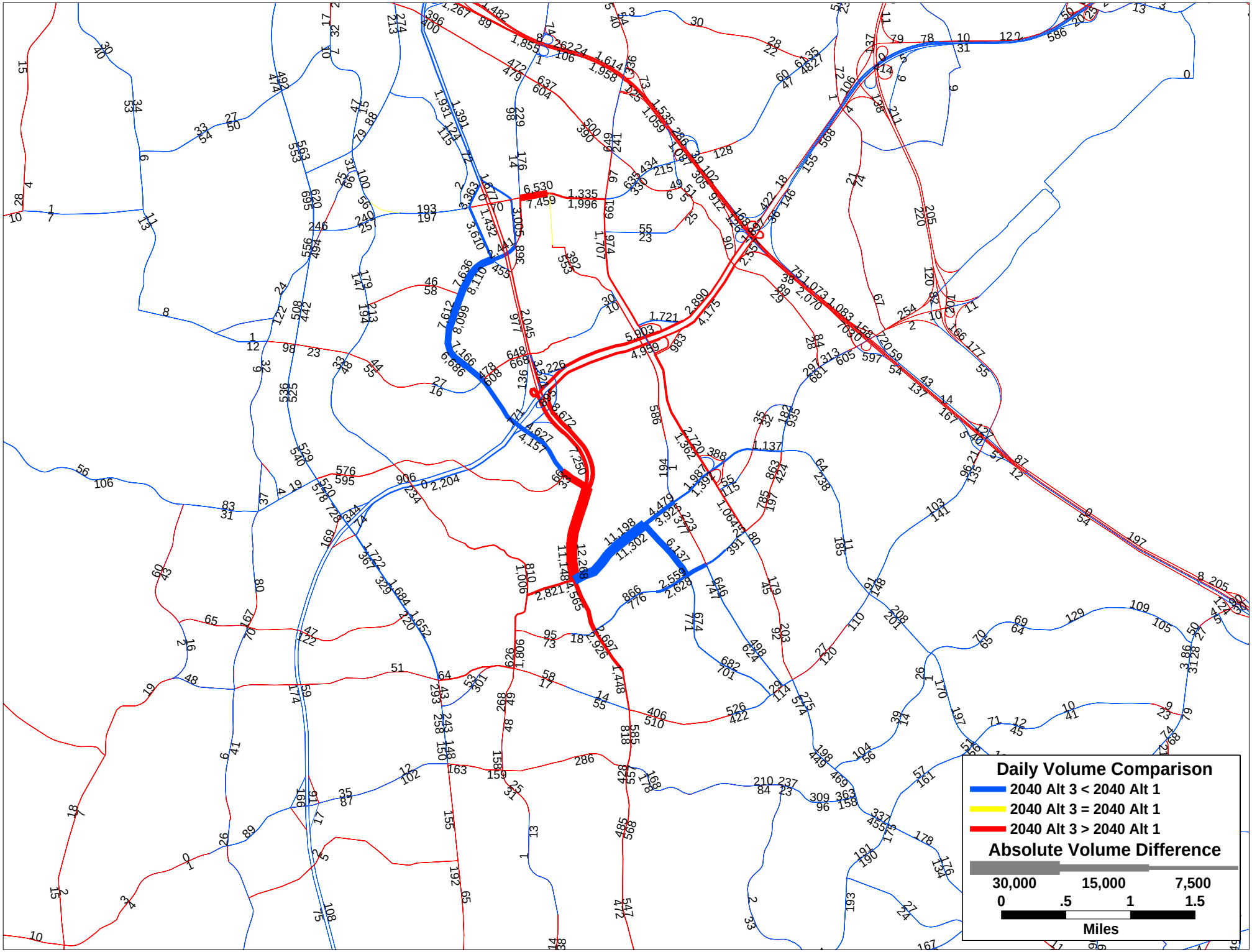

Daily Volume Comparison
2040 No-Build < 2010 Base Year
2040 No-Build = 2010 Base Year
2040 No-Build > 2010 Base Year
Absolute Volume Difference
100,000
50,000
25,000
0
.5
1
1.5
Miles

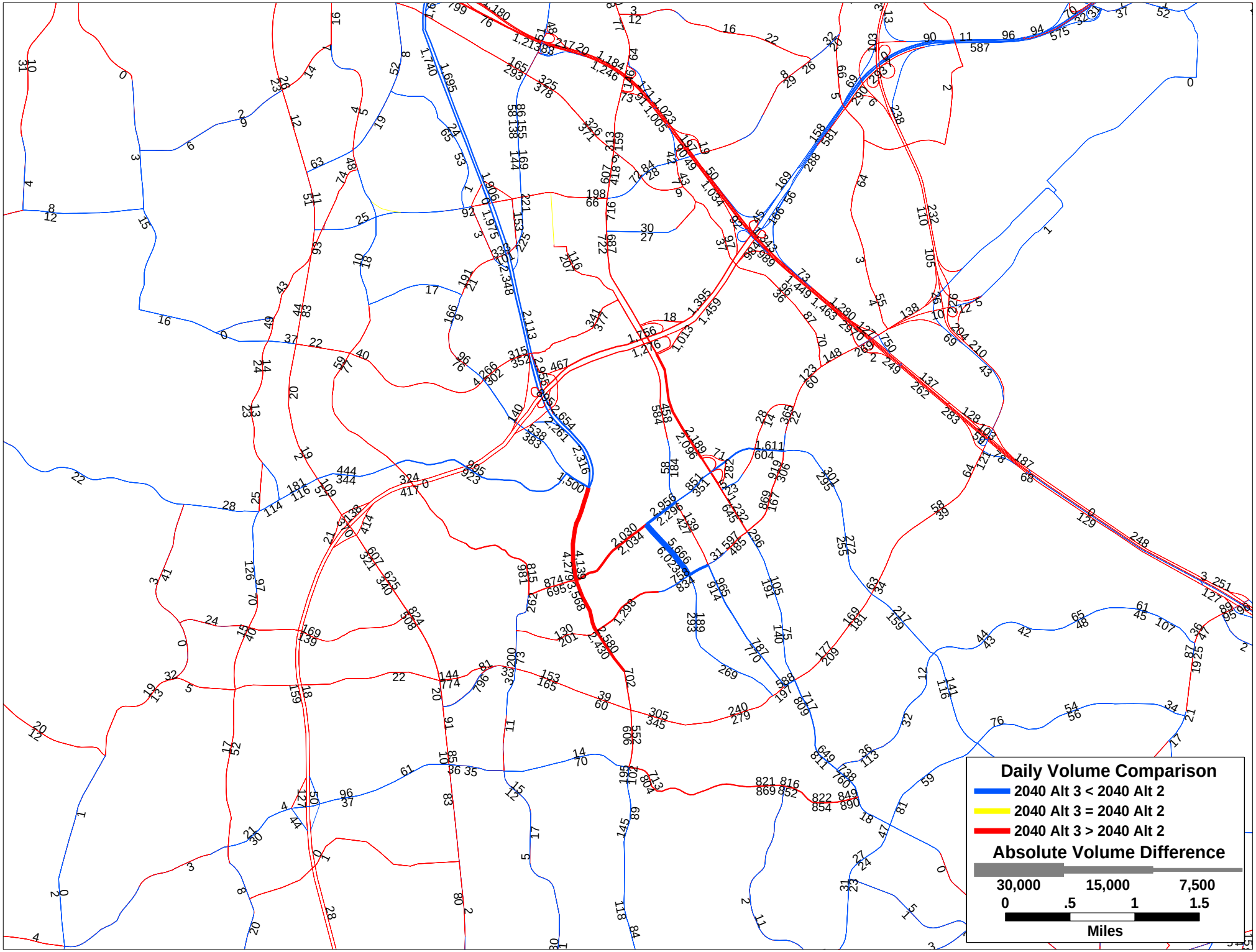

Daily Volume Comparison
2040 Alt 1 < 2040 No-Build
2040 Alt 1 = 2040 No-Build
2040 Alt 1 > 2040 No-Build
Absolute Volume Difference
30,000
15,000
7,500
0
.5
1
1.5
Miles


Daily Volume Comparison
2040 Alt 2 < 2040 No-Build
2040 Alt 2 = 2040 No-Build
2040 Alt 2 > 2040 No-Build
Absolute Volume Difference
30,000
15,000
7,500
0
.5
1
1.5
Miles

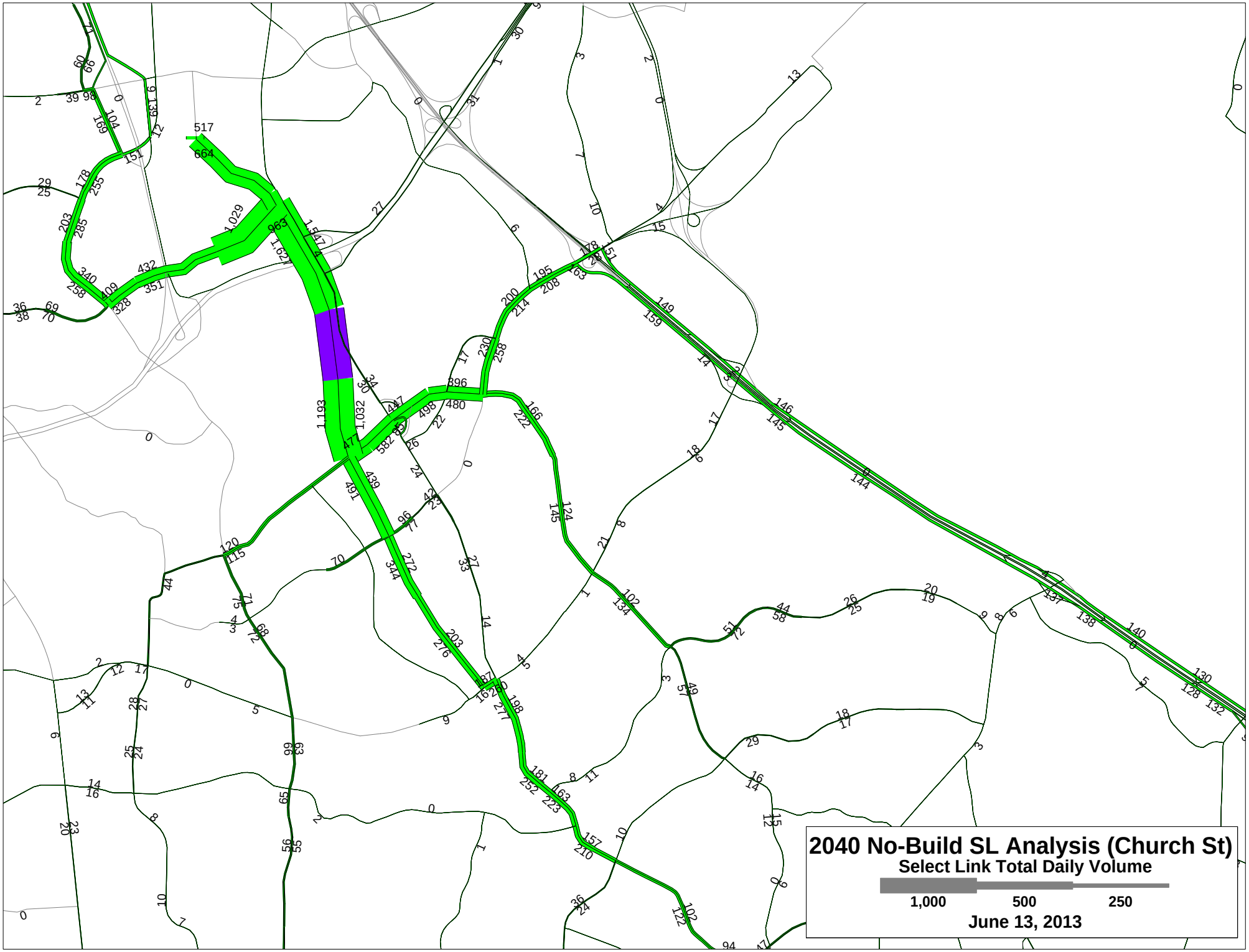

Daily Volume Comparison
2040 Alt 3 < 2040 No-Build
2040 Alt 3 = 2040 No-Build
2040 Alt 3 > 2040 No-Build
Absolute Volume Difference
30,000
15,000
7,500
0
.5
1
1.5
Miles

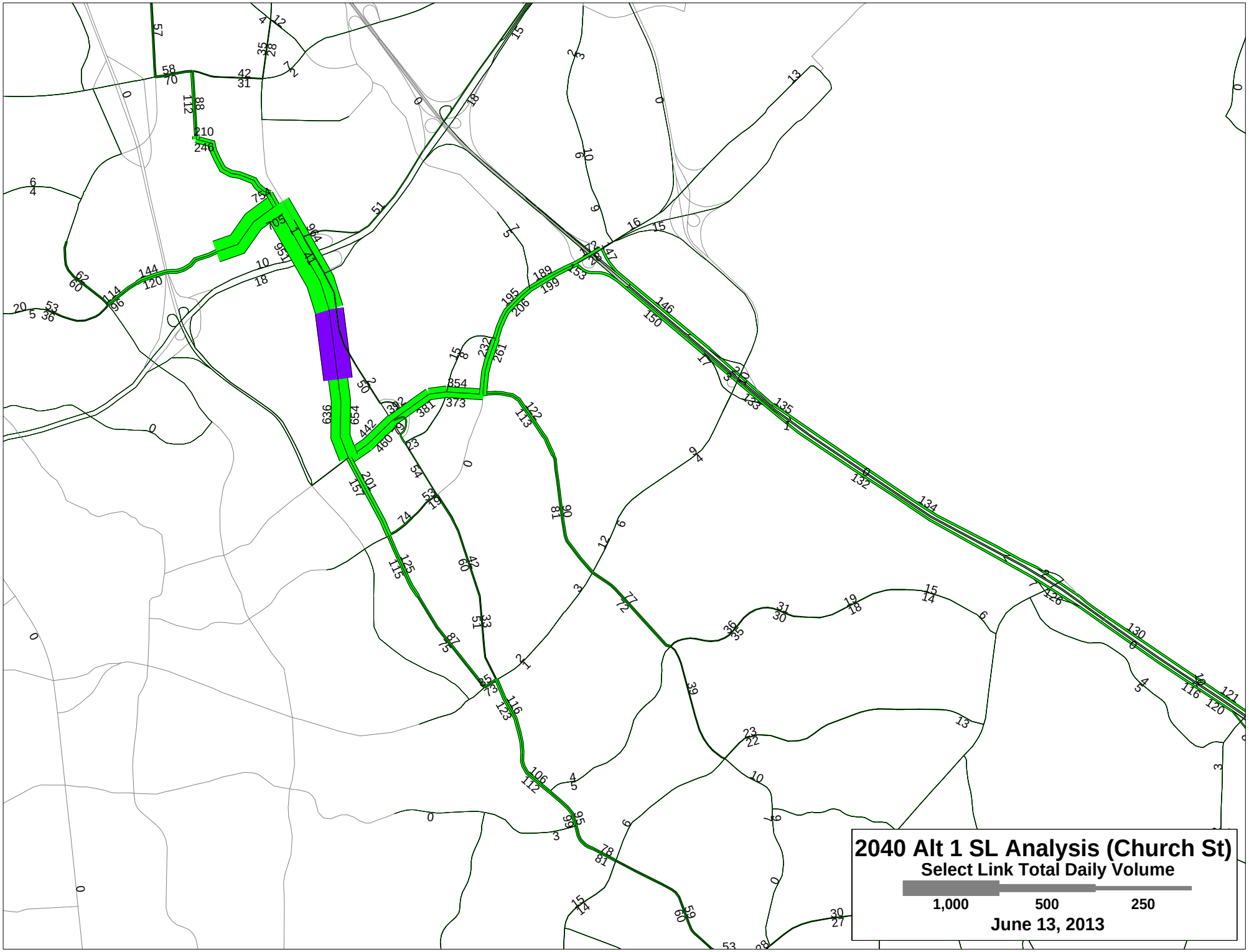

Daily Volume Comparison
2040 Alt 2 < 2040 Alt 1
2040 Alt 2 = 2040 Alt 1
2040 Alt 2 > 2040 Alt 1
Absolute Volume Difference
30,000
15,000
7,500
0
.5
1
1.5
Miles

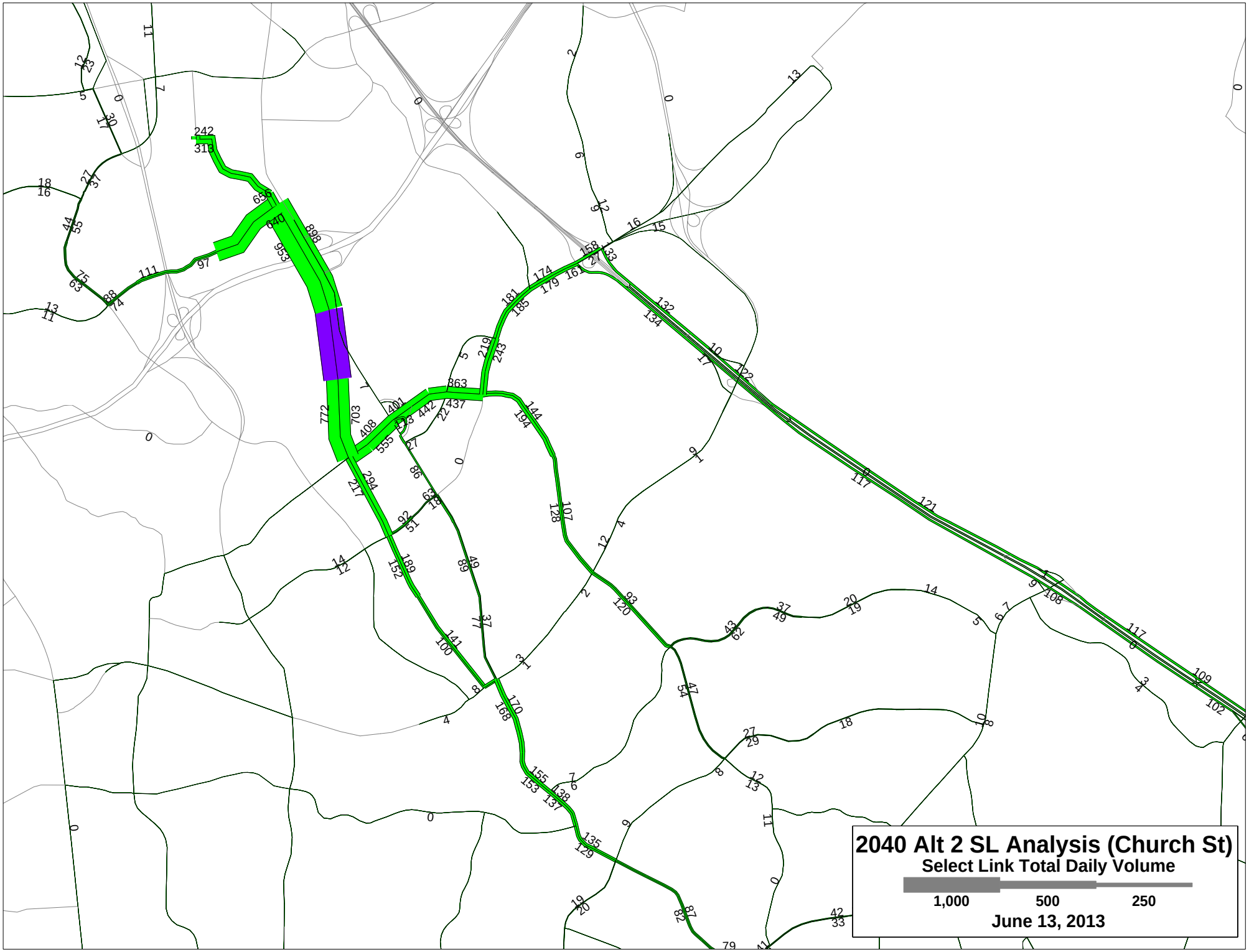

Daily Volume Comparison
2040 Alt 3 < 2040 Alt 1
2040 Alt 3 = 2040 Alt 1
2040 Alt 3 > 2040 Alt 1
Absolute Volume Difference
30,000
15,000
7,500
0
.5
1
1.5
Miles

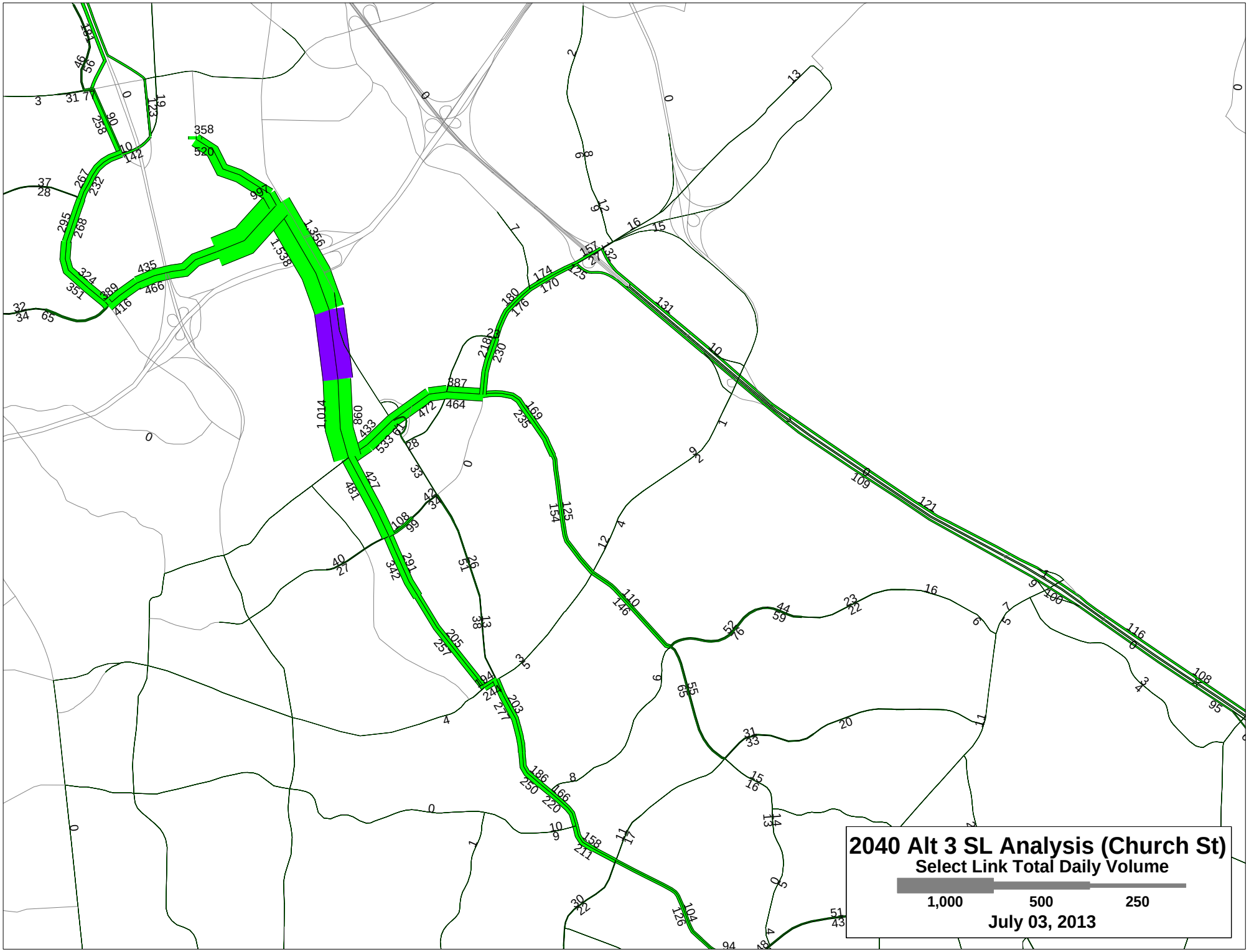

Daily Volume Comparison
2040 Alt 3 < 2040 Alt 2
2040 Alt 3 = 2040 Alt 2
2040 Alt 3 > 2040 Alt 2
Absolute Volume Difference
30,000
15,000
7,500
0
.5
1
1.5
Miles

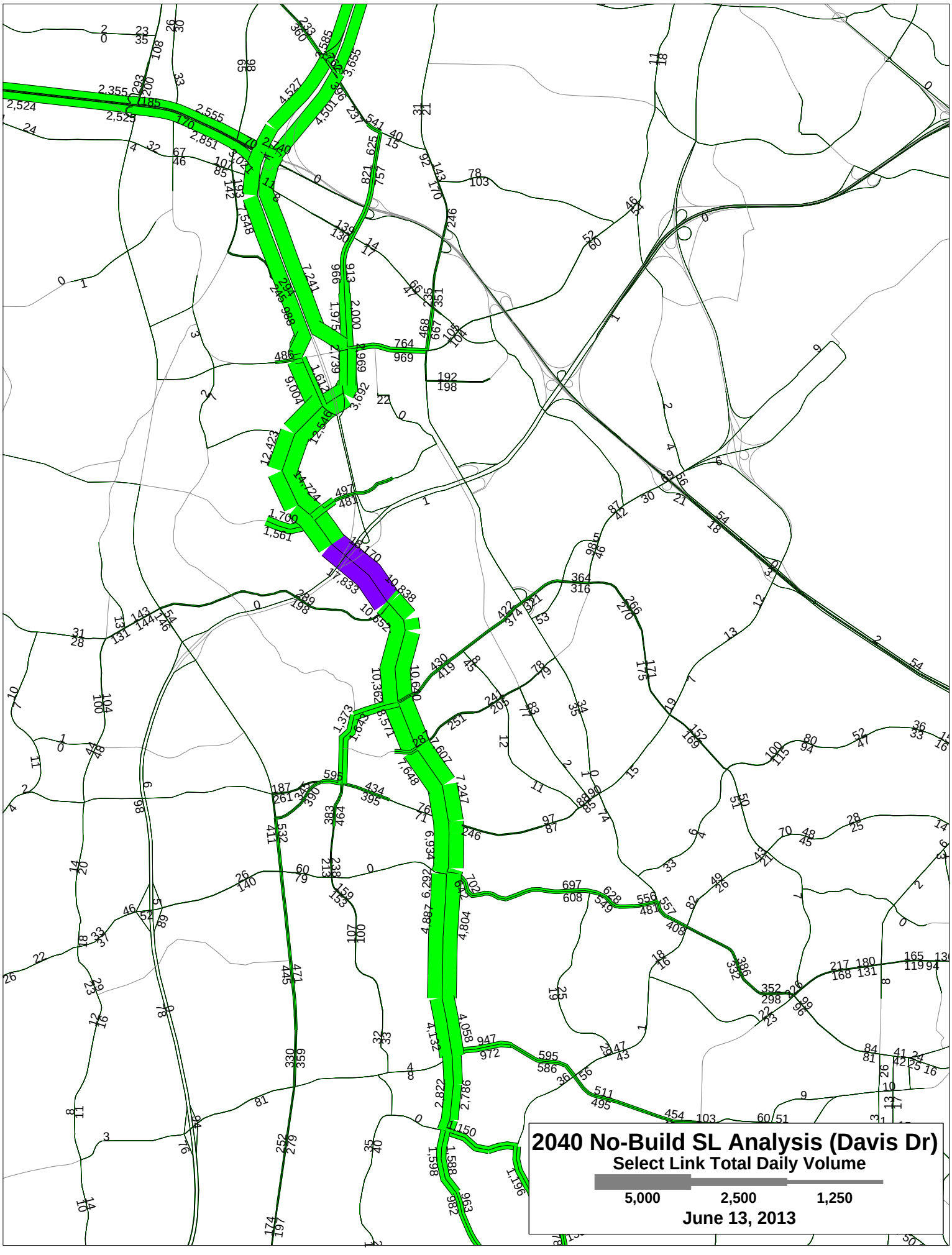
APPENDIX 4 - SELECT LINK ANALYSIS AT VARIOUS ROAD SEGMENTS

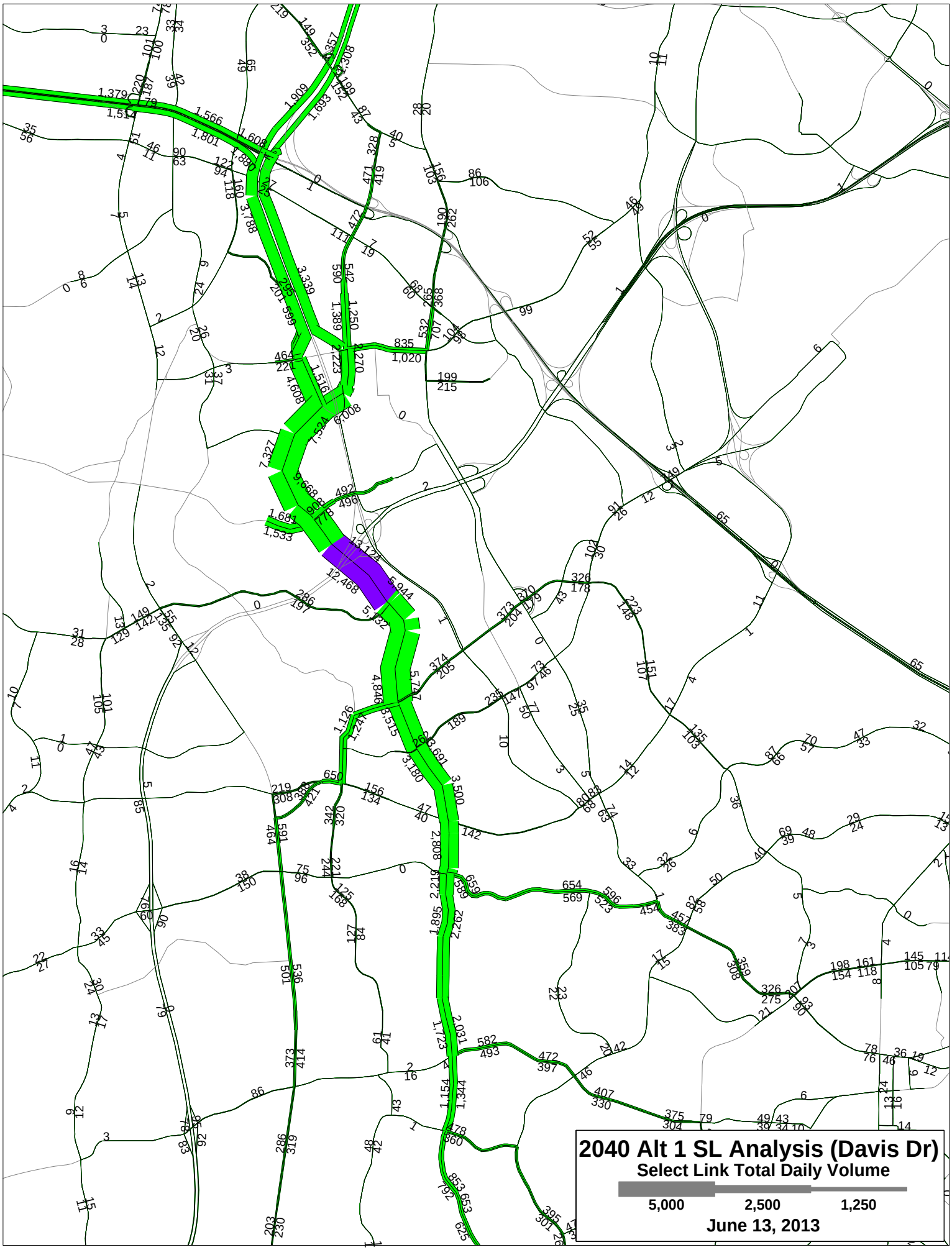

2040 No-Build SL Analysis (Church St)
Select Link Total Daily Volume
1,000
500
250
June 13, 2013


2040 Alt 1 SL Analysis (Church St)
Select Link Total Daily Volume
1,000
500
250
June 13, 2013


2040 Alt 2 SL Analysis (Church St)
Select Link Total Daily Volume
1,000
500
250
June 13, 2013


2040 Alt 3 SL Analysis (Church St)
Select Link Total Daily Volume
1,000
500
250
July 03, 2013


2040 No-Build SL Analysis (Davis Dr)
Select Link Total Daily Volume
5,000
2,500
1,250
June 13, 2013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Select Link Total Daily Volume
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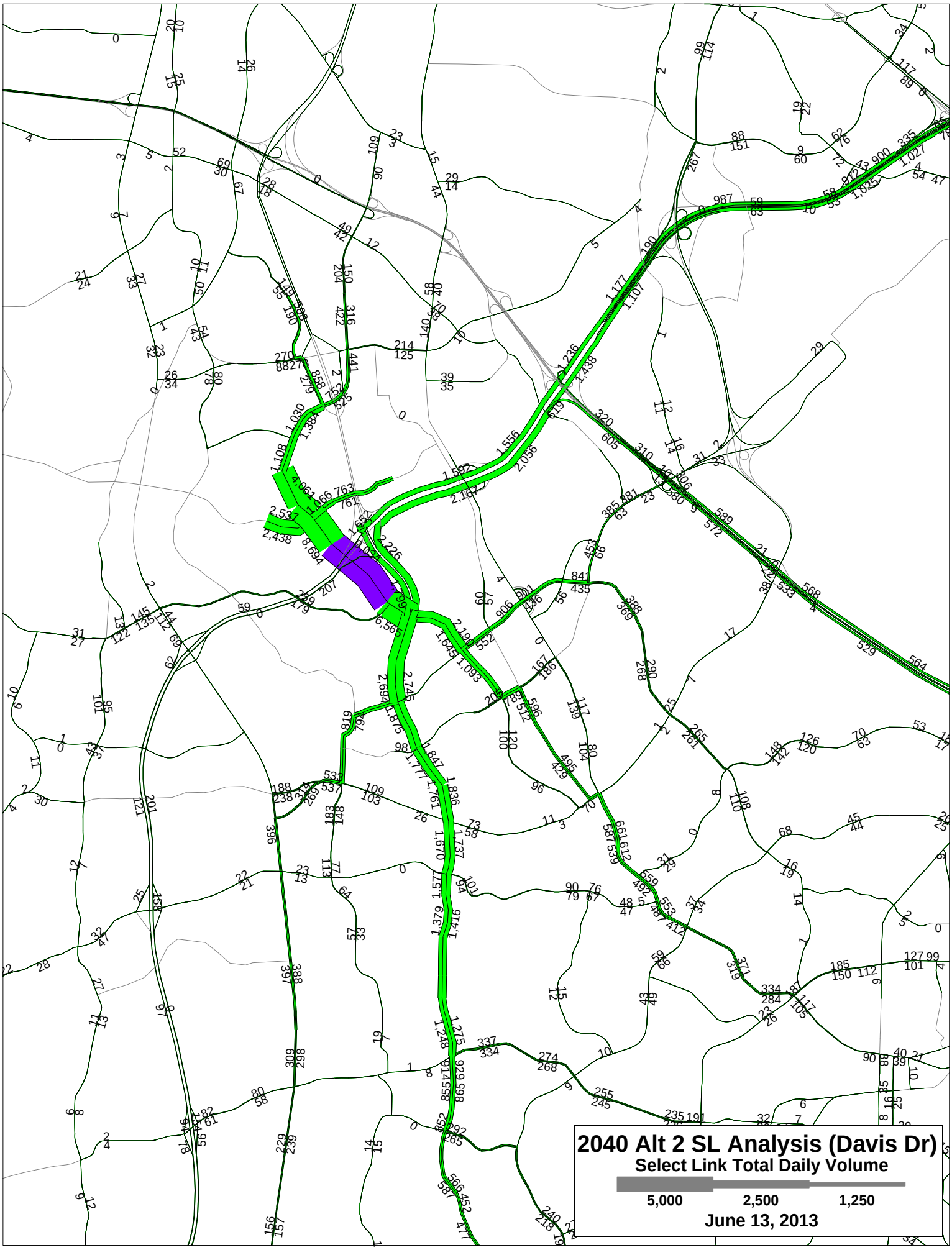
2,500
1,250
June 13, 2013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Select Link Total Daily Volume
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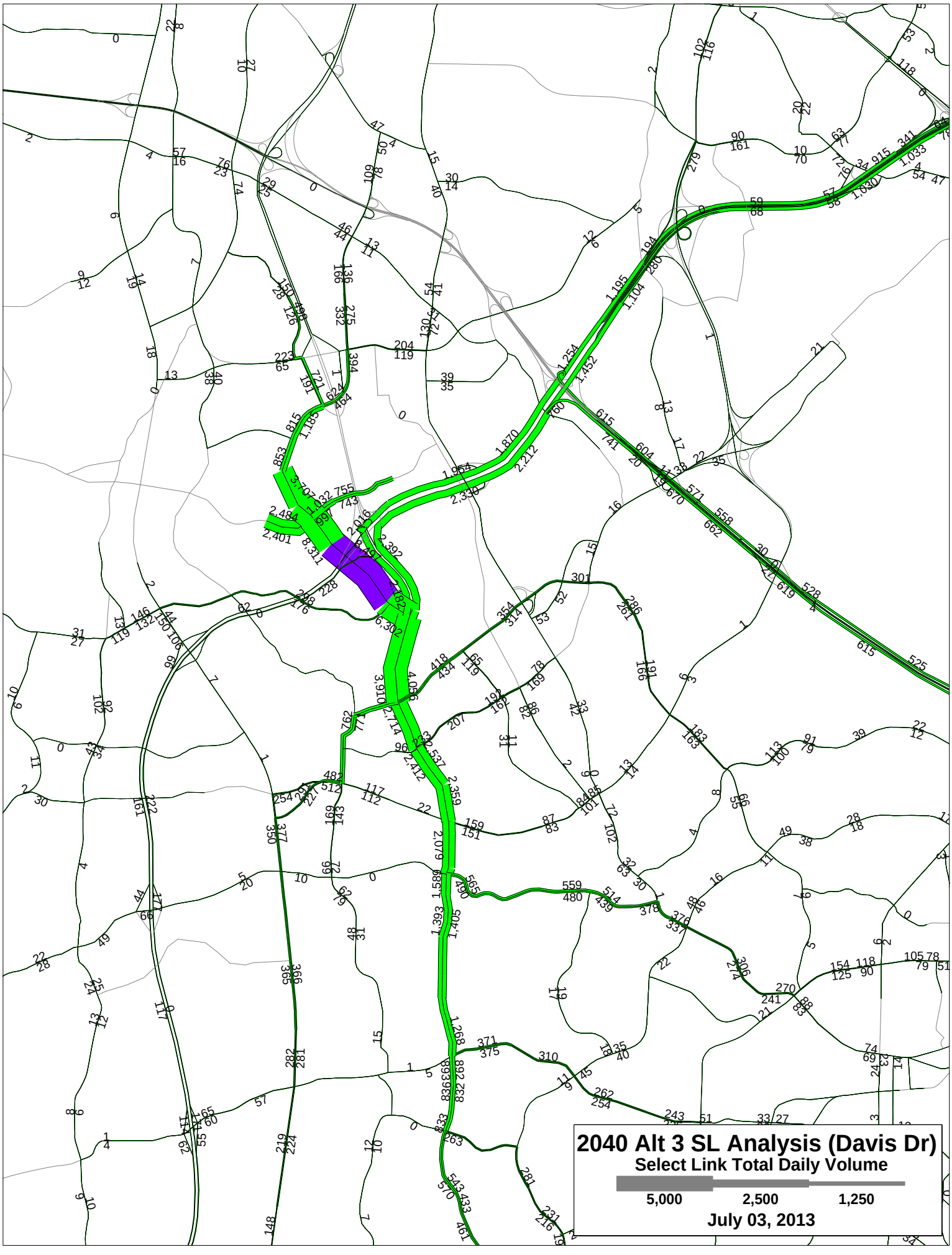
2,500
1,250
June 13, 2013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Select Link Total Daily Volume
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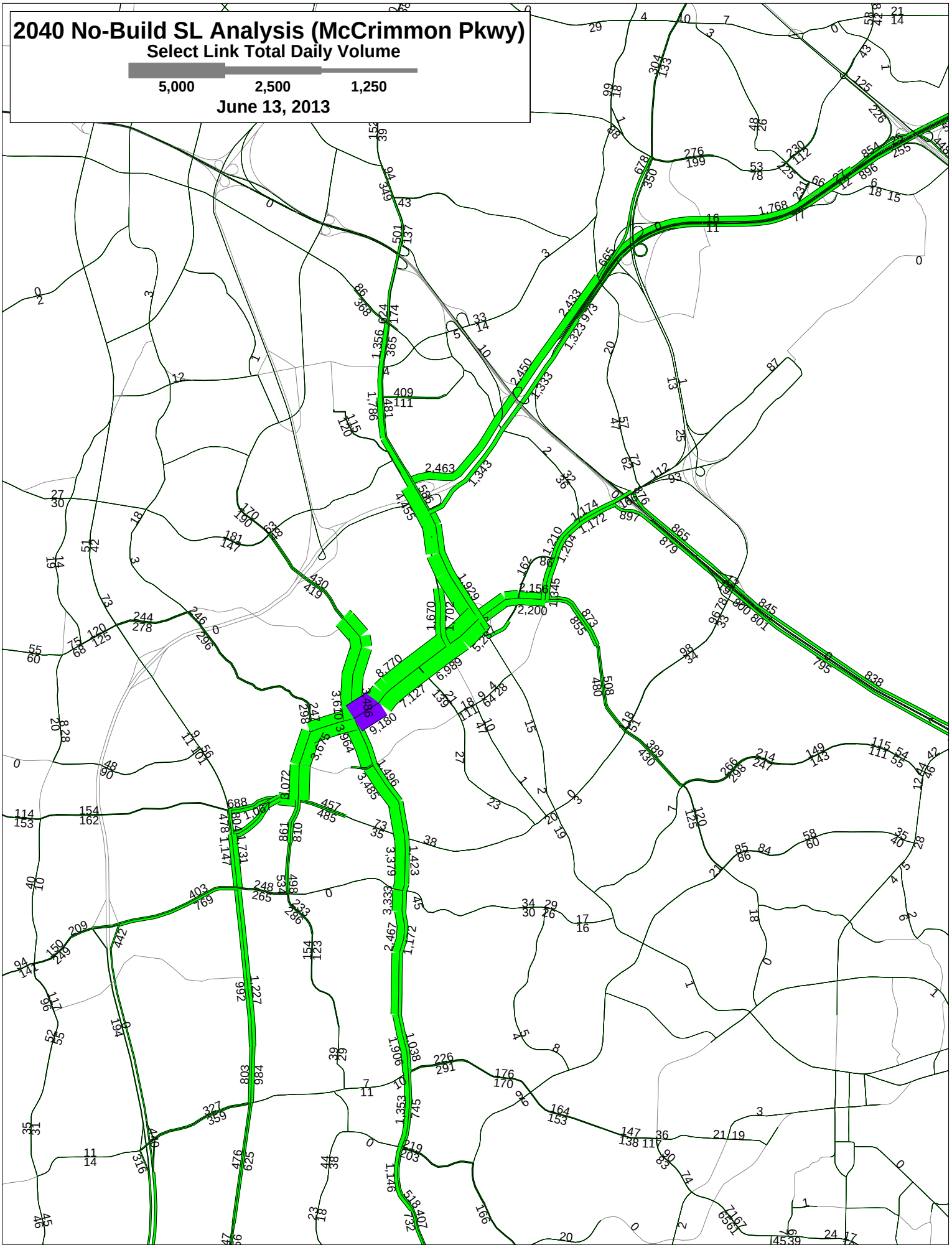
July 03, 2013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Select Link Total Daily Volume
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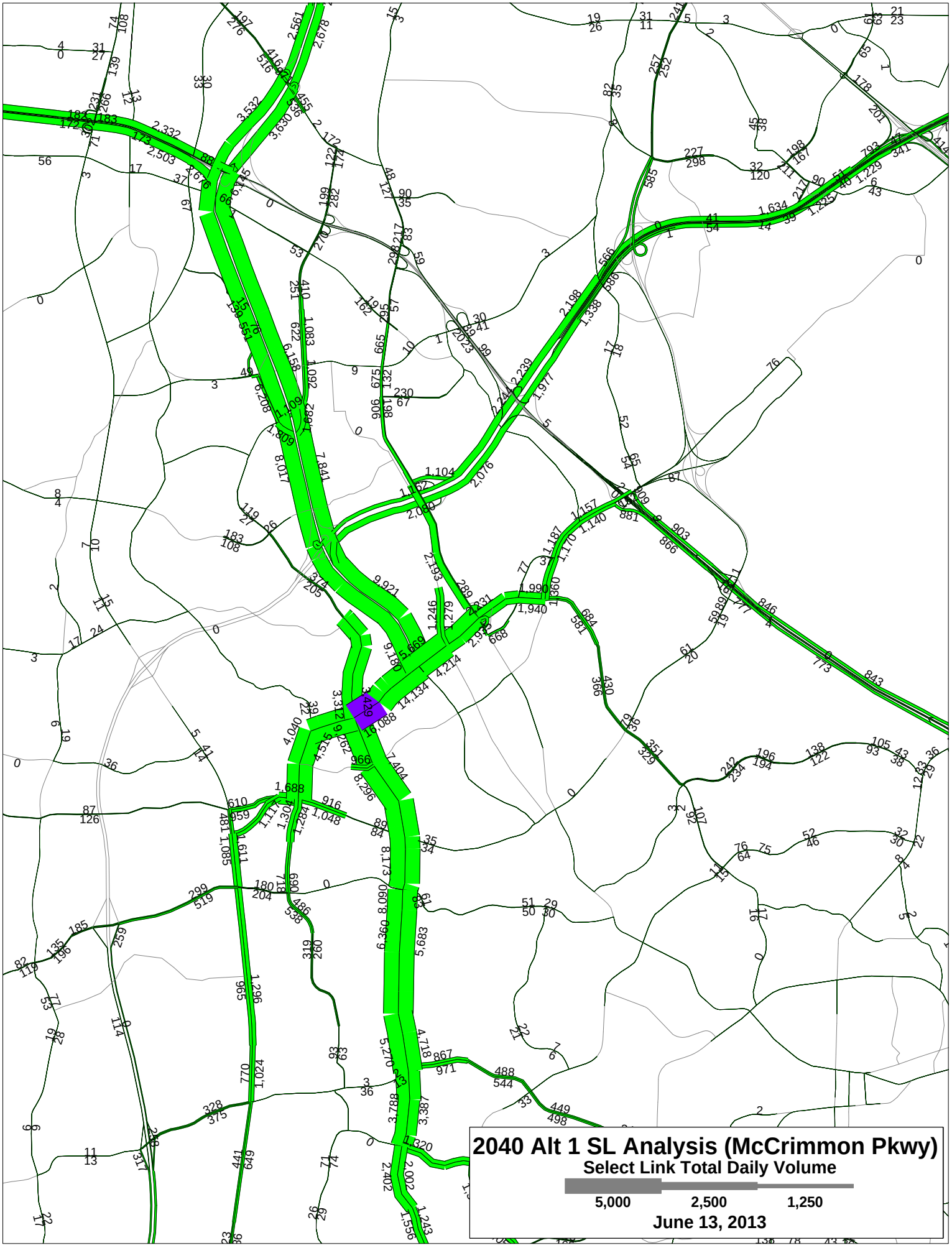
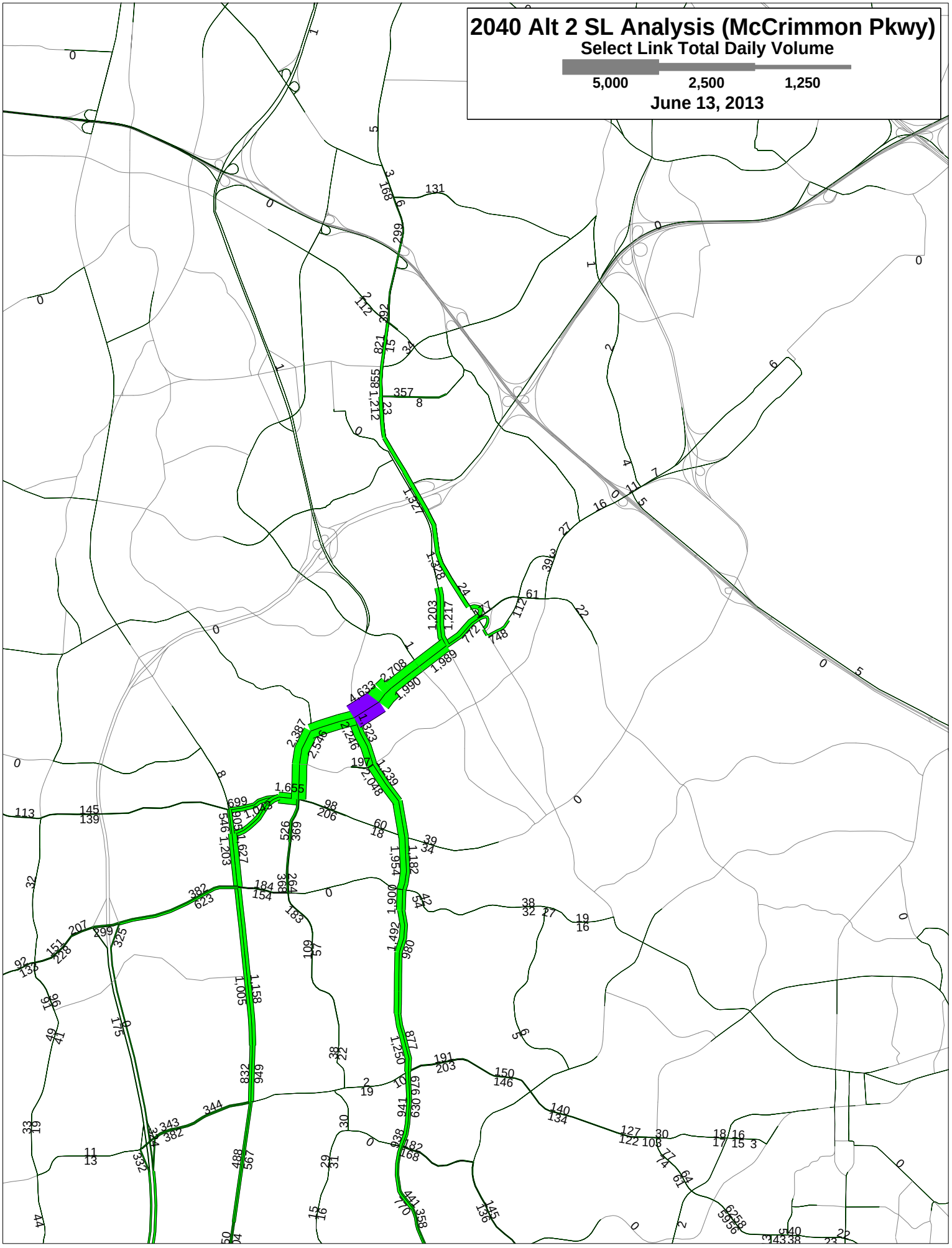
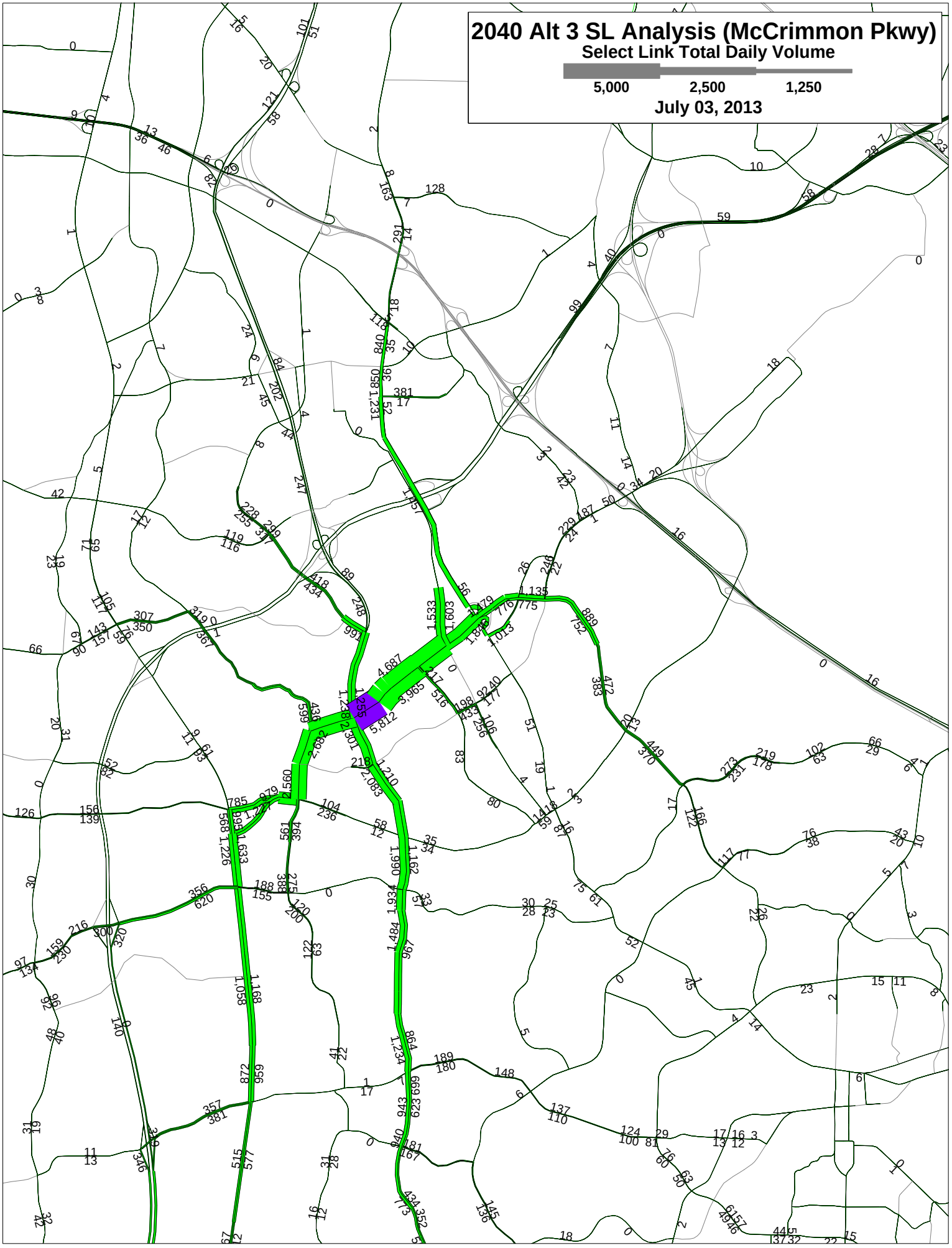
1,250
June 13, 2013


2040 Alt 1 SL Analysis (McCrimmon Pkwy)
Select Link Total Daily Volume
5,000
2,500
1,250
June 13, 2013


2040 Alt 2 SL Analysis (McCrimmon Pkwy)
Select Link Total Daily Volume
5,000
2,500
1,250
June 13, 2013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Select Link Total Daily Volume
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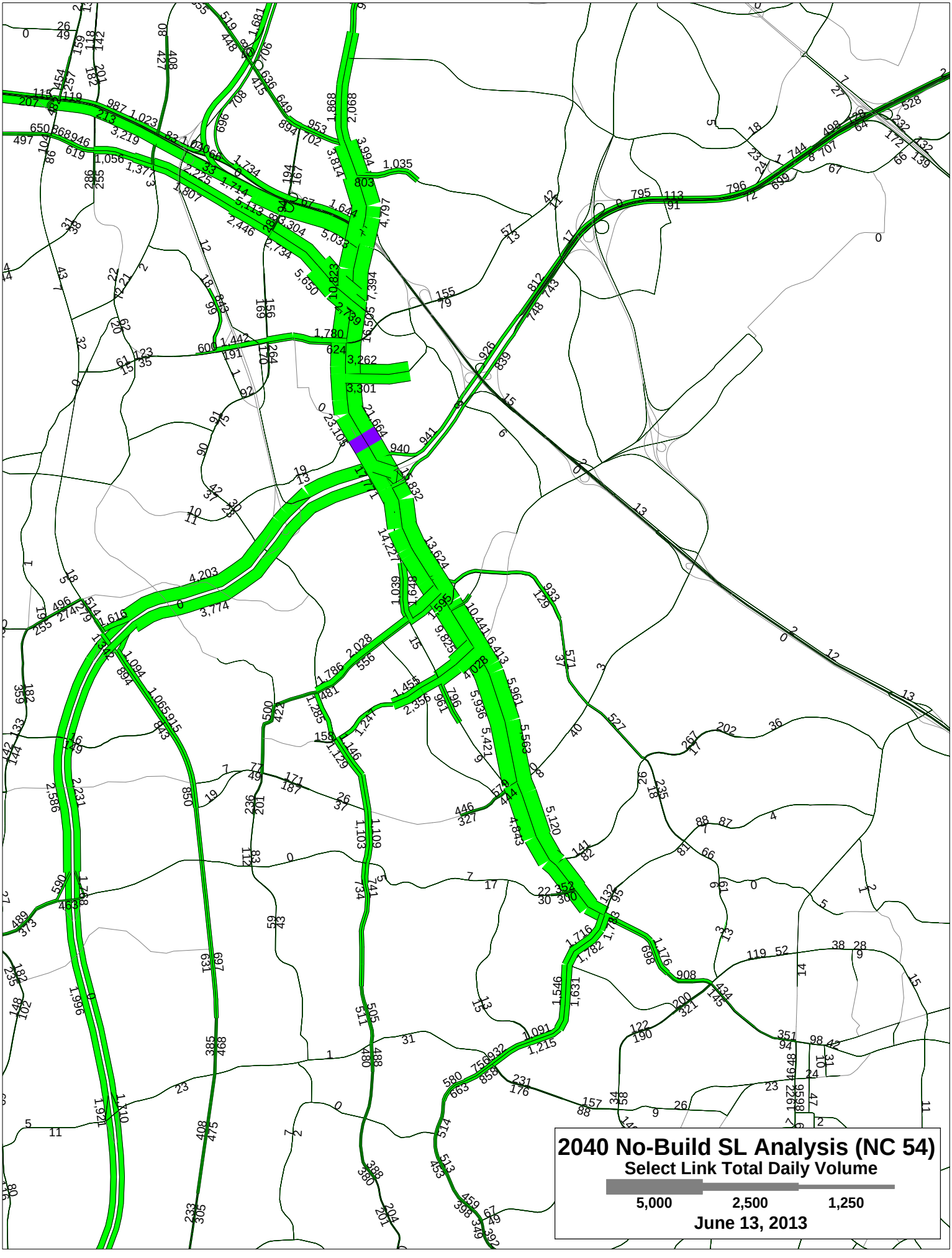
2,500
1,250
July 03, 2013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Select Link Total Daily Volume
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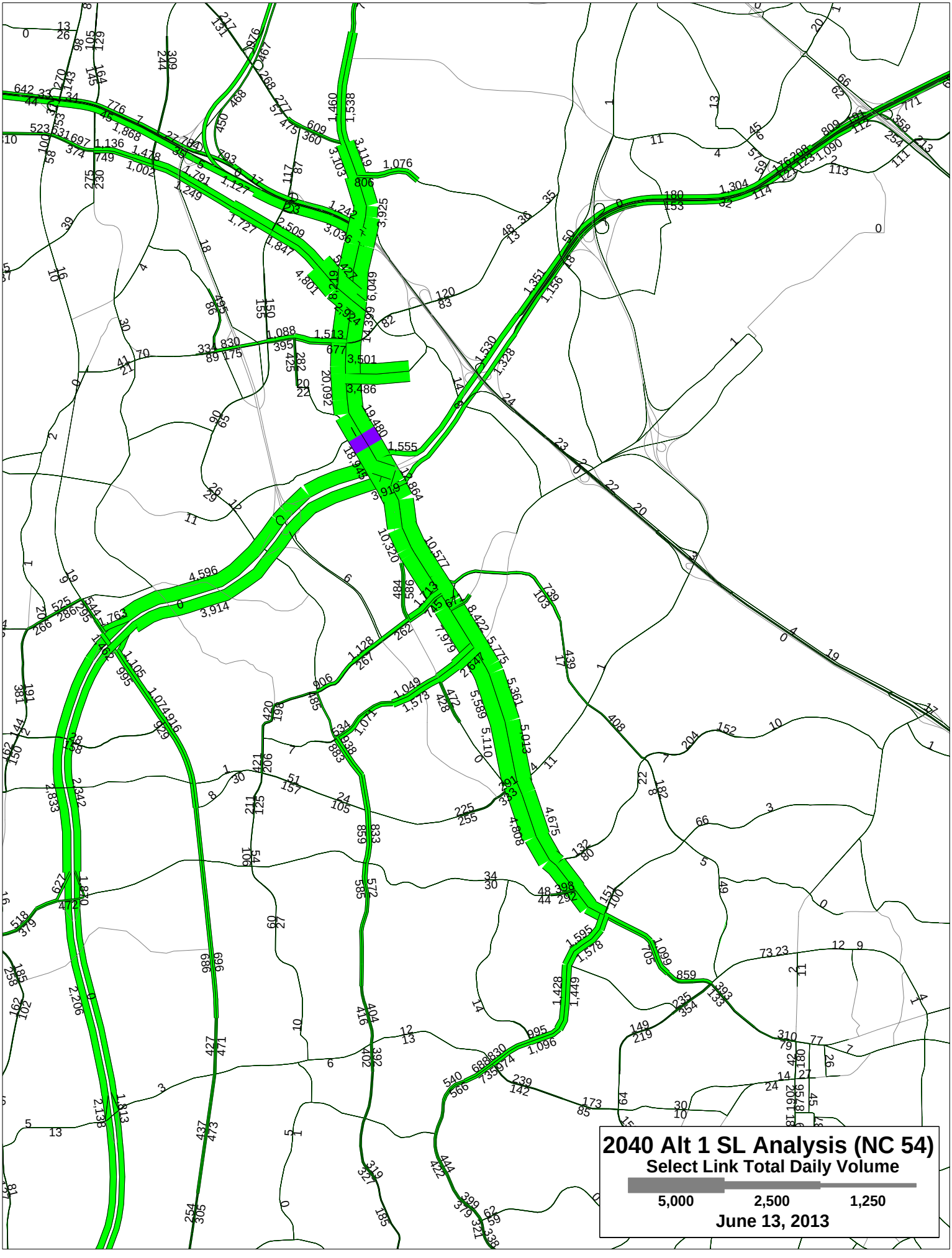
1,250
June 13, 2013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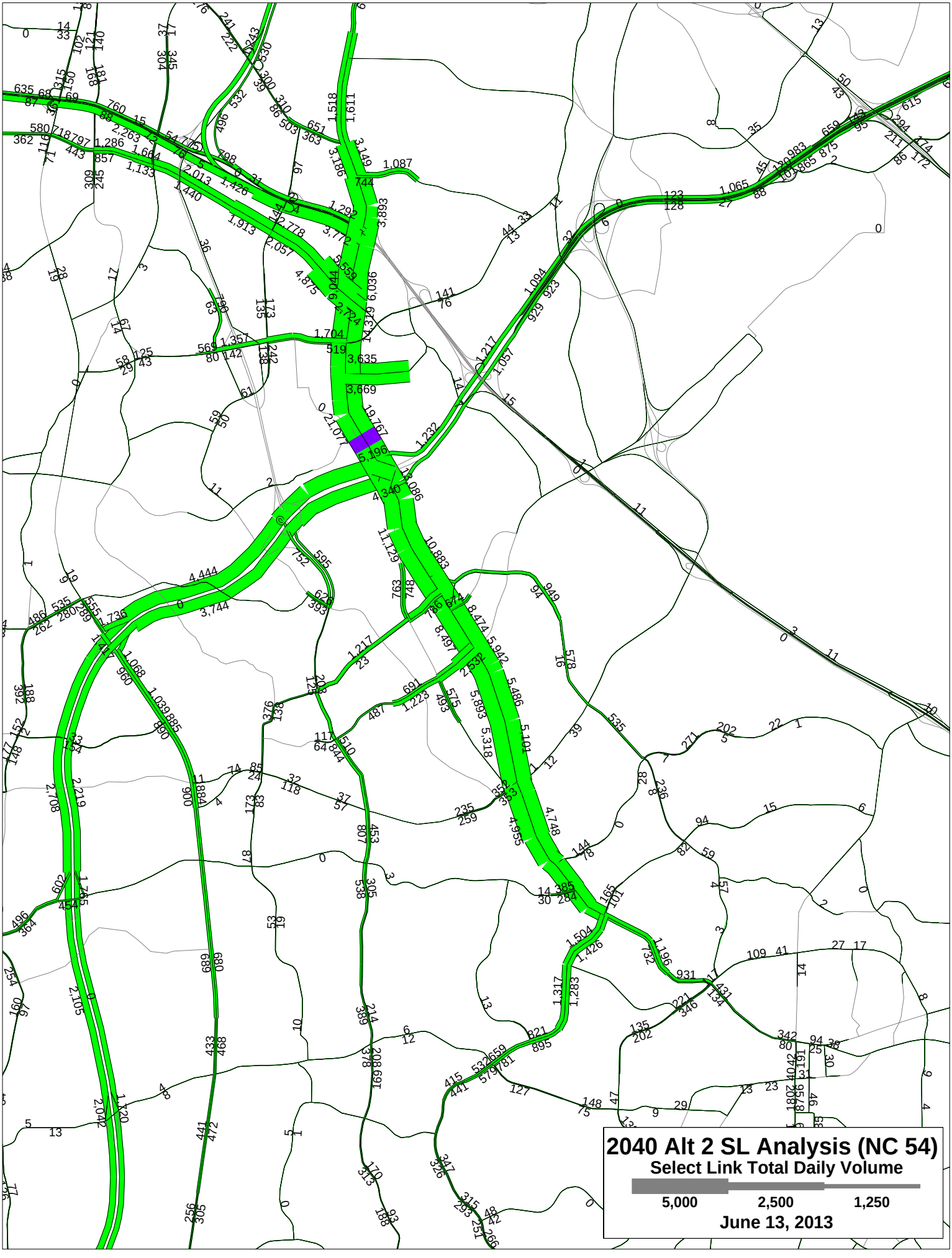
Select Link Total Daily Volume
5,000
2,500
1,250
June 13, 2013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Select Link Total Daily Volume
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2,500
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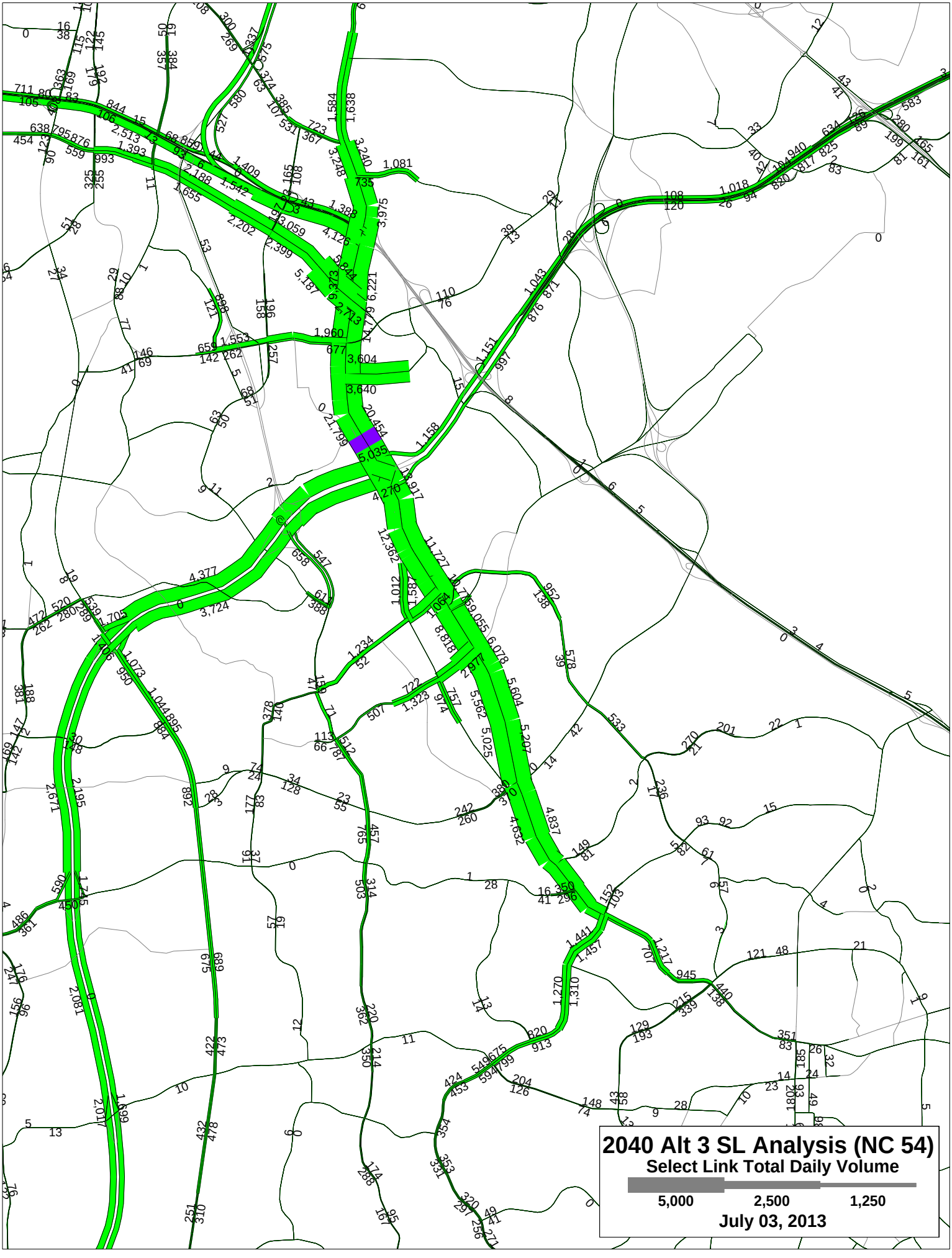
June 13, 2013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Select Link Total Daily Volume
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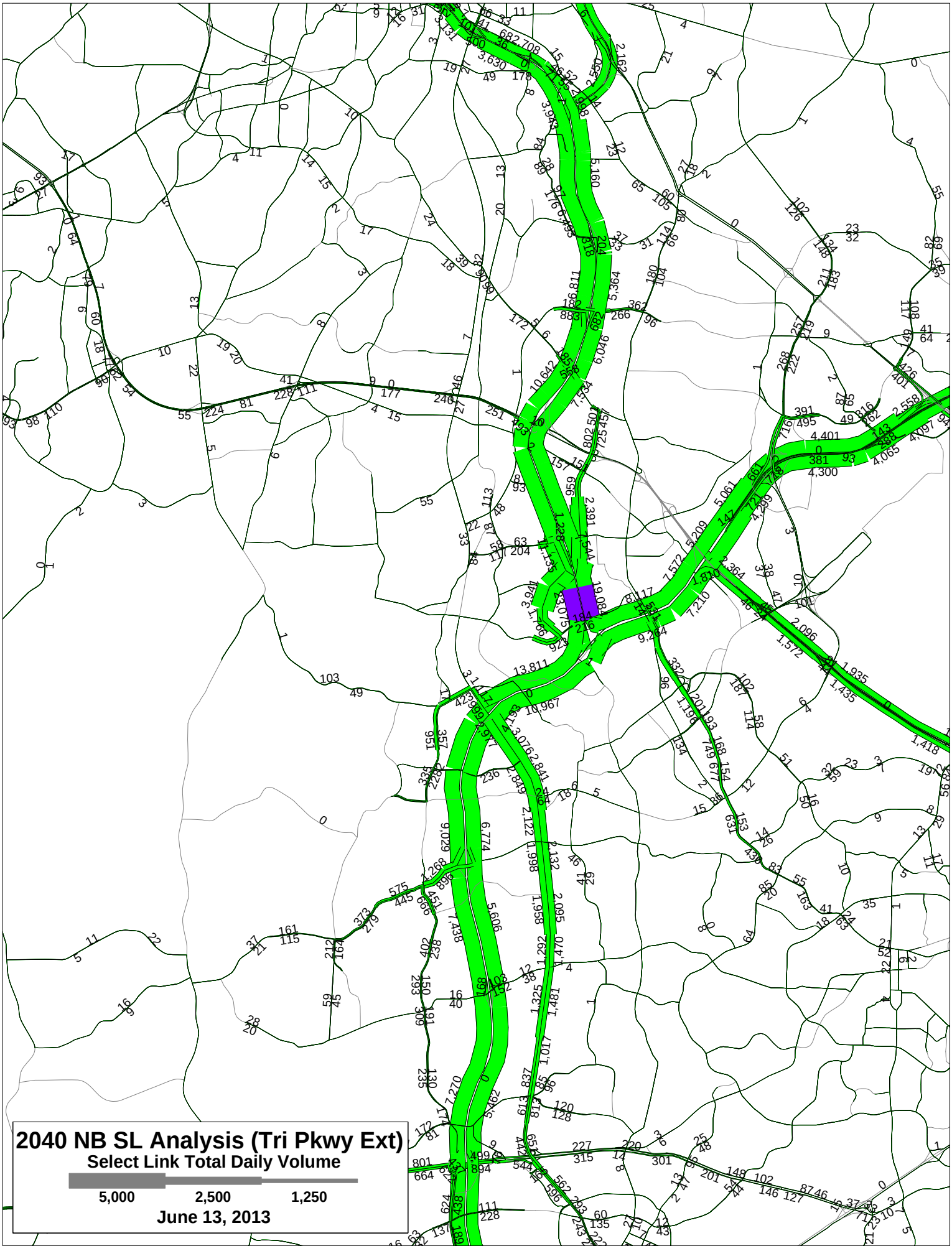
2,500
1,250
July 03, 2013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Select Link Total Daily Volume
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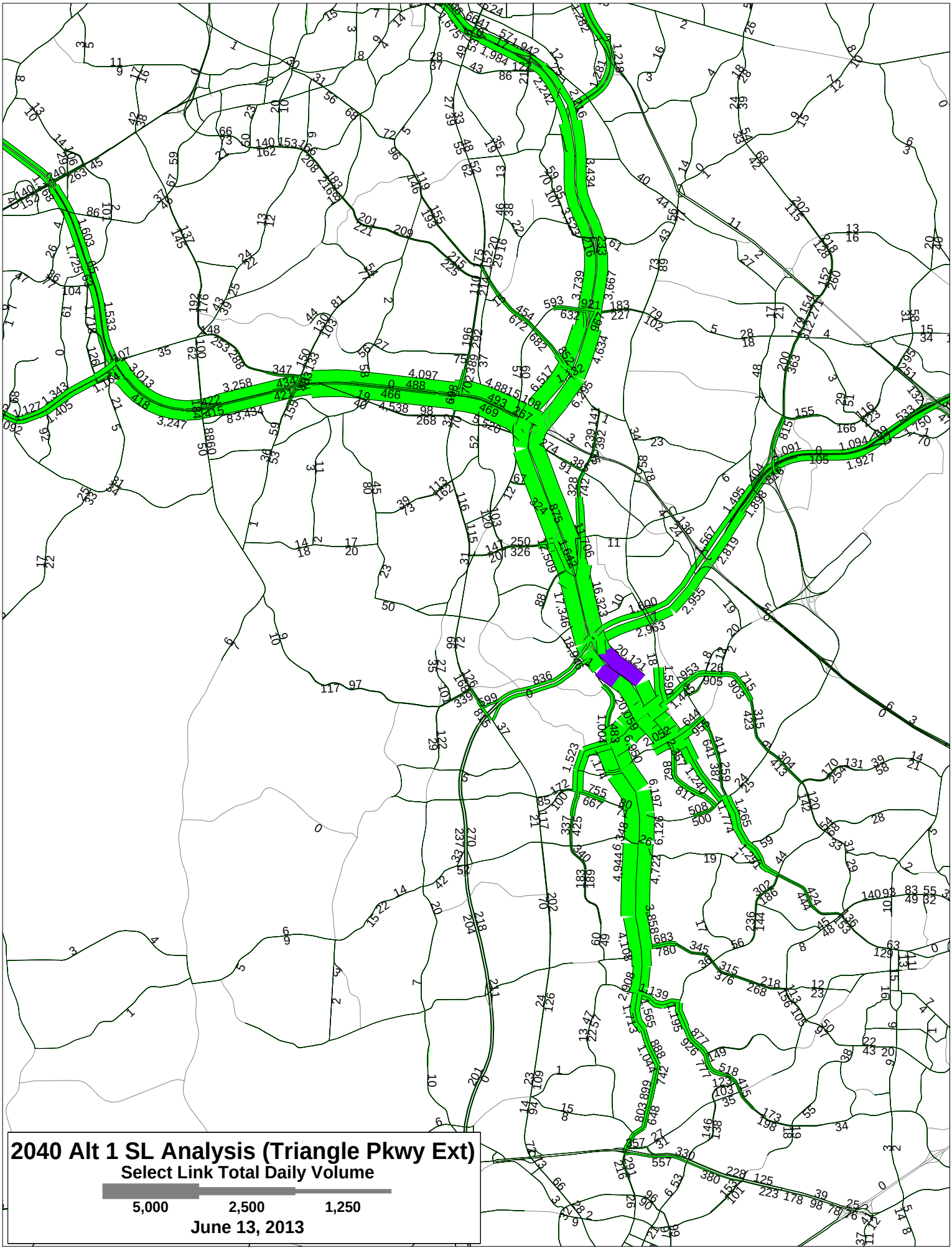
2,500
1,250
June 13, 2013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Select Link Total Daily Volume
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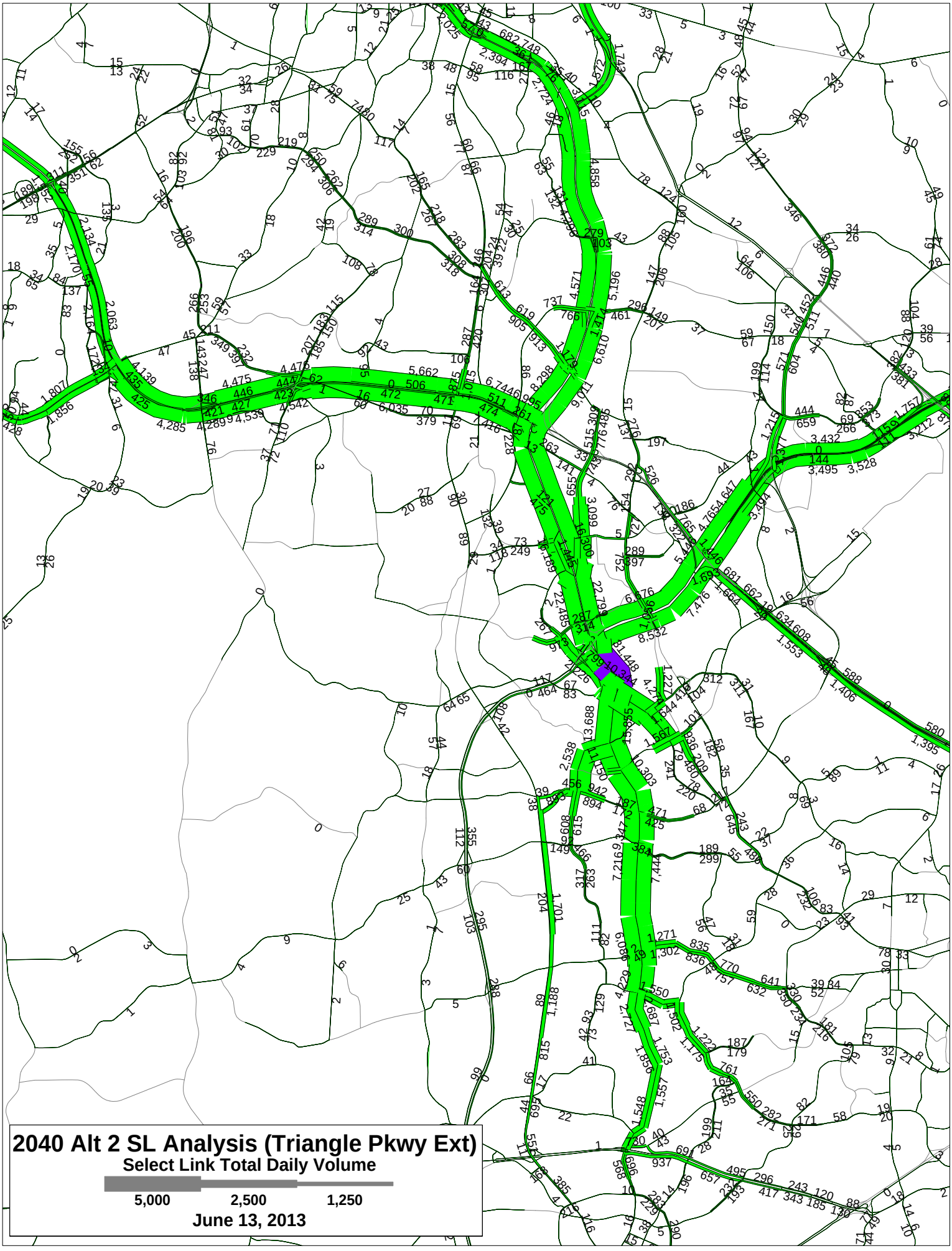
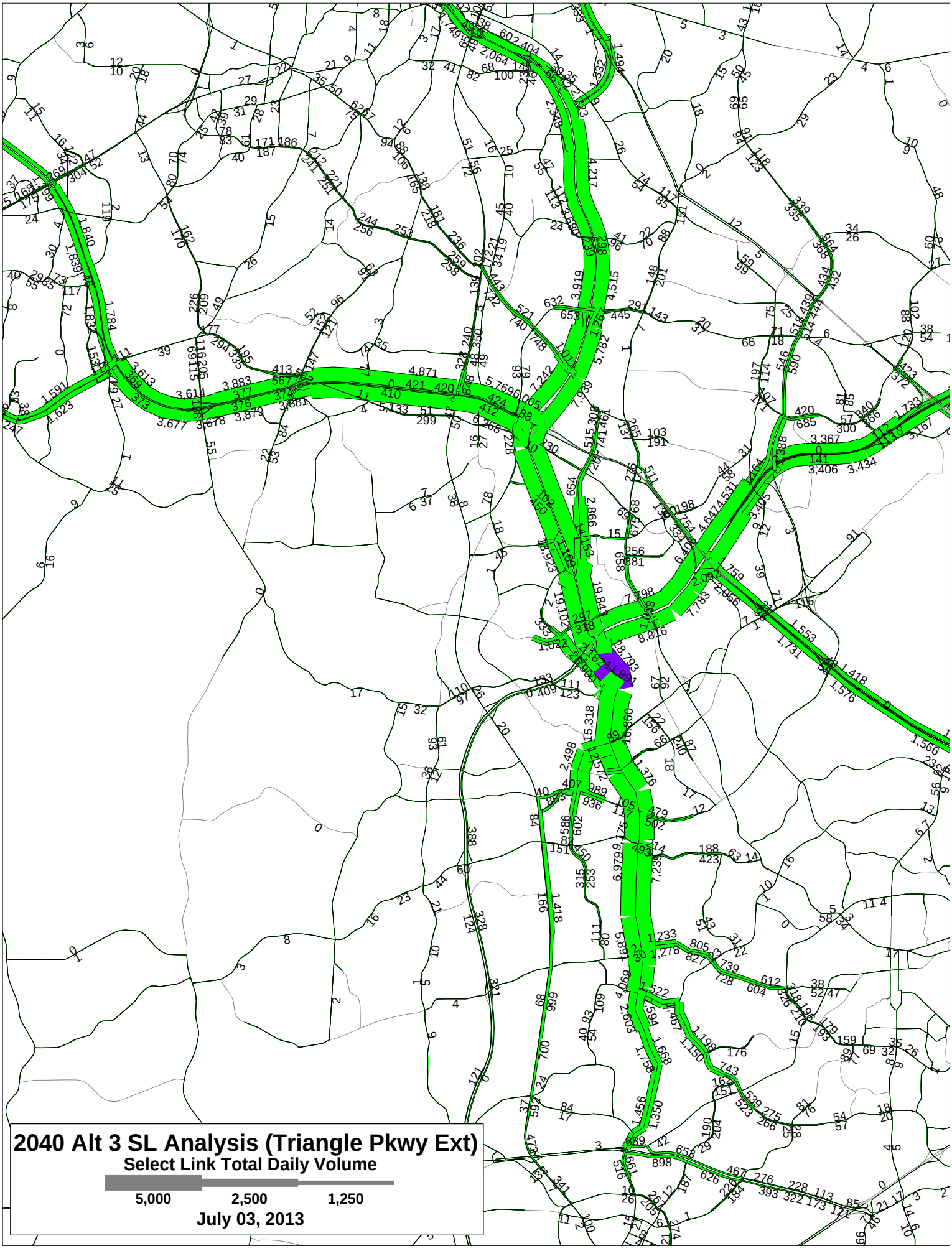
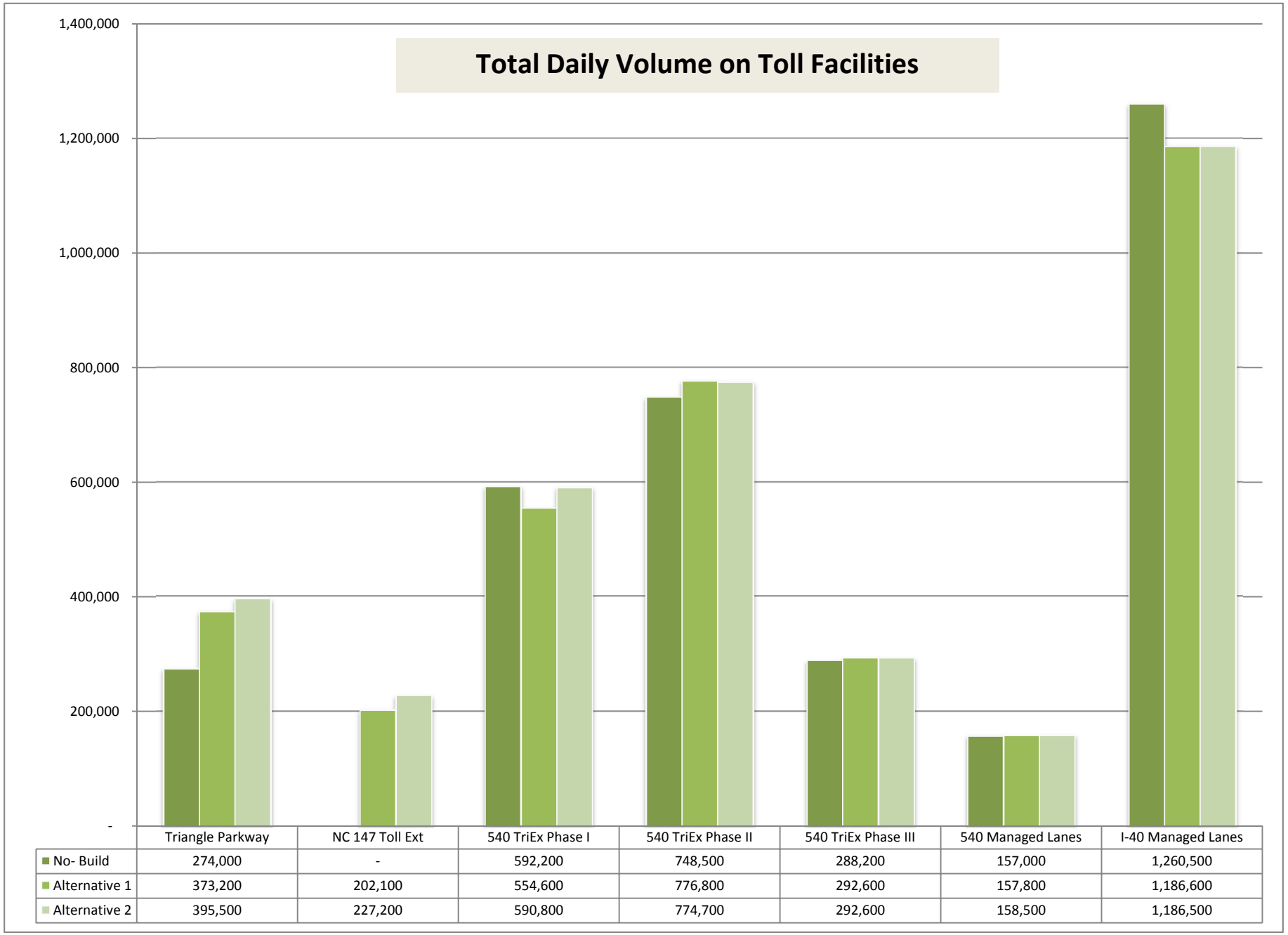
2,500
1,250
June 13, 2013


2040 Alt 2 SL Analysis (Triangle Pkwy Ext)
Select Link Total Daily Volume
5,000
2,500
1,250
June 13, 2013

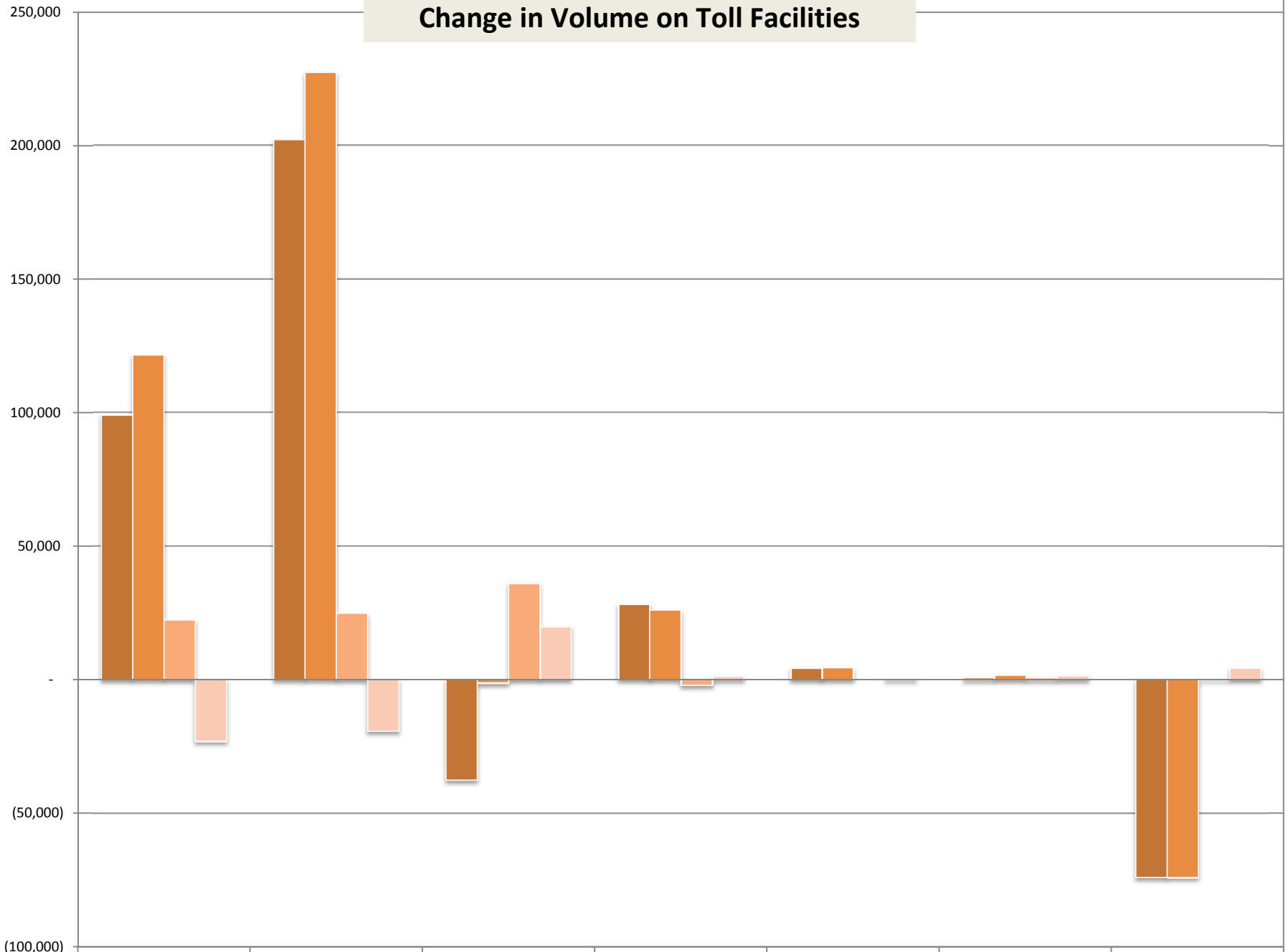

2040 Alt 3 SL Analysis (Triangle Pkwy Ext)
Select Link Total Daily Volume
5,000
2,500
1,250
July 03, 2013

APPENDIX 5 - PERFORMANCE MEASURE SUMMARY BY FACILITY TYPE

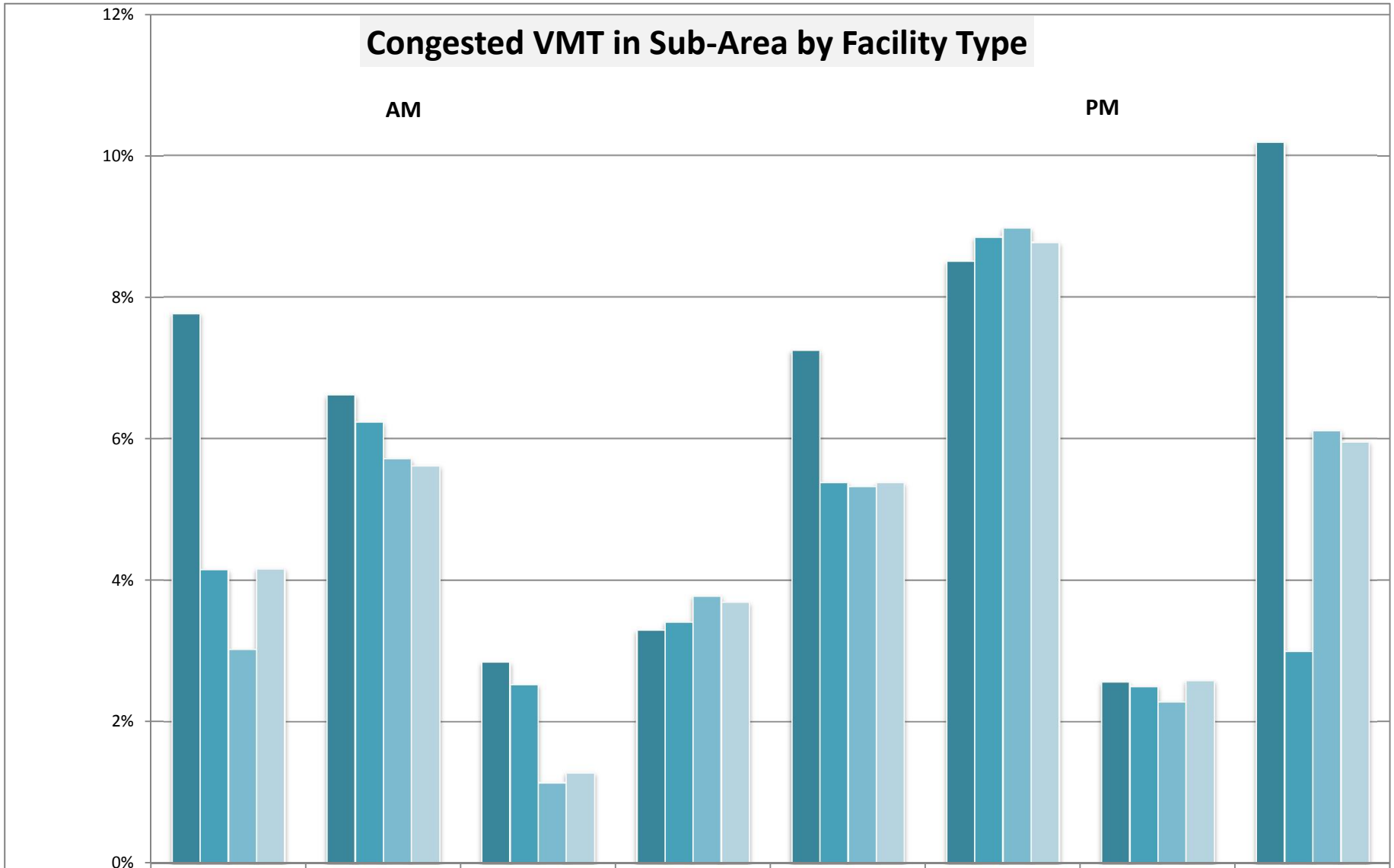


	Triangle Parkway	NC 147 Toll Ext	540 TriEx Phase I	540 TriEx Phase II	540 TriEx Phase III	540 Managed Lanes	I-40 Managed Lanes
No- Build	274,000	-	592,200	748,500	288,200	157,000	1,260,500
Alternative 1	373,200	202,100	554,600	776,800	292,600	157,800	1,186,600
Alternative 2	395,500	227,200	590,800	774,700	292,600	158,500	1,186,500

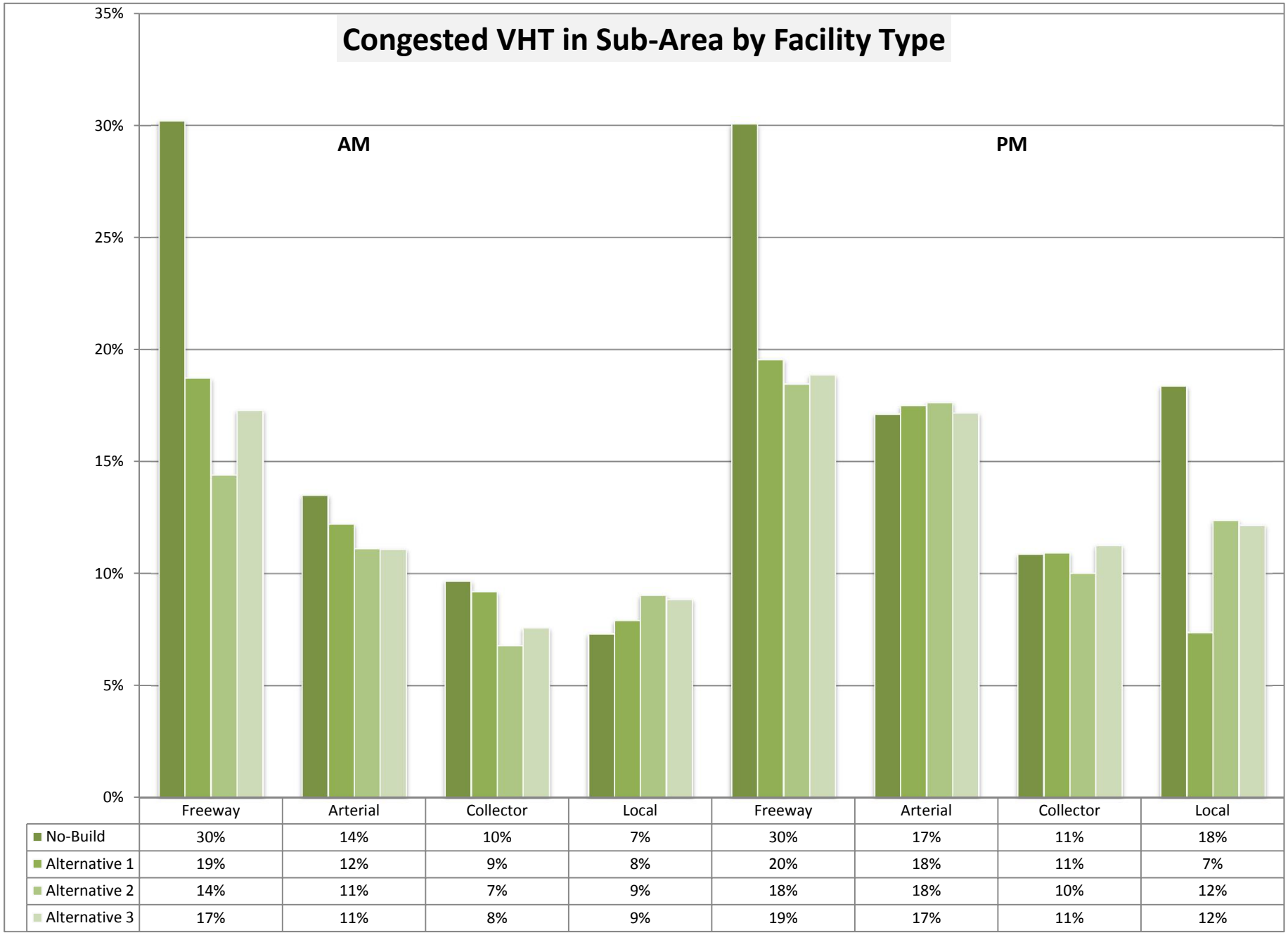
Change in Volume on Toll Facilities



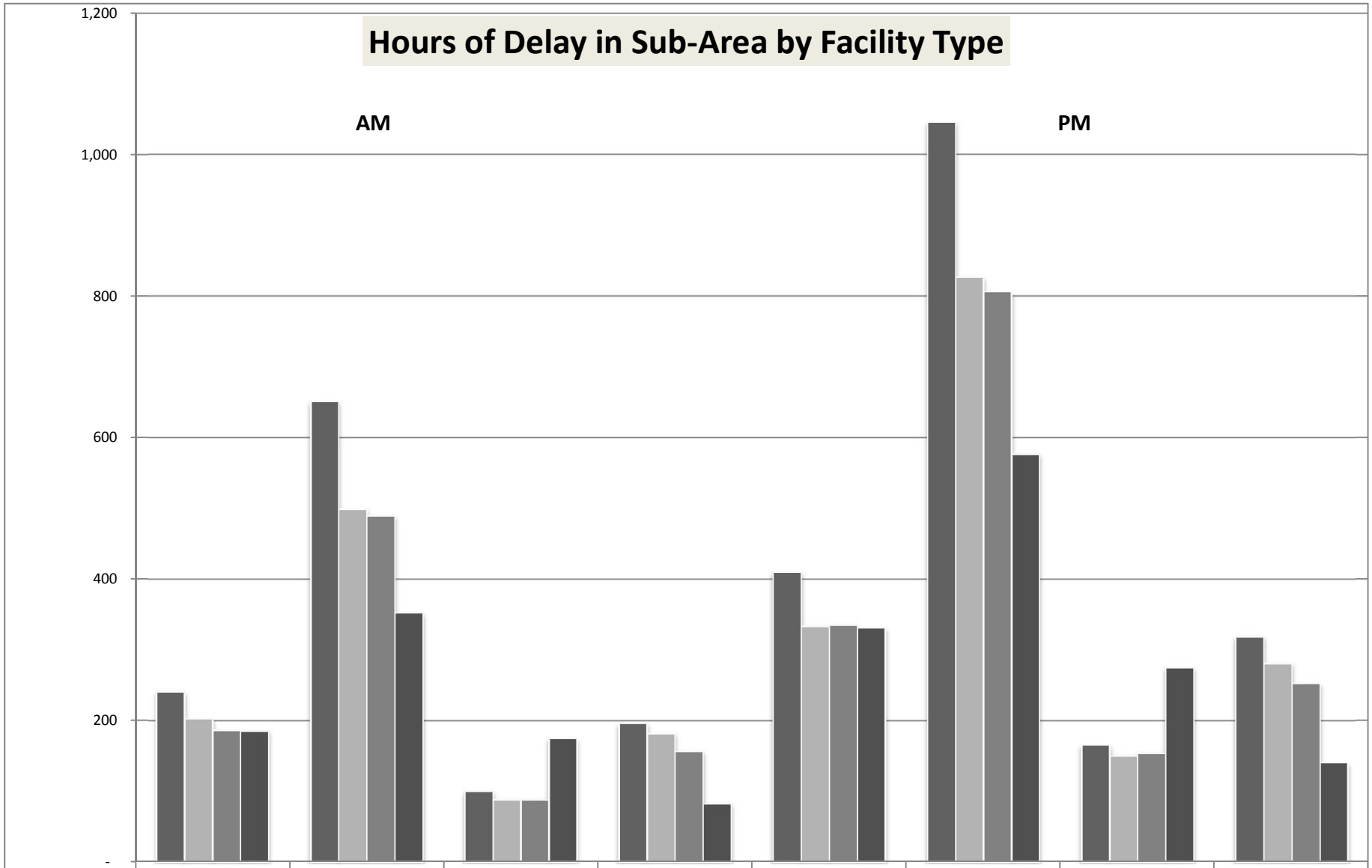
	Triangle Parkway	NC 147 Toll Ext	540 TriEx Phase I	540 TriEx Phase II	540 TriEx Phase III	540 Managed Lanes	I-40 Managed Lanes
Alt 1 - No-Build	99,200	202,100	(37,600)	28,400	4,300	700	(73,900)
Alt 2 - No-Build	121,500	227,200	(1,400)	26,200	4,400	1,500	(74,000)
Alternative 2- Alternative 1	22,300	25,000	36,200	(2,200)	-	700	(100)
Alternative 3- Alternative 2	(23,106)	(19,297)	19,761	1,181	532	1,385	4,131



	Freeway	Arterial	Collector	Local	Freeway	Arterial	Collector	Local
No-Build	8%	7%	3%	3%	7%	9%	3%	10%
Alternative 1	4%	6%	3%	3%	5%	9%	3%	3%
Alternative 2	3%	6%	1%	4%	5%	9%	2%	6%
Alternative 3	4%	6%	1%	4%	5%	9%	3%	6%



	Freeway	Arterial	Collector	Local	Freeway	Arterial	Collector	Local
No-Build	30%	14%	10%	7%	30%	17%	11%	18%
Alternative 1	19%	12%	9%	8%	20%	18%	11%	7%
Alternative 2	14%	11%	7%	9%	18%	18%	10%	12%
Alternative 3	17%	11%	8%	9%	19%	17%	11%	12%



	Freeway	Arterial	Collector	Local	Freeway	Arterial	Collector	Local
No-Build	241	651	101	196	411	1,046	166	319
Alternative 1	203	499	89	182	334	827	151	281
Alternative 2	187	490	89	157	336	807	154	253
Alternative 3	186	353	175	83	331	577	275	141

APPENDIX 6 - PROBABLE COST OF CONSTRUCTION

TIP No. **Func** County: **Wake**

Route Triangle Parkway Ext Alt 1

From 540 to McCrimmon Pkwy

Typical Section

CONSTR. COST
$33,500,000

Prepared By: L. Fisher Date

Requested By: Date

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			Clearing and Grubbing	45.0	Acre	$ 12,000.00	$ 540,000.00
			Borrow Excavation	400,000	CY	$ 5.00	$ 2,000,000.00
			Unclassified Excavation	50,000	CY	$ 7.00	$ 350,000.00
			Drainage (ramps, loops)	1.8	Miles	$ 150,000.00	$ 270,000.00
			Drainage (shoulder)	1.6	Miles	$ 350,000.00	$ 560,000.00
			Drainage (C&G)	0.1	Miles	$ 450,000.00	$ 45,000.00
			Fine Grading	92,419	SY	$ 2.00	$ 184,837.56
			Pavement Widening		SY		$ -
			New Pavement	92,419	SY	$ 42.00	$ 3,881,588.67
			Pavement Resurfacing		SY		$ -
			_._"Average Asphalt Wedging		SY		$ -
			Subgrade Stabilization		SY		$ -
			1'-6" Concrete Curb and Gutter	2,313	LF	$ 10.00	$ 23,130.00
			2'-6" Concrete Curb and Gutter	2,783	LF	$ 14.00	$ 38,962.00
			4" Concrete Sidewalk		SY		$ -
			7" Monolithic Islands		SY		$ -
			Fencing				
			Woven Wire	9,677	LF	$ 6.00	$ 58,062.00
			Chain Link		LF		$ -
			Erosion Control	45.0	Acres	$ 12,000.00	$ 540,000.00
			Signing Interchanges				
			Resigning exist. Trumpet with flyovers to add Half Clover and ramps	1.0	Each	$ 250,000.00	$ 250,000.00
			Guardrail	3,000.0	LF	$ 15.00	$ 45,000.00
			Upgrade Traffic Signal		Each		$ -
			Traffic Signal (New)	1	Each	$ 100,000.00	$ 100,000.00
			Traffic Control	0.6	Miles	$ 75,000.00	$ 45,000.00
			Thermo and Markers	2.9	Miles	$ 16,000.00	$ 46,400.00
			Structures				
			ML / 540 2@ 70'Wx 290'L	40,600.00	SF	$ 160.00	$ 6,496,000.00
			RC Box Culverts				
			1 @10x10-x' Ext-90Skew Triangle Par	200.00	LF	$ 1,600.00	$ 320,000.00
			1 @10x10-x' Ext-90Skew Triangle Par	320.00	LF	$ 1,600.00	$ 512,000.00
			1 @10x10-x' Ext-90Skew Triangle Par	185.00	LF	$ 1,600.00	$ 296,000.00
			1 @10x10-x' Ext-90Skew Triangle Par	115	LF	$ 1,600.00	$ 184,000.00
			1 @10x10-x' Ext-90Skew Triangle Par	115	LF	$ 1,600.00	$ 184,000.00
			Mainline Toll Plaza	4	EA	$ 1,500,000.00	$ 6,000,000.00
			Utility Construction				
			Relocate Existing Water Line		LF		$ -
			Relocate Existing Sewer Line		LF		$ -
			Misc. & Mob (15% Strs&Util)				$ 2,098,800.00
			Misc. & Mob (45% Functional)				$ 4,040,091.10

Lgth ___ Miles

		Roadway
Contract Cost ……..	$ 29,108,871.32	
E. & C. 15% ……..	$ 4,366,330.70	$ 4,366,330.70
Construction Cost ……..	**$ 33,475,202.02**	
SAY	**$ 33,500,000.00**	

Roadway	
	$ 8,977,980.22
Strs & Util	
	$ 13,992,000.00
	$ 2,098,800.00
	$ 4,040,091.10

TIP No. **Func** County: **Wake**

Route Triangle Parkway Ext Alt 2

From 540 to Davis Drive (Including Davis Drive Realignment and Tower Hall Extension)

CONSTR. COST
$38,200,000

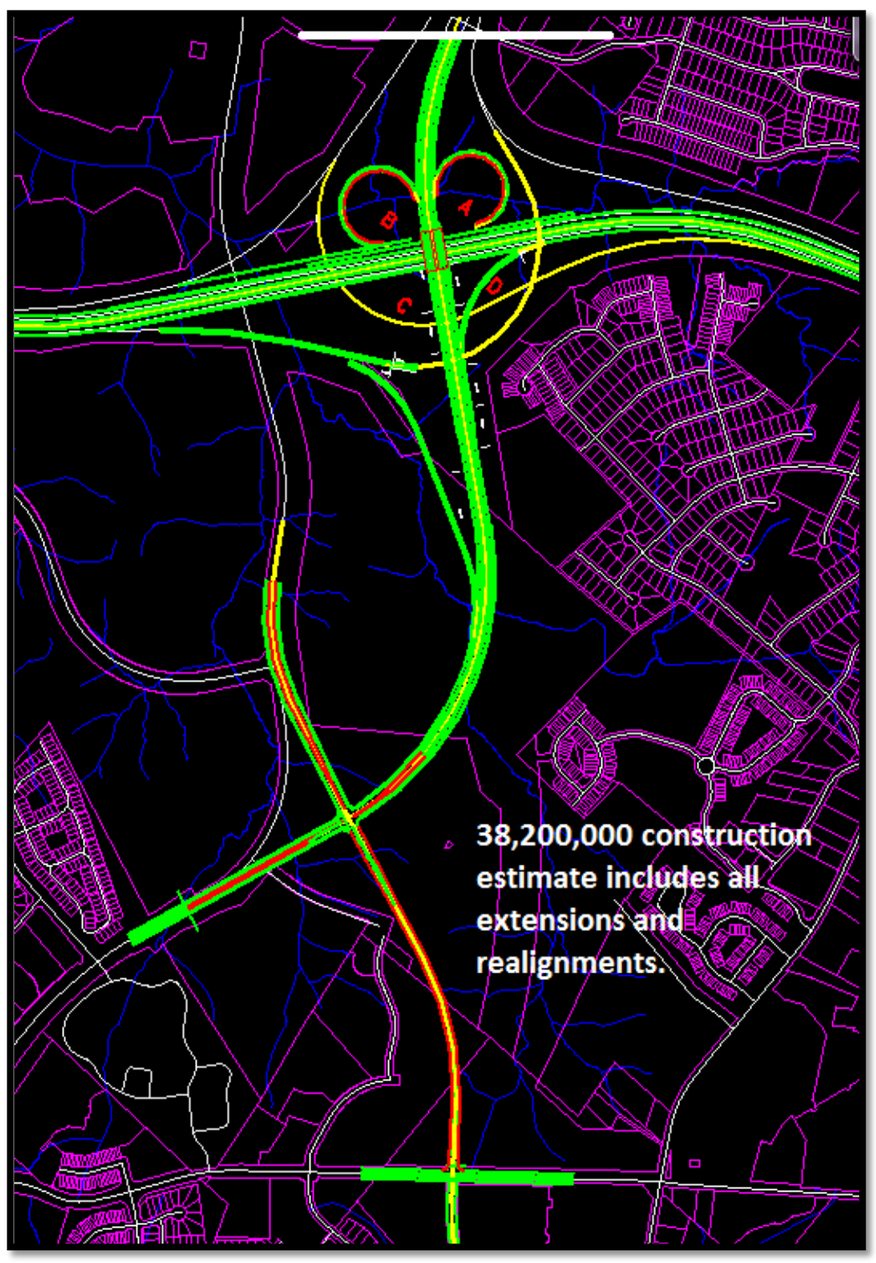
Prepared By: L. Fisher Date

Requested By: Date

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			Clearing and Grubbing	51.0	Acre	$ 12,000.00	$ 612,000.00
			Borrow Excavation	500,000	CY	$ 5.00	$ 2,500,000.00
			Unclassified Excavation	75,000	CY	$ 7.00	$ 525,000.00
			Drainage (Ramps, loops)	1.8	Miles	$ 150,000.00	$ 270,000.00
			Drainage (Shoulder)	1.7	Miles	$ 350,000.00	$ 595,000.00
			Drainage (C&G)	0.6	Miles	$ 450,000.00	$ 270,000.00
			Fine Grading	120,321	SY	$ 2.00	$ 240,641.33
			Pavement Widening		SY		$ -
			New Pavement	120,321	SY	$ 42.00	$ 5,053,468.00
			Pavement Resurfacing		SY		$ -
			_._"Average Asphalt Wedging		SY		$ -
			Subgrade Stabilization		SY		$ -
			1'-6" Concrete Curb and Gutter	7,421	LF	$ 10.00	$ 74,210.00
			2'-6" Concrete Curb and Gutter	7,684	LF	$ 14.00	$ 107,576.00
			4" Concrete Sidewalk		SY		$ -
			7" Monolithic Islands		SY		$ -
			Fencing				
			Woven Wire	9,677	LF	$ 6.00	$ 58,062.00
			Chain Link		LF		$ -
			Erosion Control	51.0	Acres	$ 12,000.00	$ 612,000.00
			Signing Interchanges				
			Resigning exist. Trumpet with flyovers to add Half Clover and ramps	1.0	Each	$ 250,000.00	$ 250,000.00
			Guardrail	3,000	LF	$ 15.00	$ 45,000.00
			Upgrade Traffic Signal		Each		$ -
			Traffic Signal (New)	2	Each	$ 100,000.00	$ 200,000.00
			Traffic Control	1.3	Miles	$ 75,000.00	$ 97,500.00
			Thermo and Markers	3.3	Miles	$ 16,000.00	$ 52,800.00
			Structures				
			ML / 540 2@ 70'Wx 290'L	40,600.00	SF	$ 160.00	$ 6,496,000.00
			RC Box Culverts				
			1 @10x10-x' Ext-90Skew Triangle Parkway	200.00	LF	$ 1,600.00	$ 320,000.00
			2 @10x10-x' Ext-90Skew Triangle Parkway	320.00	LF	$ 1,600.00	$ 512,000.00
			3 @10x10-x' Ext-90Skew Triangle Parkway	185.00	LF	$ 1,600.00	$ 296,000.00
			1@10x10-x' Ext-90Skew Davis Dr	140	LF	$ 1,600.00	$ 224,000.00
			1@10x10-x' Ext-90Skew Davis Dr	160	LF	$ 1,600.00	$ 256,000.00
			1 @10x10-x' Ext-90Skew Town Hall	120	LF	$ 1,600.00	$ 192,000.00
			Mainline Toll Plaza	4	EA	$ 1,500,000.00	$ 6,000,000.00
			Utility Construction				
			Relocate Existing Water Line		LF		$ -
			Relocate Existing Sewer Line		LF		$ -
			Misc. & Mob (15% Strs&Util)				$ 2,144,400.00
			Misc. & Mob (45% Functional)				$ 5,203,465.80

Lgth ___ Miles

Contract Cost	$ 33,207,123.13
E. & C. 15%	$ 4,981,068.47
Construction Cost	**$ 38,188,191.60**
SAY	**$ 38,200,000.00**



TIP No. **Func** County: **Wake**

Triangle Parkway Ext Alt 2
Partial Est. - Realignment of Davis Drive

Typical Section

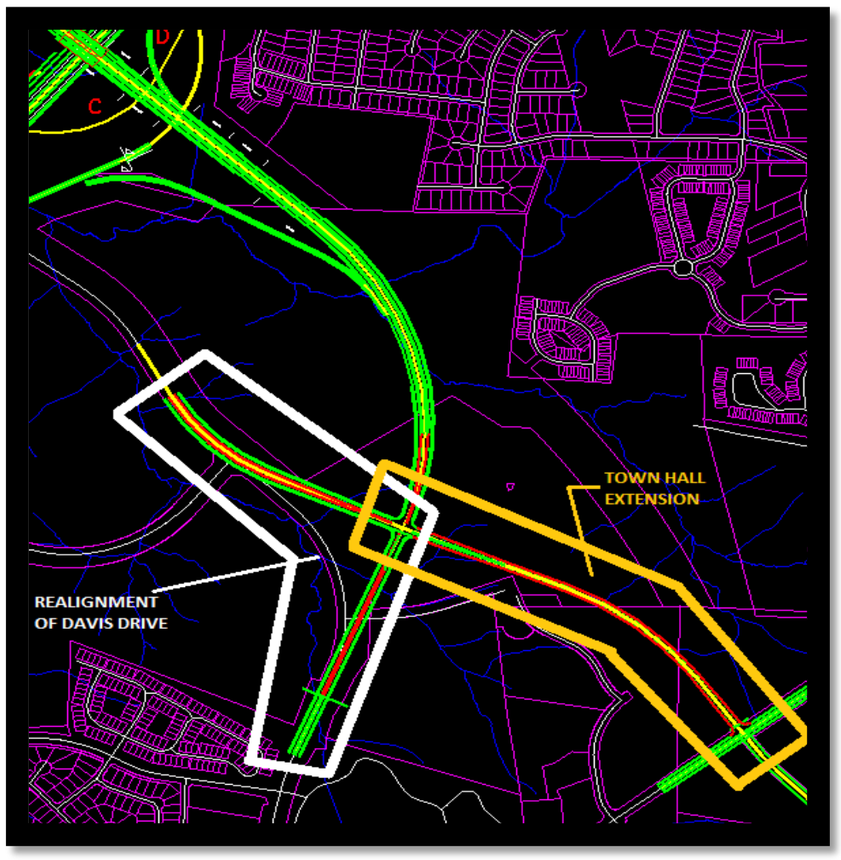
CONSTR. COST
$4,300,000

Prepared By: J Goodnight Date
Requested By: Date

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			Clearing and Grubbing	12.0	Acre	$ 12,000.00	$ 144,000.00
			Borrow Excavation	55,000	CY	$ 5.00	$ 275,000.00
			Unclassified Excavation	15,000	CY	$ 7.00	$ 105,000.00
			Drainage (Ramps, loops)	0.0	Miles	$ 150,000.00	$ -
			Drainage (Shoulder)	0.7	Miles	$ 350,000.00	$ 245,000.00
			Drainage (C&G)	0.0	Miles	$ 450,000.00	$ -
			Fine Grading	23,037	SY	$ 2.00	$ 46,073.56
			Pavement Widening		SY		$ -
			New Pavement	23,037	SY	$ 42.00	$ 967,544.67
			Pavement Resurfacing		SY		$ -
			_._"Average Asphalt Wedging		SY		$ -
			Subgrade Stabilization		SY		$ -
			1'-6" Concrete Curb and Gutter	6,074	LF	$ 10.00	$ 60,740.00
			2'-6" Concrete Curb and Gutter		LF	$ 14.00	$ -
			4" Concrete Sidewalk		SY		$ -
			7" Monolithic Islands		SY		$ -
			Fencing				
			Woven Wire		LF	$ 6.00	$ -
			Chain Link		LF		$ -
			Erosion Control	12.0	Acres	$ 12,000.00	$ 144,000.00
			Signing Interchanges				
			Resigning exist. Trumpet with flyovers to add Half Clover and ramps		Each	$ 250,000.00	$ -
			Guardrail	1,000	LF	$ 15.00	$ 15,000.00
			Upgrade Traffic Signal		Each		$ -
			Traffic Signal (New)	1	Each	$ 100,000.00	$ 100,000.00
			Traffic Control	0.3	Miles	$ 75,000.00	$ 22,500.00
			Thermo and Markers	0.9	Miles	$ 16,000.00	$ 14,400.00
			Structures				
			ML / 540 2@ 70'Wx 290'L		SF	$ 160.00	$ -
			RC Box Culverts				
			1 @10x10-x' Ext-90Skew Triangle Parkway		LF	$ 1,600.00	$ -
			2 @10x10-x' Ext-90Skew Triangle Parkway		LF	$ 1,600.00	$ -
			3 @10x10-x' Ext-90Skew Triangle Parkway		LF	$ 1,600.00	$ -
			1@10x10-x' Ext-90Skew Davis Dr	140	LF	$ 1,600.00	$ 224,000.00
			1@10x10-x' Ext-90Skew Davis Dr	160	LF	$ 1,600.00	$ 256,000.00
			1 @10x10-x' Ext-90Skew Town Hall		LF	$ 1,600.00	$ -
			Mainline Toll Plaza		EA	###########	$ -
			Utility Construction				
			Relocate Existing Water Line		LF		$ -
			Relocate Existing Sewer Line		LF		$ -
			Misc. & Mob (15% Strs&Util)				$ 72,000.00
			Misc. & Mob (45% Functional)				$ 962,666.20

Lgth ___ Miles

Contract Cost	$ 3,653,924.42
E. & C. 15%	$ 548,088.66
Construction Cost	**$ 4,202,013.09**
SAY	**$ 4,300,000.00**



TIP No. **Func** County: **Wake**

Route Triangle Parkway Ext Alt 2

From Partial Est. - Town Hall ext

Typical Section

CONSTR. COST
$3,000,000

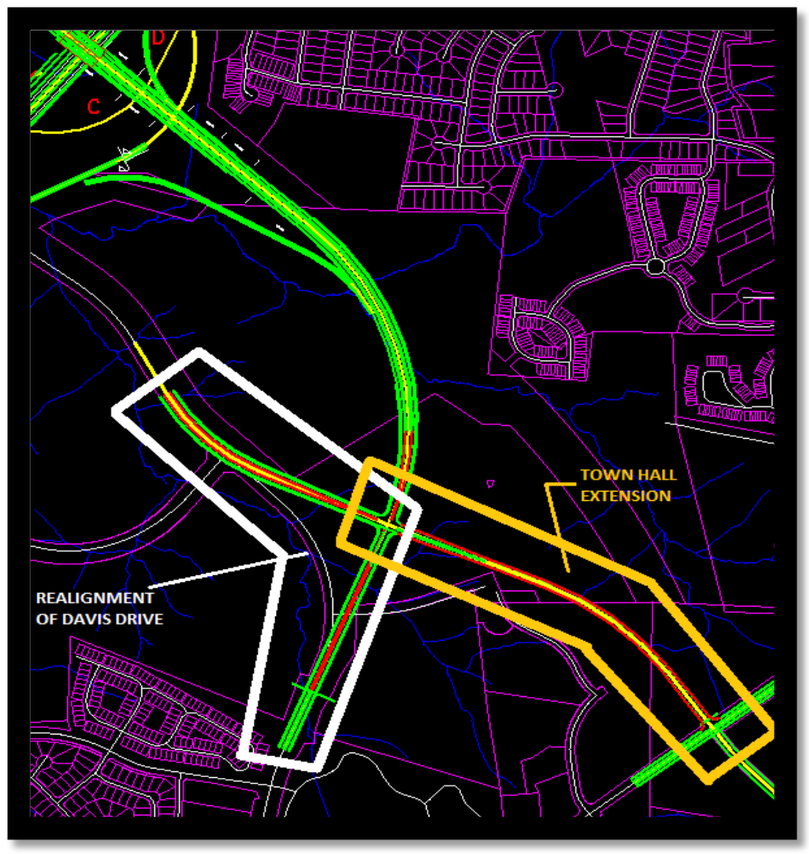
Prepared By: J Goodnight Date

Requested By: Date

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			Clearing and Grubbing	11.0	Acre	$ 12,000.00	$ 132,000.00
			Borrow Excavation	25,000	CY	$ 5.00	$ 125,000.00
			Unclassified Excavation	10,000	CY	$ 7.00	$ 70,000.00
			Drainage (Ramps, loops)		Miles	$ 150,000.00	$ -
			Drainage (Shoulder)		Miles	$ 350,000.00	$ -
			Drainage (C&G)	0.6	Miles	$ 450,000.00	$ 270,000.00
			Fine Grading	15,107	SY	$ 2.00	$ 30,214.22
			Pavement Widening		SY		$ -
			New Pavement	15,107	SY	$ 42.00	$ 634,498.67
			Pavement Resurfacing		SY		$ -
			_._"Average Asphalt Wedging		SY		$ -
			Subgrade Stabilization		SY		$ -
			1'-6" Concrete Curb and Gutter		LF	$ 10.00	$ -
			2'-6" Concrete Curb and Gutter	5,280	LF	$ 14.00	$ 73,920.00
			4" Concrete Sidewalk		SY		$ -
			7" Monolithic Islands		SY		$ -
			Fencing				
			Woven Wire		LF	$ 6.00	$ -
			Chain Link		LF		$ -
			Erosion Control	11.0	Acres	$ 12,000.00	$ 132,000.00
			Signing Interchanges				
			Resigning exist. Trumpet with flyovers to add Half Clover and ramps		Each	$ 250,000.00	$ -
			Guardrail	500	LF	$ 15.00	$ 7,500.00
			Upgrade Traffic Signal		Each		$ -
			Traffic Signal (New)	1	Each	$ 100,000.00	$ 100,000.00
			Traffic Control	0.2	Miles	$ 75,000.00	$ 15,000.00
			Thermo and Markers	0.8	Miles	$ 16,000.00	$ 12,800.00
			Structures				
			ML / 540 2@ 70'Wx 290'L		SF	$ 160.00	$ -
			RC Box Culverts				
			1 @10x10-x' Ext-90Skew Triangle Parkway		LF	$ 1,600.00	$ -
			2 @10x10-x' Ext-90Skew Triangle Parkway		LF	$ 1,600.00	$ -
			3 @10x10-x' Ext-90Skew Triangle Parkway		LF	$ 1,600.00	$ -
			1@10x10-x' Ext-90Skew Davis Dr		LF	$ 1,600.00	$ -
			1@10x10-x' Ext-90Skew Davis Dr		LF	$ 1,600.00	$ -
			1 @10x10-x' Ext-90Skew Town Hall	120	LF	$ 1,600.00	$ 192,000.00
			Mainline Toll Plaza		EA	###########	$ -
			Utility Construction				
			Relocate Existing Water Line		LF		$ -
			Relocate Existing Sewer Line		LF		$ -
			Misc. & Mob (15% Strs&Util)				$ 28,800.00
			Misc. & Mob (45% Functional)				$ 721,319.80

Lgth ___ Miles

Contract Cost	$ 2,545,052.69
E. & C. 15%	$ 381,757.90
Construction Cost	**$ 2,926,810.59**
SAY	**$ 3,000,000.00**



No-Build Davis Drive widening

Widen Davis Drive from 4 lanes to 6 lanes between Hopson Road and McCrimmon Parkway (Cost Per Mile)	$4,800,000.00
Miles	3.70
Subtotal	$17,760,000.00
30% Misc	$5,328,000.00
15% E&C	$2,664,000.00
Subtotal	$25,752,000.00
Piedmont (1.15 factor)	1.15
Total Construction Cost (utilities not included)	$29,614,800.00
Say	**$29,700,000.00**