TRANSPORTATION IMPACT ANALYSIS
CAROLINA NORTH DEVELOPMENT

May 7, 2009

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Town of Chapel Hill

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Introduction

- A Transportation Impact Analysis (TIA) has been completed by VHB on behalf of the Town:
  - The Scope was developed
  - The Consultant was selected
  - The University funded the TIA effort
  - The University participated in the development of the TIA
  - The TIA will be finalized after this review period
- Two reports are available on the Town website
  - Draft TIA Executive Summary (+/- 50 pages)
  - Draft TIA Main Report (+/- 300 pages)

Introduction

- Future Scenario Definition
  - Two development scenarios were defined by the University:
    - An 800,000 square foot scenario for early phase analysis (2015)
    - A 3,000,000 square foot scenario as a longer-term phase of development (2025)
  - These horizon years were selected testing of impacts, but are not predictions of specific development levels for these two years.

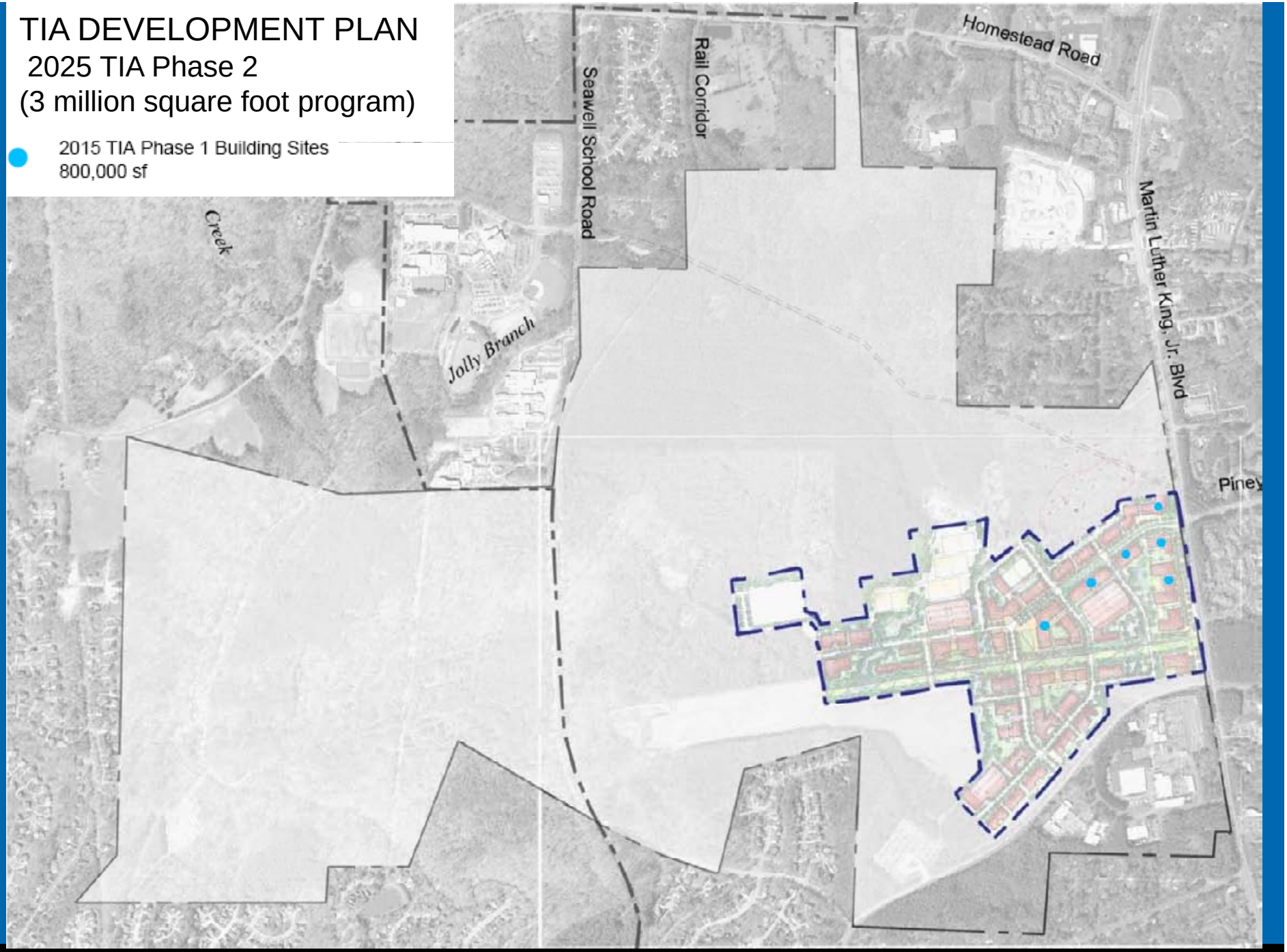
Introduction

- Issues addressed by the TIA
  - Existing and future conditions assessment (without the project)
  - Trip generation, mode split, and trip distribution
  - Assessment of parking supply on transportation impacts
  - Traffic impacts (traffic operations and neighborhood impacts)
  - Transit impacts
  - Pedestrian and bicycle facility needs
  - Review of crash history near Carolina North
  - Potential mitigation measures
  - Air quality and greenhouse gas analysis

TIA DEVELOPMENT PLAN

2025 TIA Phase 2

(3 million square foot program)

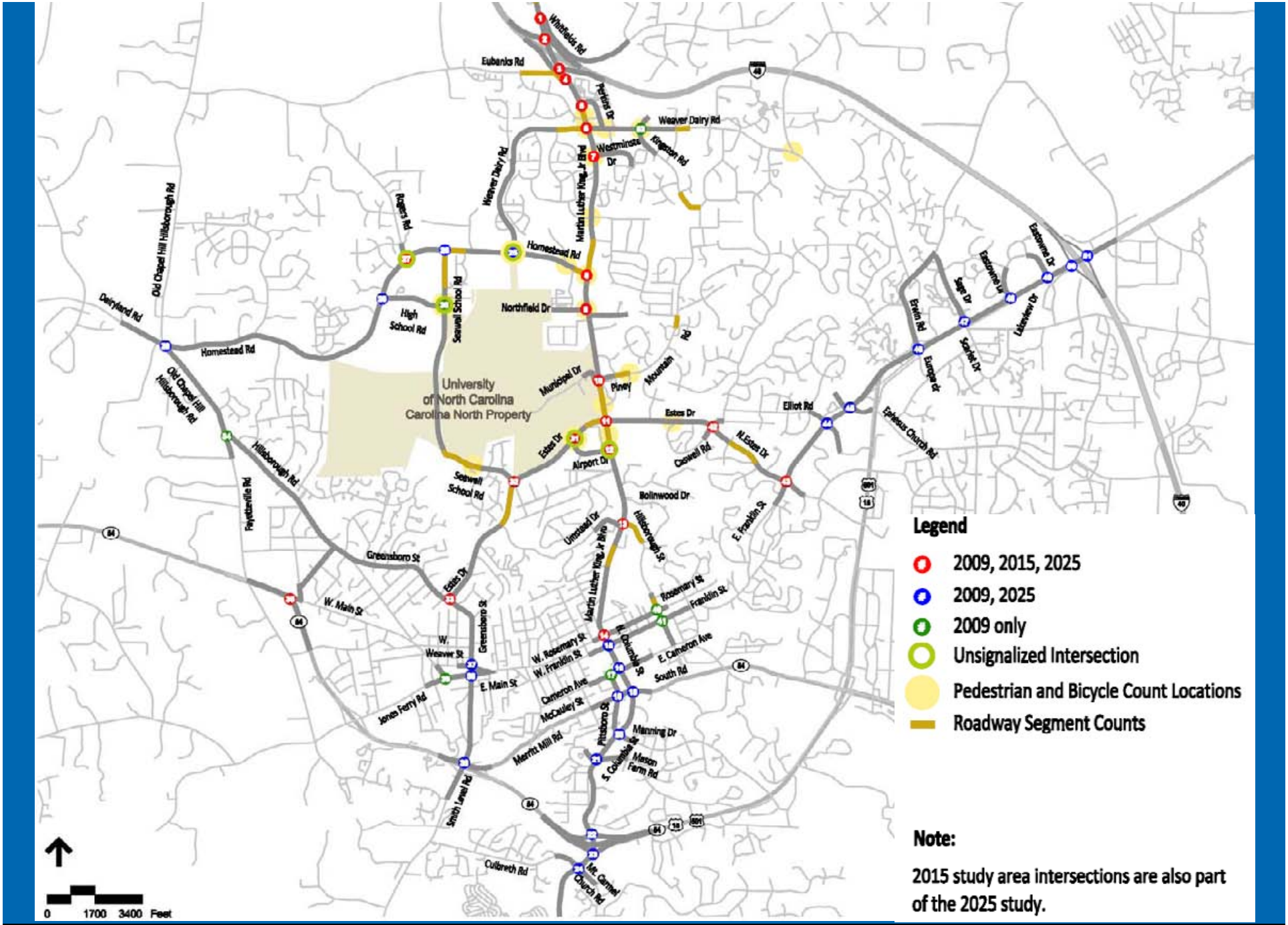


TRANSPORTATION IMPACT ANALYSIS (TIA)
CAROLINA NORTH DEVELOPMENT

TIA DEVELOPMENT PLAN

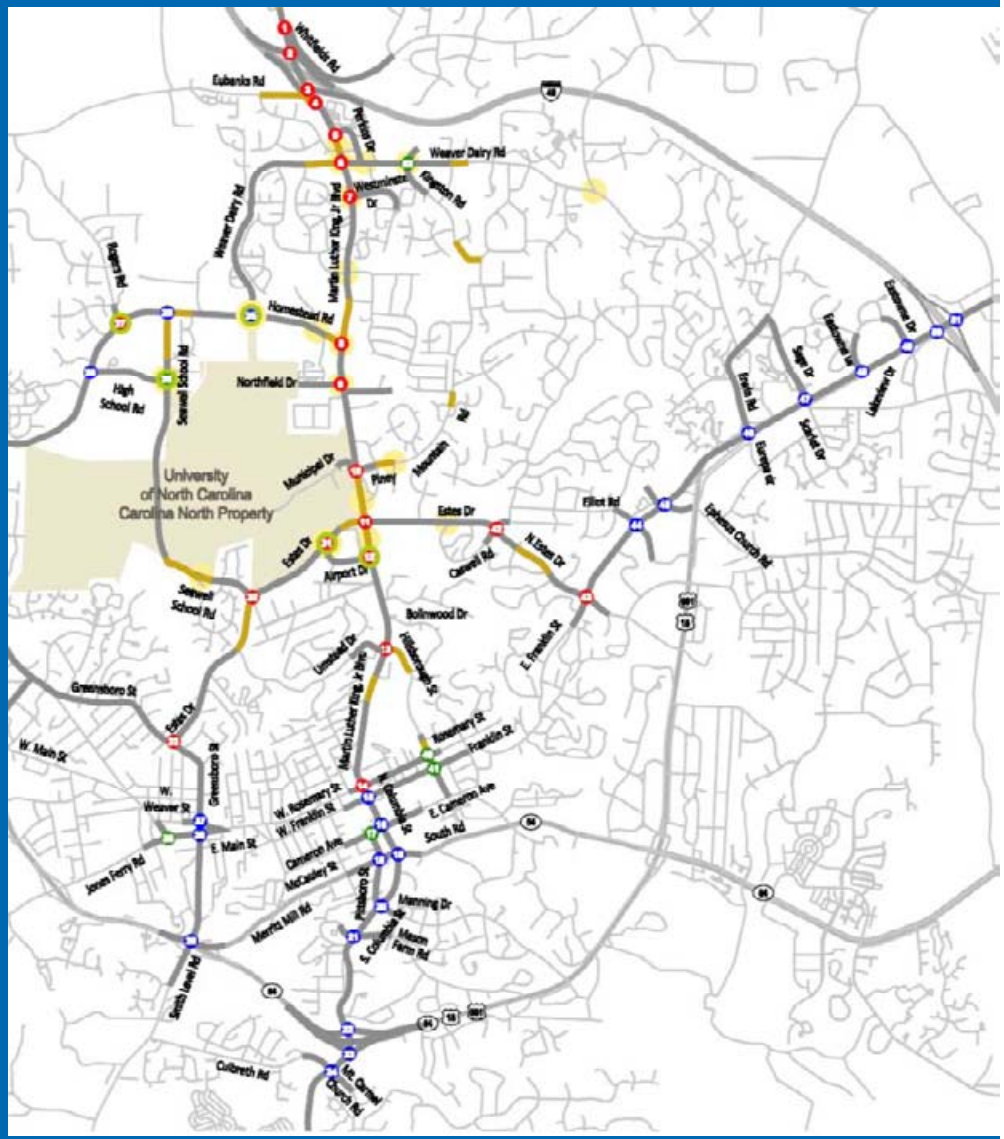
Land Use	Short-Term (2015)	Longer Term Increment	Total TIA Development (2025)
Academic	410,000	870,000	1,280,000
Private*	180,000	520,000	700,000
Civic/Retail	10,000	60,000	70,000
Housing**	200,000	550,000	750,000
Health Care	0	200,000	200,000
Total	***800,000***	***2,200,000***	***3,000,000***

***** Includes Innovation Center approved at 85,000 sf
** 1,000 gsf/unit results in 200 units for Short-Term and 750 total housing units

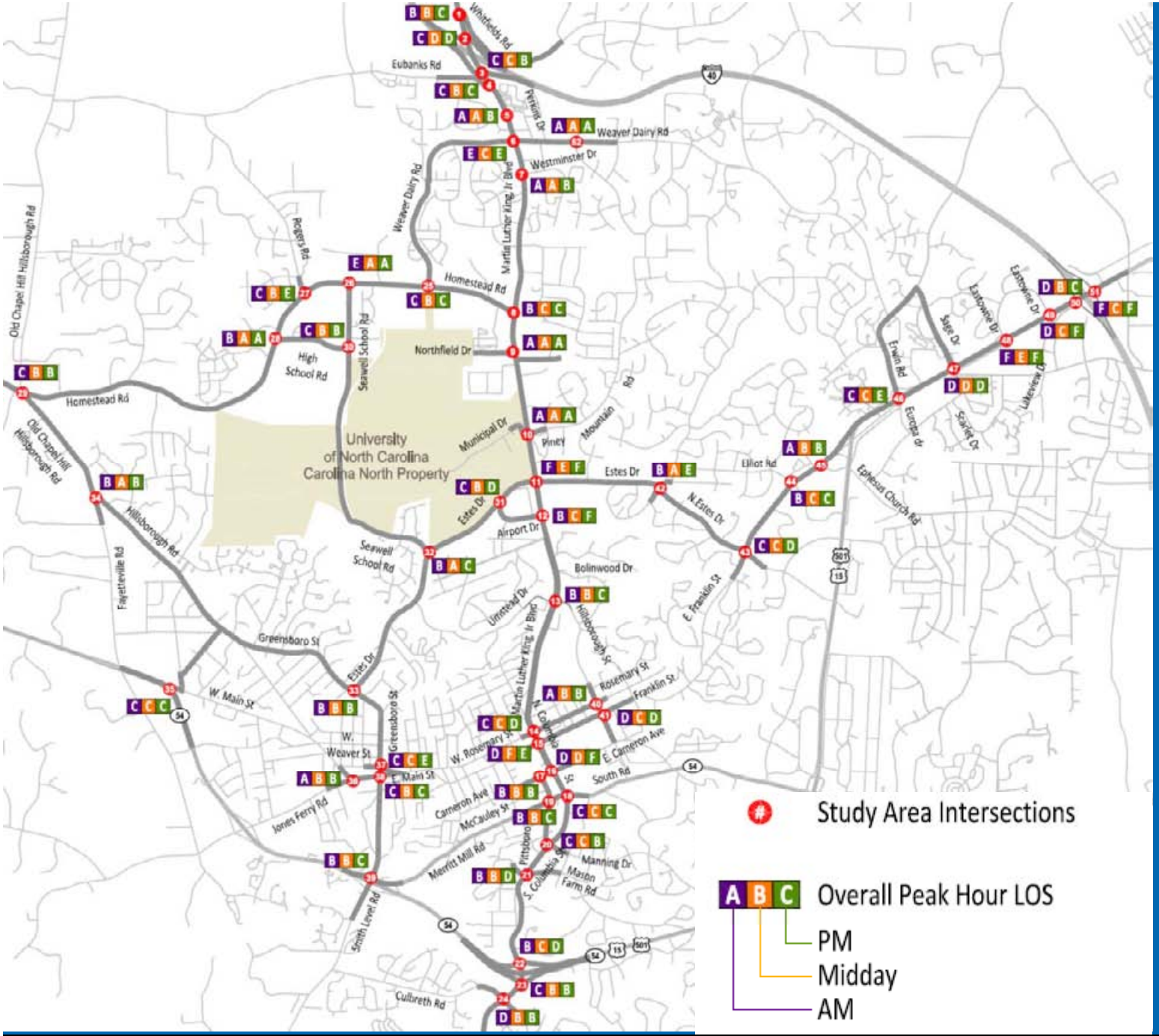

University of North Carolina Carolina North Property
Legend
2009, 2015, 2025
2009, 2025
2009 only
Unsignalized Intersection
Pedestrian and Bicycle Count Locations
Roadway Segment Counts
Note:
2015 study area intersections are also part of the 2025 study.
0 1700 3400 Feet

Existing Traffic Volumes

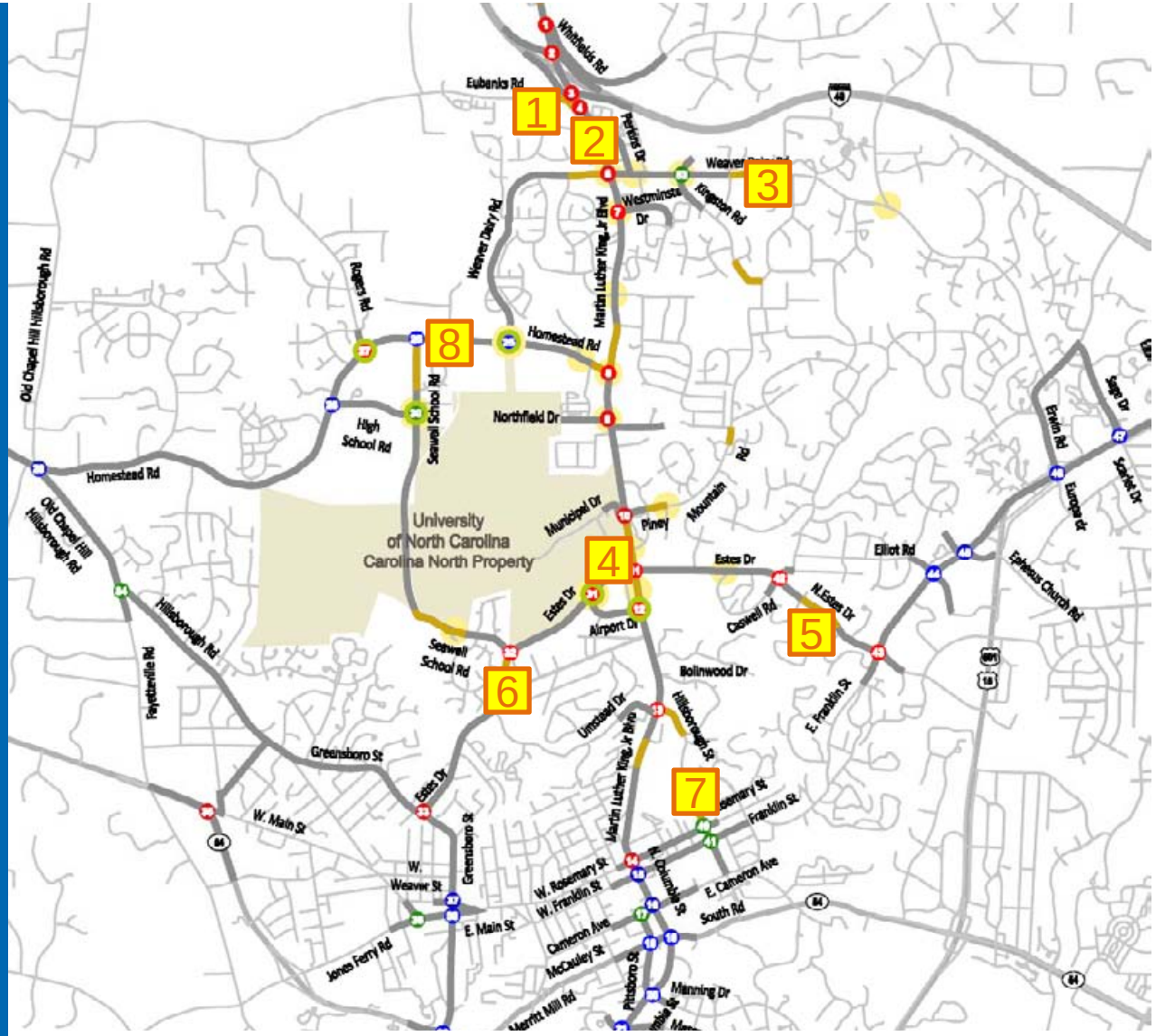
Martin Luther King, Jr. Blvd. (near Homestead Road)	+/- 28,000 vpd
Estes Drive (near Caswell Road)	+/-13,000 vpd
Homestead Road (west of Martin Luther King, Jr. Blvd)	+/- 9,500 vpd
Hillsborough Street (east of Martin Luther King, Jr. Blvd)	+/- 7,800 vpd
Seawell School Road (west of Martin Estes Drive)	+/- 4,500 vpd
Piney Mountain Road (east of Martin Luther King, Jr. Blvd)	+/- 2,900 vpd



Existing Traffic Operations



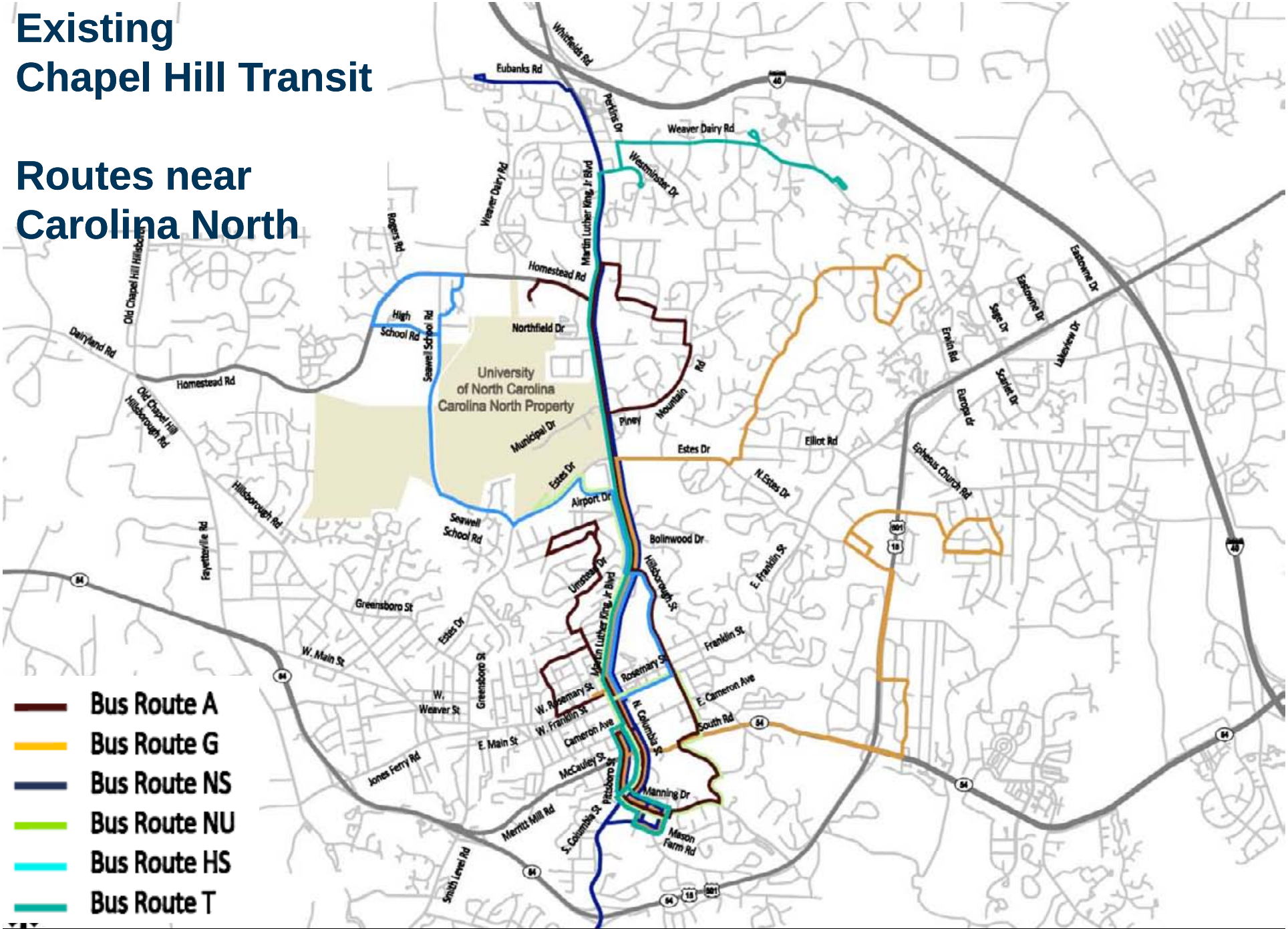
1. Eubanks Road @
2. Martin Luther King, Jr.
3. Martin Luther King, Jr. Blvd @ Northwoods Dr
4. Weaver Dairy Road @ Timberlyne Road
5. N. Estes Drive @ Halifax Road
6. N. Estes Drive @ Airport Drive
7. Estes Drive Ext @ Seawell School Road
8. Hillsborough Street @ Rosemary Street
9. Homestead Road @ Seawell School Road



Existing Conditions: Links Exceeding Town Threshold Capacity

Existing Chapel Hill Transit

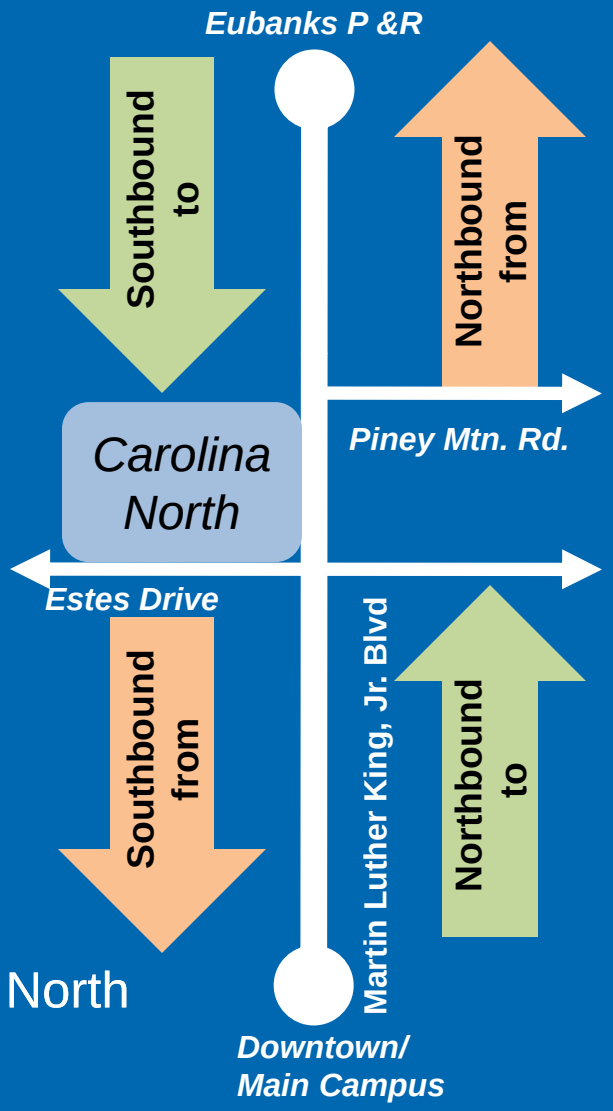
Routes near Carolina North



Existing Available Transit Capacity to & from Carolina North

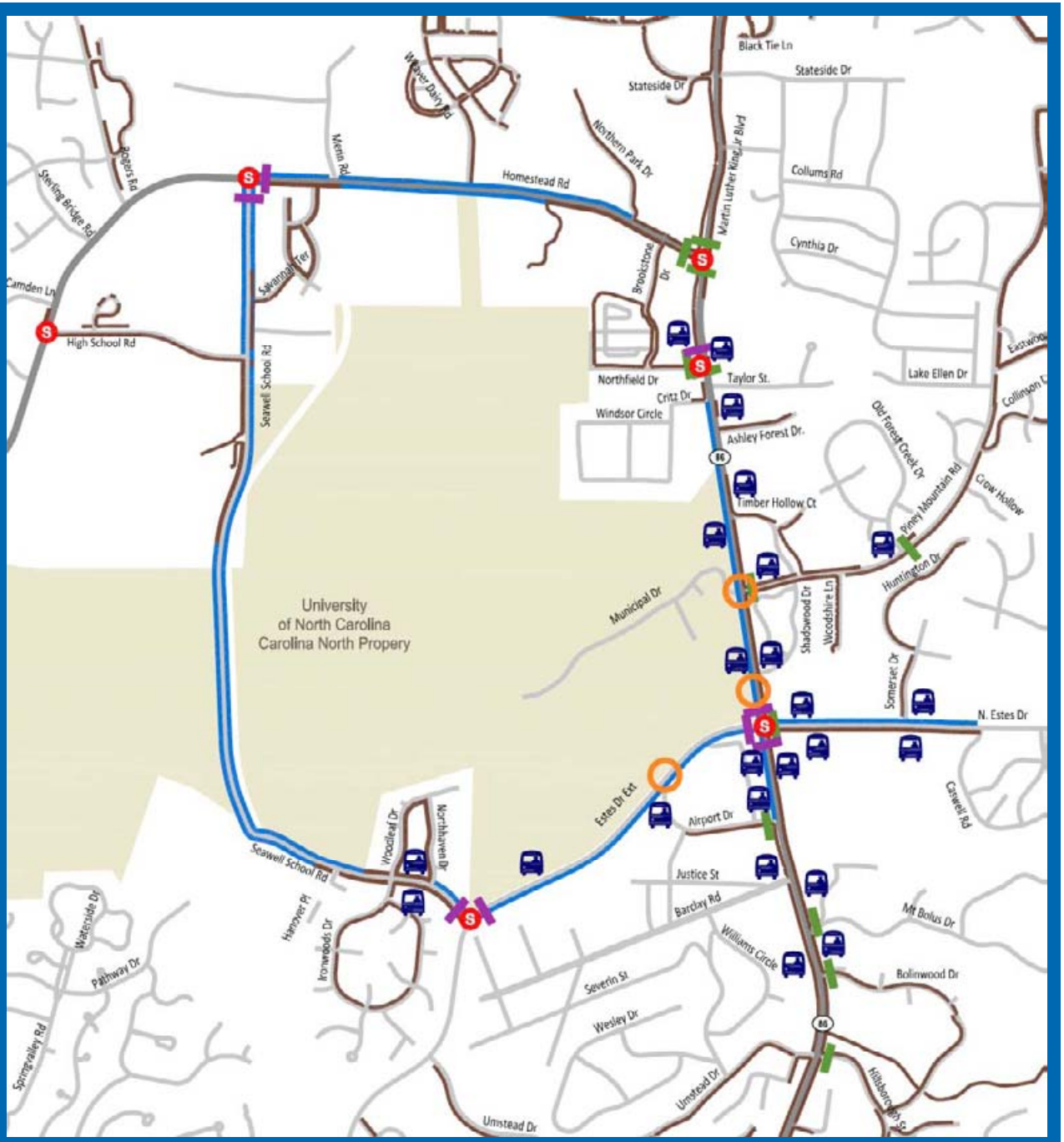
	to CN*	from CN*
• Morning Peak Hour		
– Northbound:	510	315
– Southbound:	150	235
• Midday		
– Northbound:	315	250
– Southbound:	365	370
• Evening Peak Hour		
– Northbound:	150	105
– Southbound:	205	370

* Combined Capacity of six routes serving Carolina North



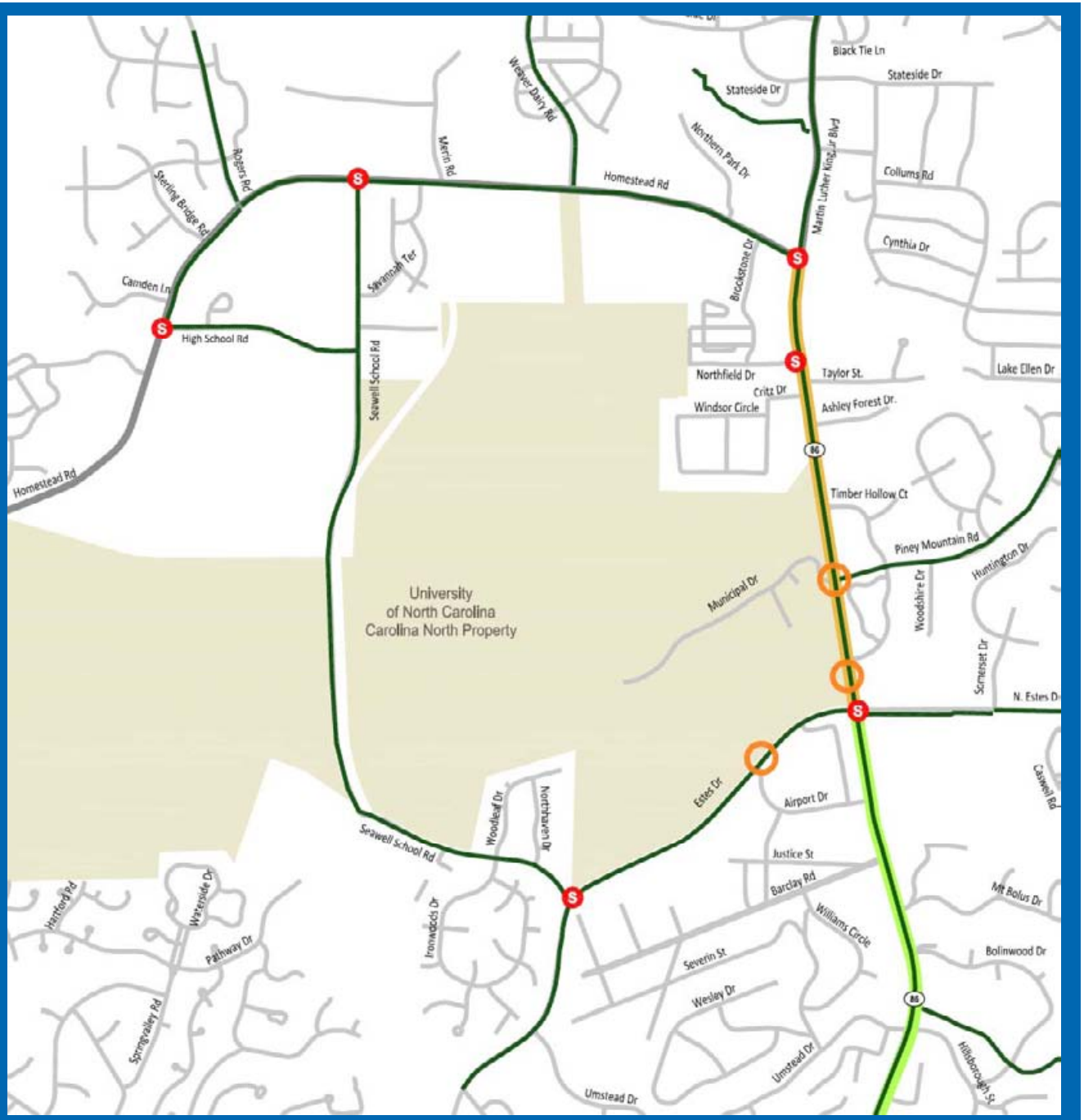
Pedestrian & Bicycle Conditions

Pedestrian Facilities



- Signalized Intersections
- Existing Sidewalk
- Existing Crosswalk
- Access Points
- Existing Bus Stop

Bicycle Facilities

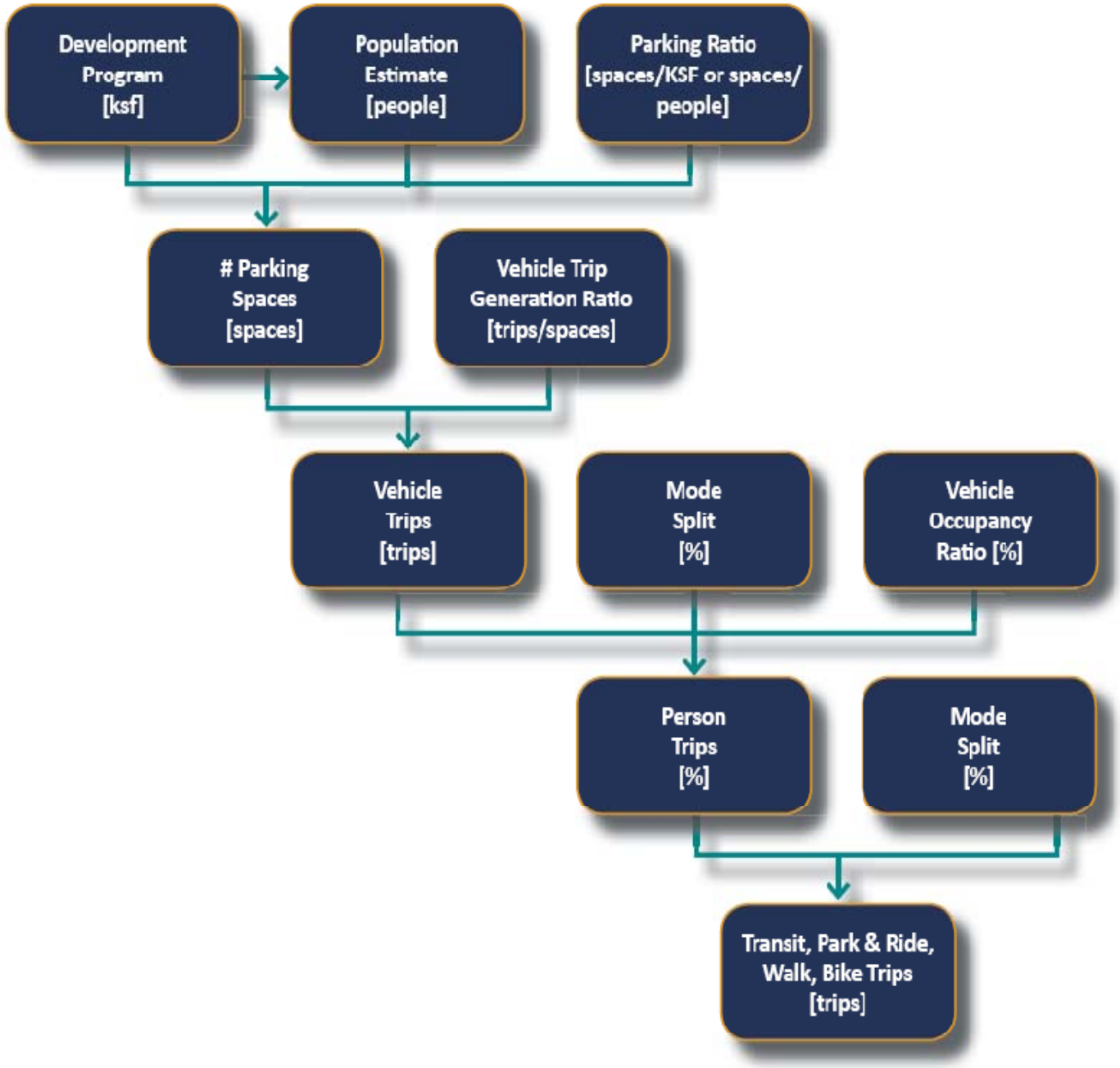


- Signalized Intersections
- Existing Bicycle Network
- Existing Bicycle Network - Paved Striped Shoulders
- Existing Bicycle Network - Shared Lane Pavement Markings
- Access Points

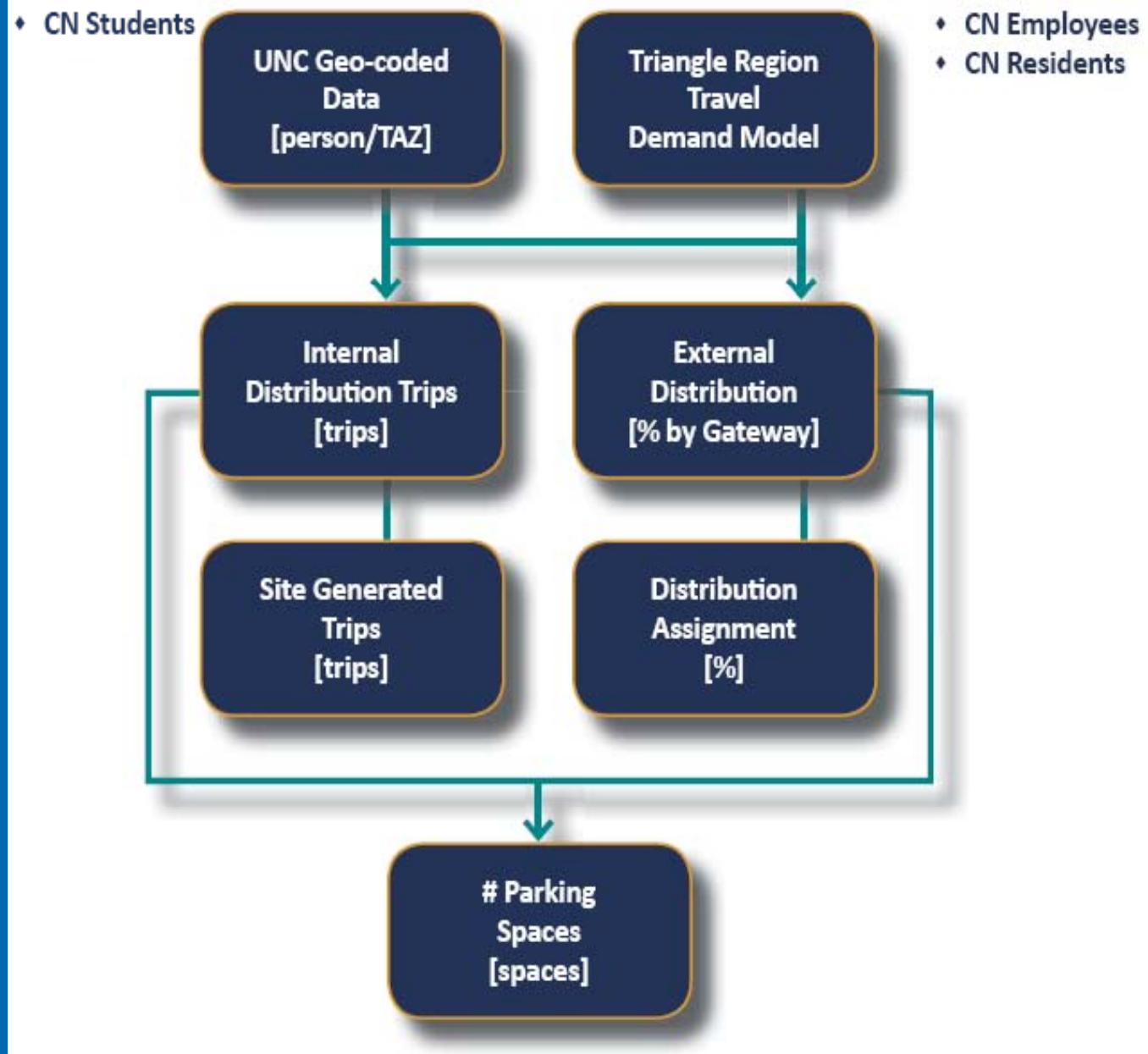
Impact Assessment

- Travel Forecasting Methodology
- Traffic Impacts
- Transit Impacts
- Pedestrian and Bicycle Facility Needs
- Potential Mitigation Measures

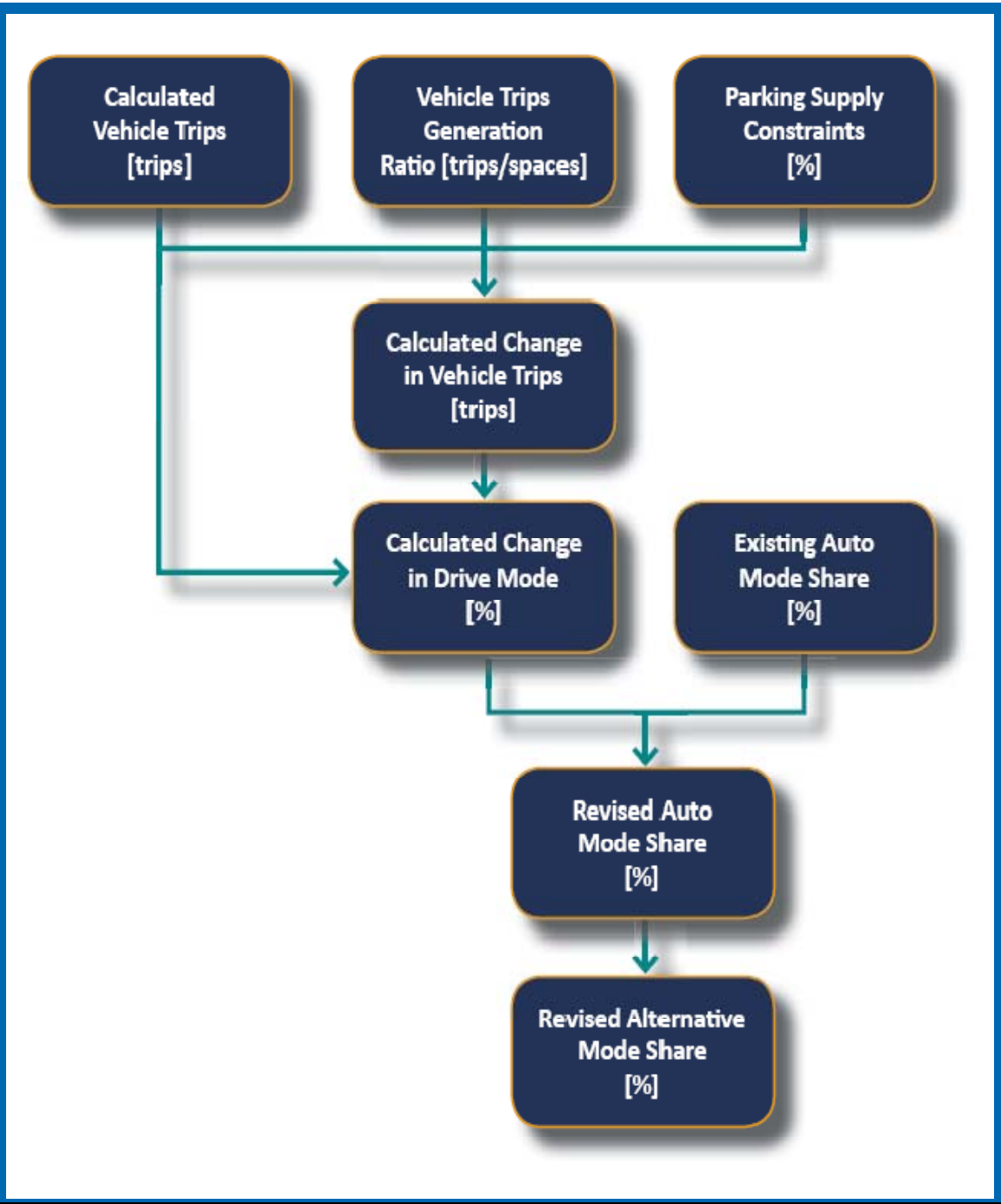
TRIP GENERATION METHODOLOGY



TRIP DISTRIBUTION METHODOLOGY



MODE SPLIT METHODOLOGY



2015 (800,000 sf) Parking Ratios

Use	Early Phase	Baseline	-10 %
University/ Employee	0.65/ employee	0.50/ employee	0.45/ employee
University/ Student	0.33/student	0.25/student	0.23/student
University/ Visitors	0.20/1,000 sf	0.20/1,000 sf	0.18/1,000 sf
Private R&D	2.65/1,000 sf	2.50/1,000 sf	2.25/1,000 sf
Housing	1.25/unit	1.25/unit	1.13/unit
Civic/Retail	1.50/1,000 sf	1.50/1,000 sf	1.35/1,000 sf
Fields	35/field	35/field	32/field
Total Spaces	**1,743**	**1,526**	**1,373**

2025 (3,000,000 sf) Parking Ratios

Use	Baseline	-10 % Ratio	-20 % Ratio
University/ Employee	0.50/employee	0.45/employee	0.40/employee
University/ Student	0.25/student	0.23/student	0.20/student
University/ Visitors	0.20/1,000 sf	0.18/1,000 sf	0.16/1,000 sf
Private R&D	2.50/1,000 sf	2.25/1,000 sf	2.0/1,000 sf
Housing	1.25/ unit	1.13/unit	1.00/unit
Civic/Retail	1.50/ 1,000 sf	1.35/1,000 sf	1.20/1,000 sf
Medical/Employee	0.50/employee	0.45/employee	0.40/employee
Medical/Patient -Visitor	2.50/1,000 sf	2.25/1,000 sf	2.00/1,000 sf
Fields	35/field	32/field	28/field
Total Spaces	**5,834**	**5,254**	**4,668**

Mode Split
2007 University and Town-wide Data

Mode	Univ. Employee	Univ. Student	Other
Drive to Site	67 %	36 %	92 %
Transit	9 %	32 %	3 %
Park & Ride	15 %	9 %	4 %
Walk/Bike	9 %	23 %	1 %
Total	100 %	100 %	100 %

Trip Generation

Table 5: Carolina North Trip Generation 2015 (TIA Phase One) – 800,000 sf

Trip Type	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Vehicle	5,049	420	115	535	265	399	665
Park & Ride	1,248	120	22	141	65	109	174
Transit	1,941	126	84	210	124	135	259
Walk/Bike/Other	1,497	57	71	128	87	84	171
Total	**9,734**	**722**	**292**	**1,014**	**542**	**727**	**1,269**

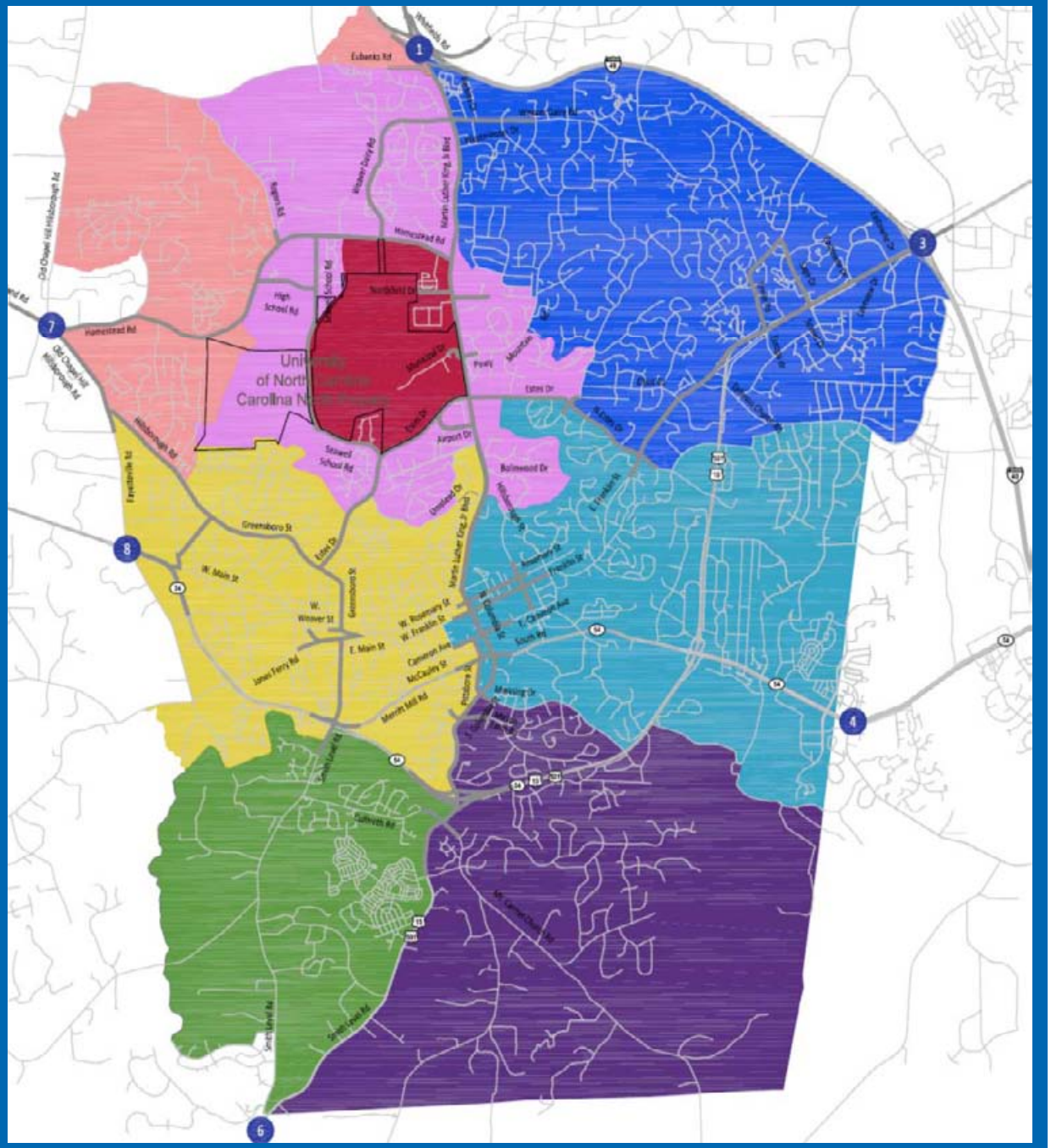
Table 6: Carolina North Trip Generation 2025 (TIA Phase Two) – 3,000,000 sf

Trip Type	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Vehicle	23,261	1,929	554	2,484	990	1,736	2,726
Park & Ride	4,089	398	73	471	197	355	551
Transit	6,438	416	310	726	347	417	764
Walk/Bike/Other	5,957	186	260	446	255	272	528
Total	**39,746**	**2,929**	**1,197**	**4,127**	**1,788**	**2,781**	**4,569**

Trip Distribution

Gateway

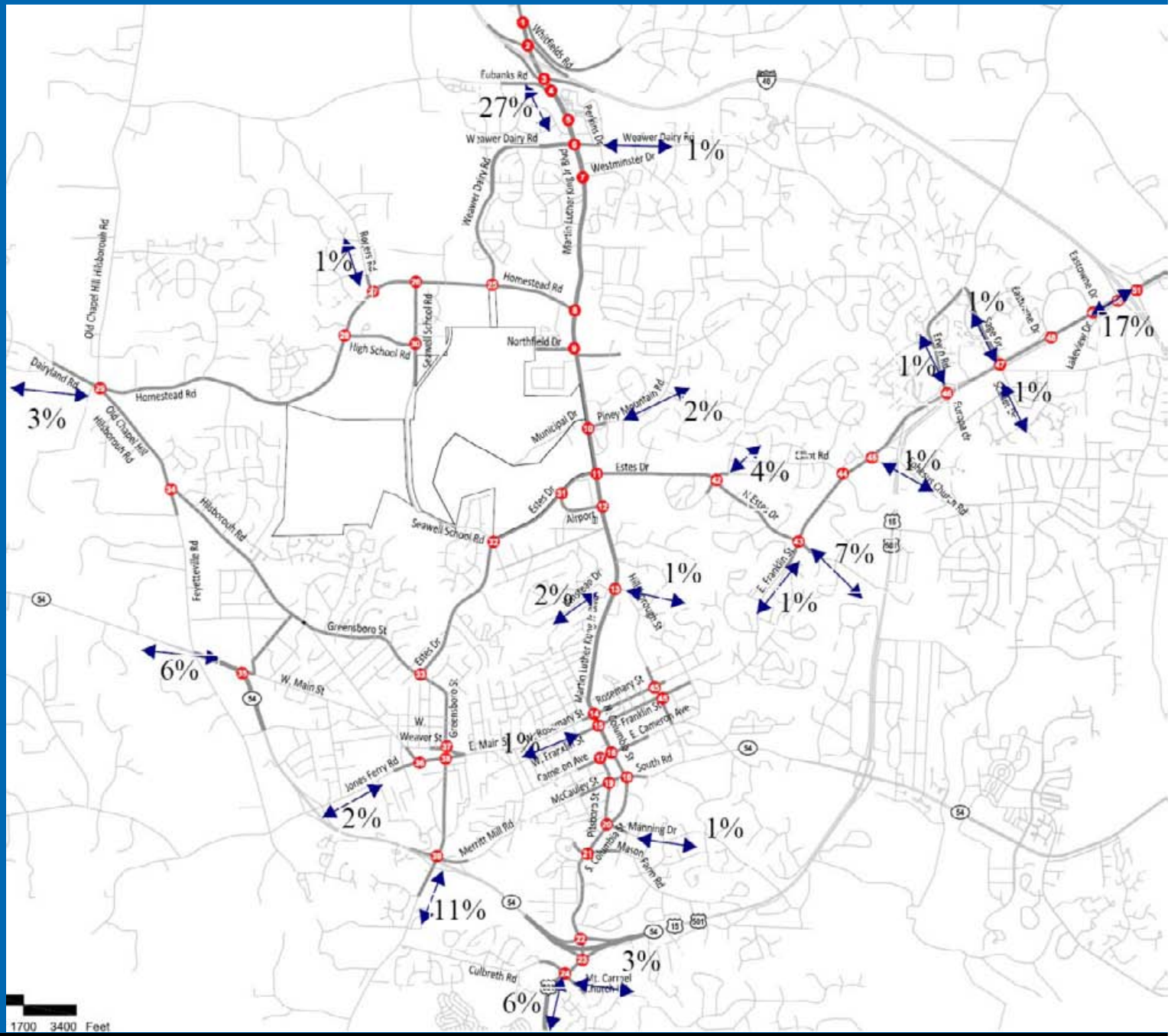
- Carolina North (1 TAZs)
- 101 (5 TAZs)
- 102 (37 TAZs)
- 103 (38 TAZs)
- 104 (27 TAZs)
- 105 (6 TAZs)
- 106 (11 TAZs)
- 200 - Adjacent Zones (12 TAZs)
- # Gateway Locations



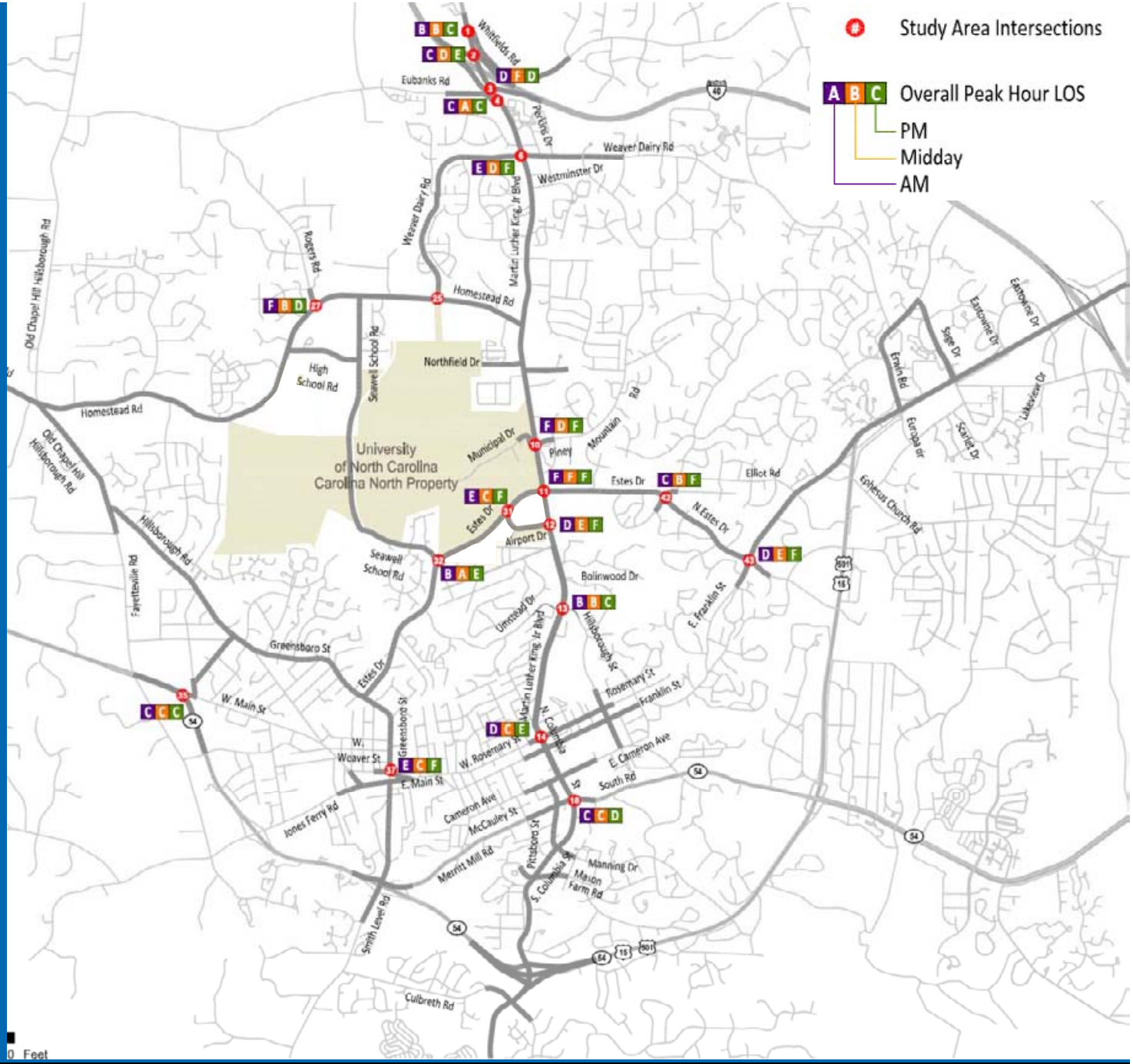
40 % within
Chapel Hill – Carrboro

60 % external to
Chapel Hill - Carrboro

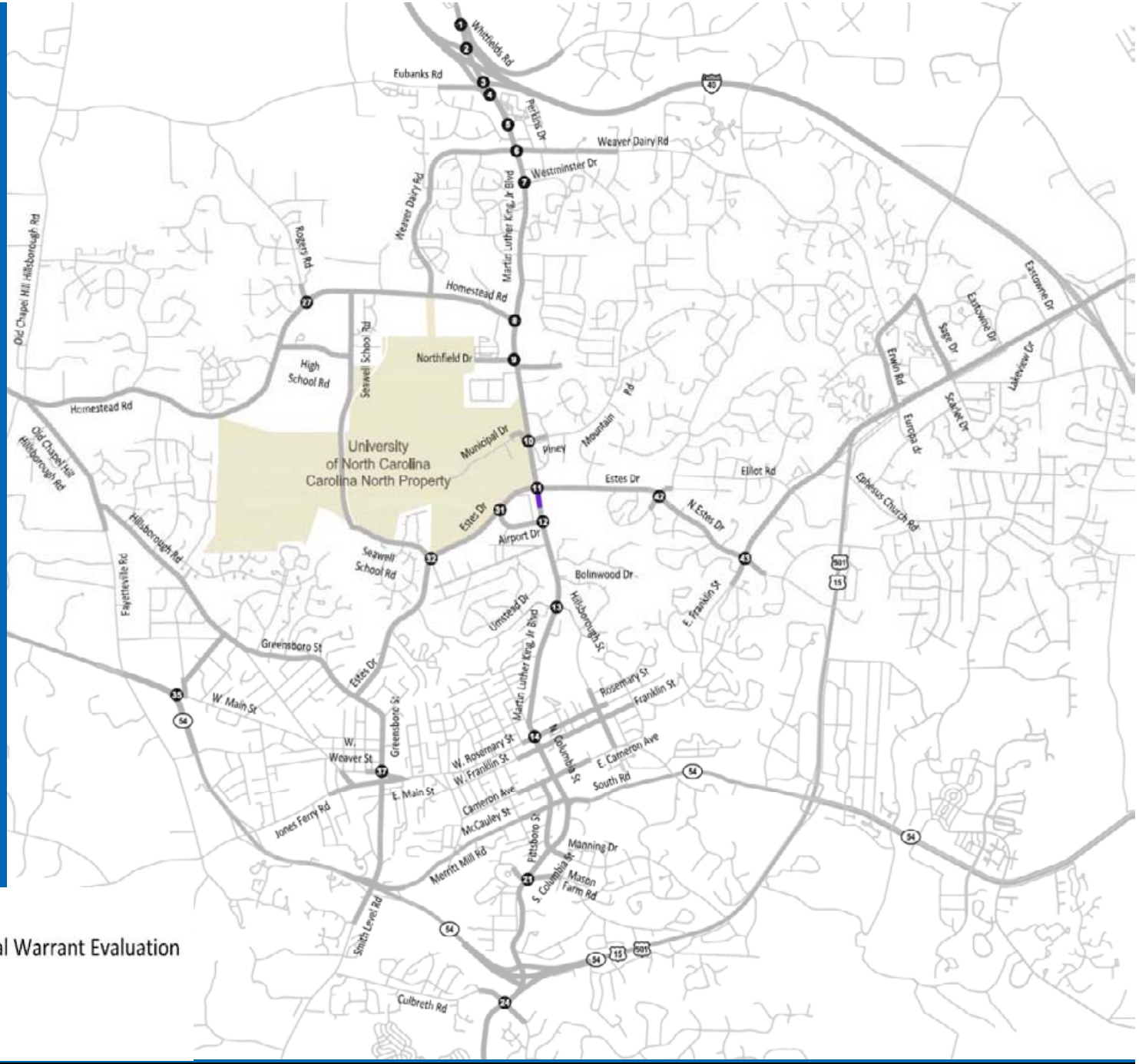
Employee Trip Distribution



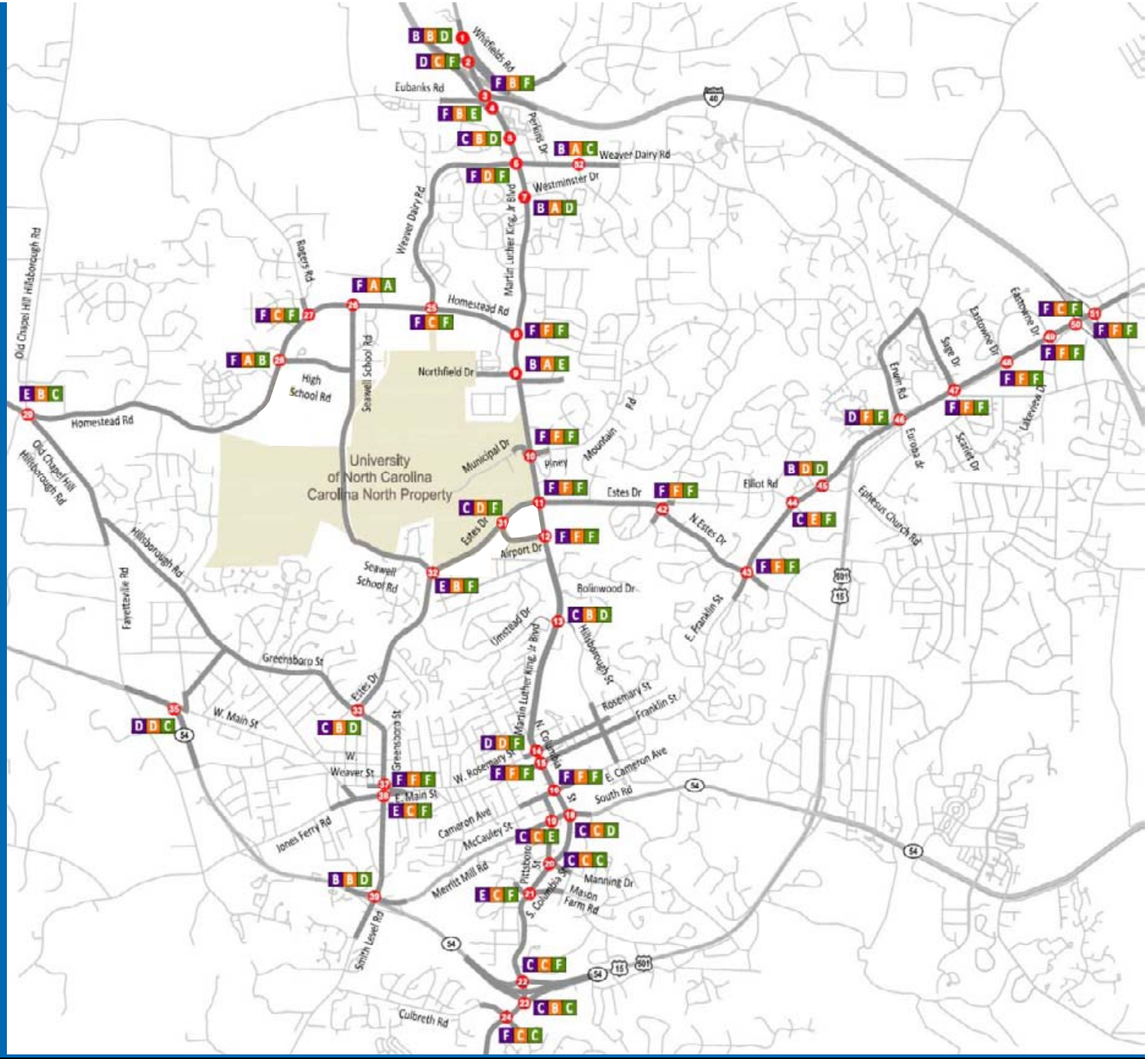
2015 Build Intersection Level-of-Service



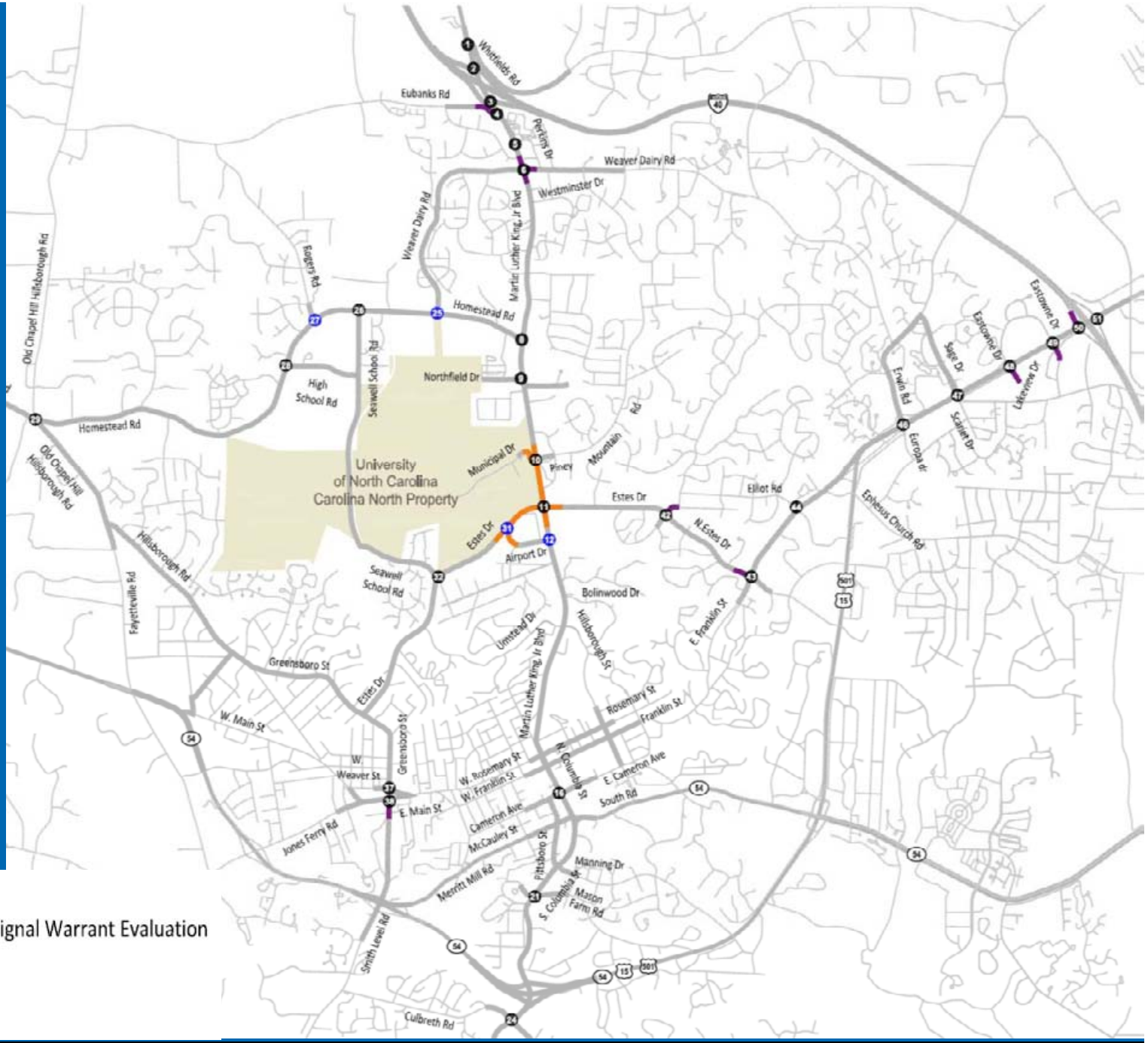
2015 Intersection Impacts and Potential Mitigation



2025 Build Intersection Level-of-Service



2025 Intersection Impacts and Potential Mitigation



- Signal Timing Improvement
- Intersection Signalization / Signal Warrant Evaluation
- Geometric Improvement
- Substantial Reconstruction

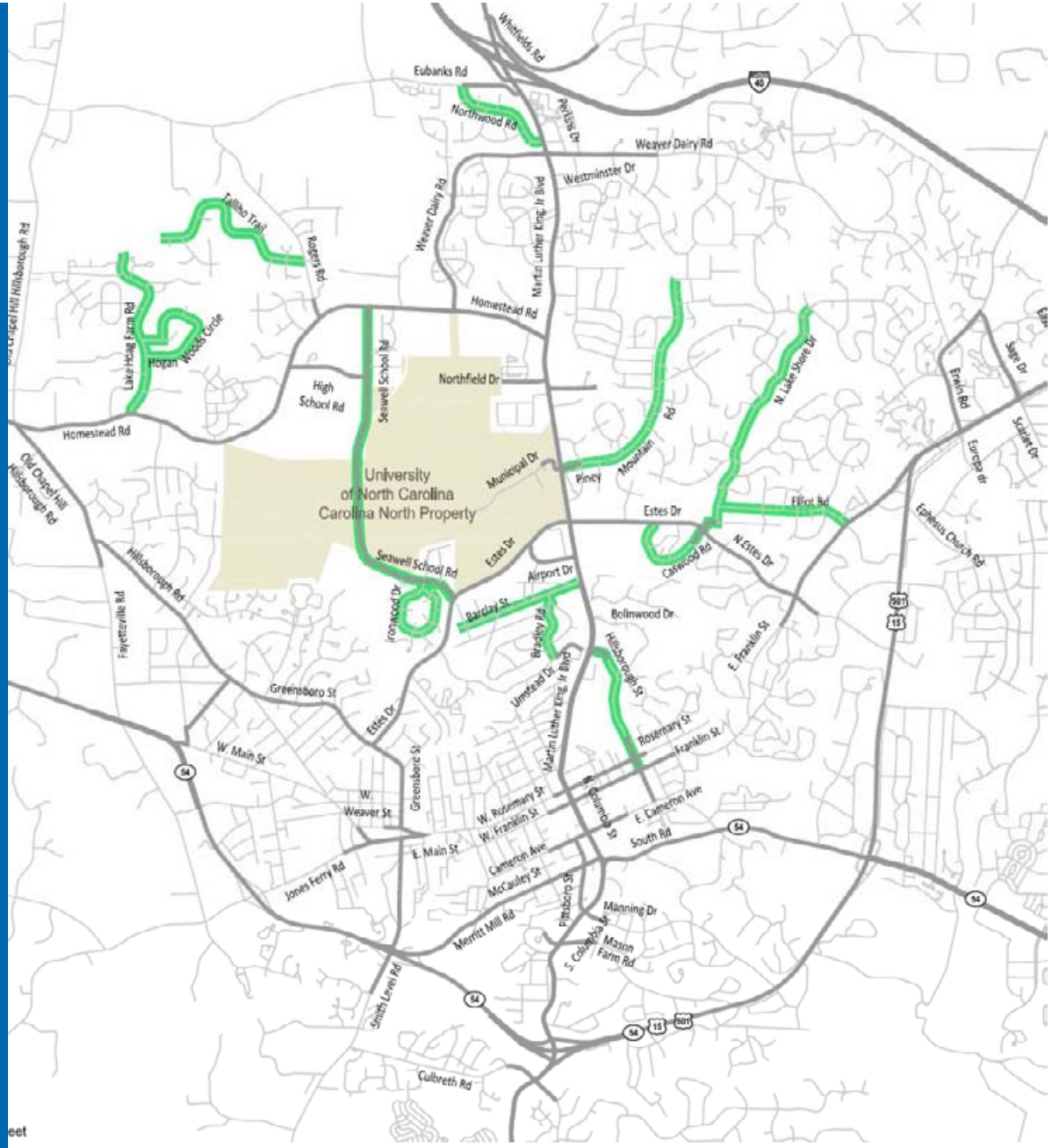
Streets Evaluated for Traffic Calming Implementation

<u>Carolina North Traffic Expected</u>

- Piney Mountain Road
- Hillsborough Street (Chapel Hill)
- Seawell School Road
- North Elliott/Curtis/Caswell Roads

<u>Carolina North Traffic Possible</u>

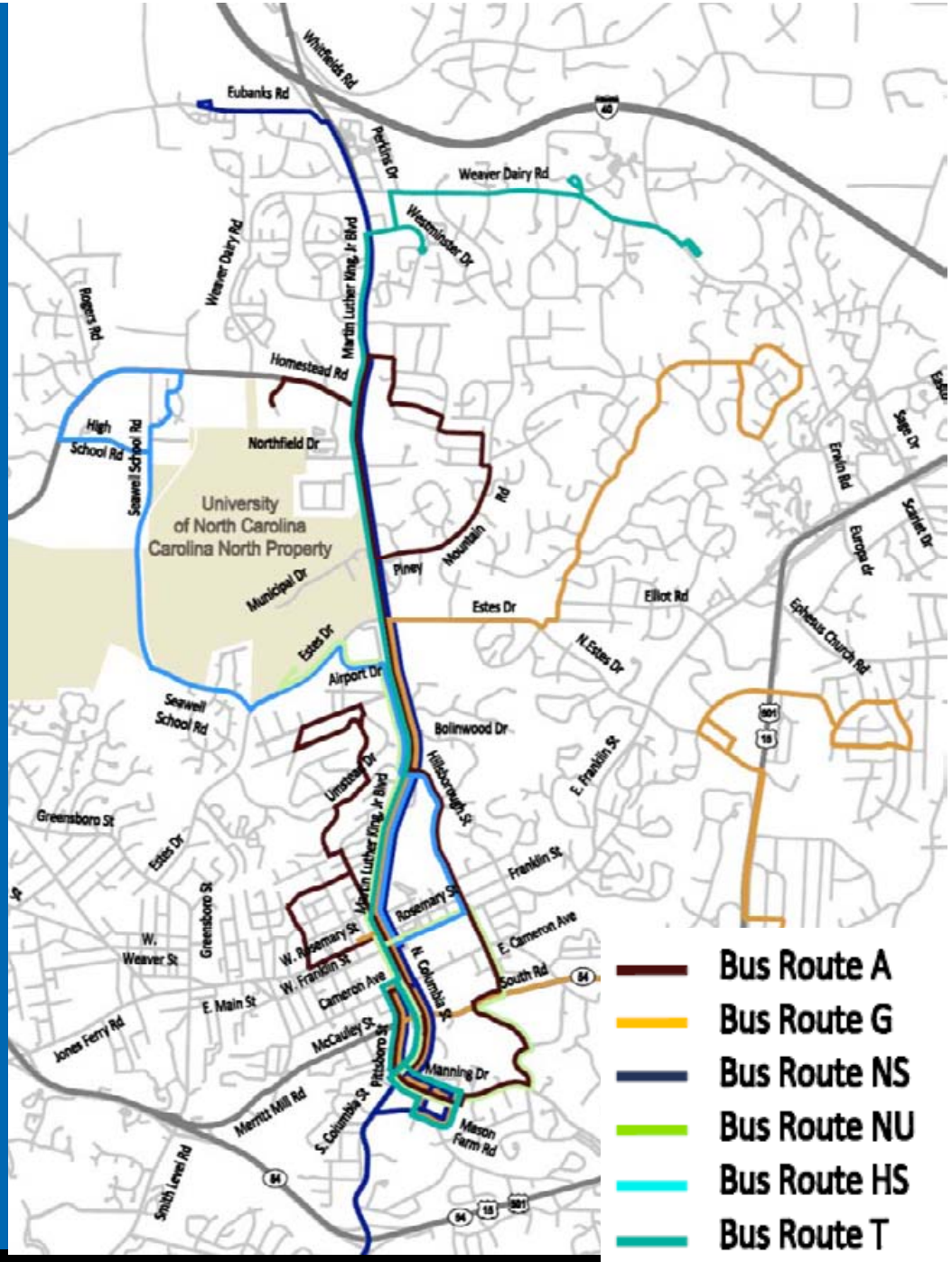
- Northwoods Road
- North Lakeshore Drive
- Barclay Road



Transit Impacts

2015 (800,000 SF) Phase 1

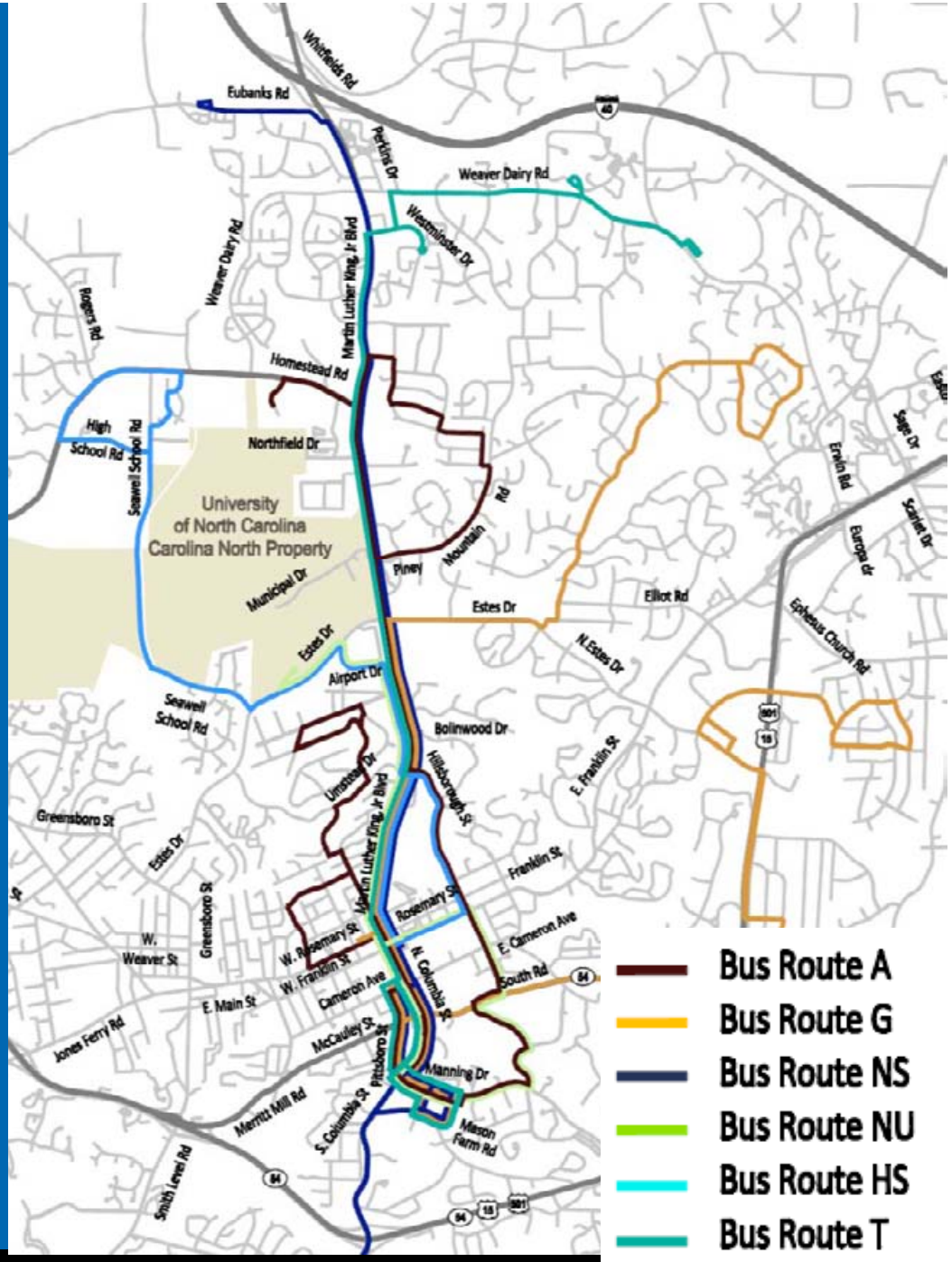
- Route NS reaches capacity
- 2 additional vehicles needed
- 400 to 500 additional park & ride spaces needed
- Other service adjustments may be needed



Transit Impacts

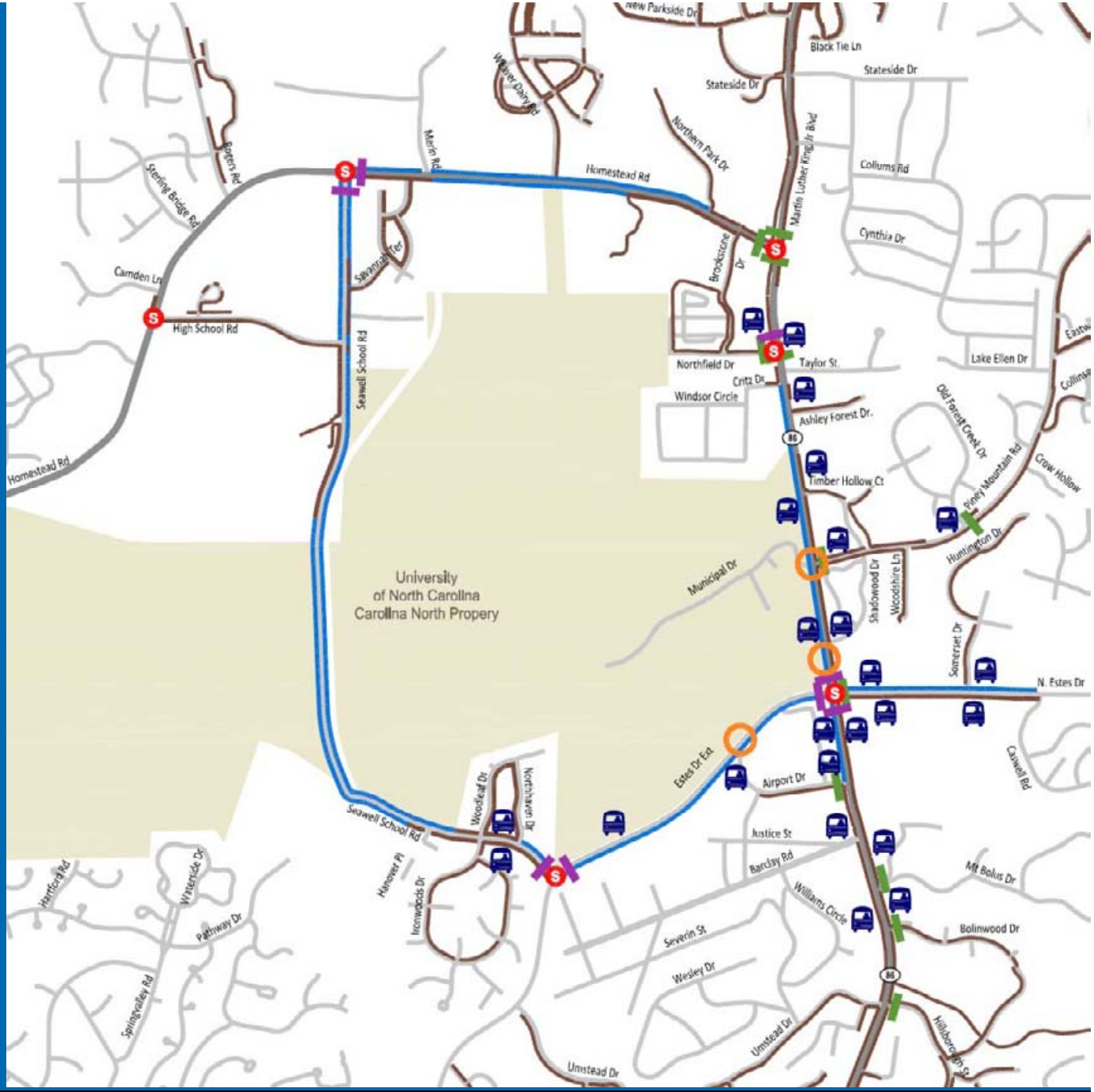
2025 (3,000,000 SF) Phase 2

- More service needed on Routes NS, A, T, G
- +/- 10 additional vehicles needed
- Approximately 1,500 additional park & ride spaces
- Route structure may need to change



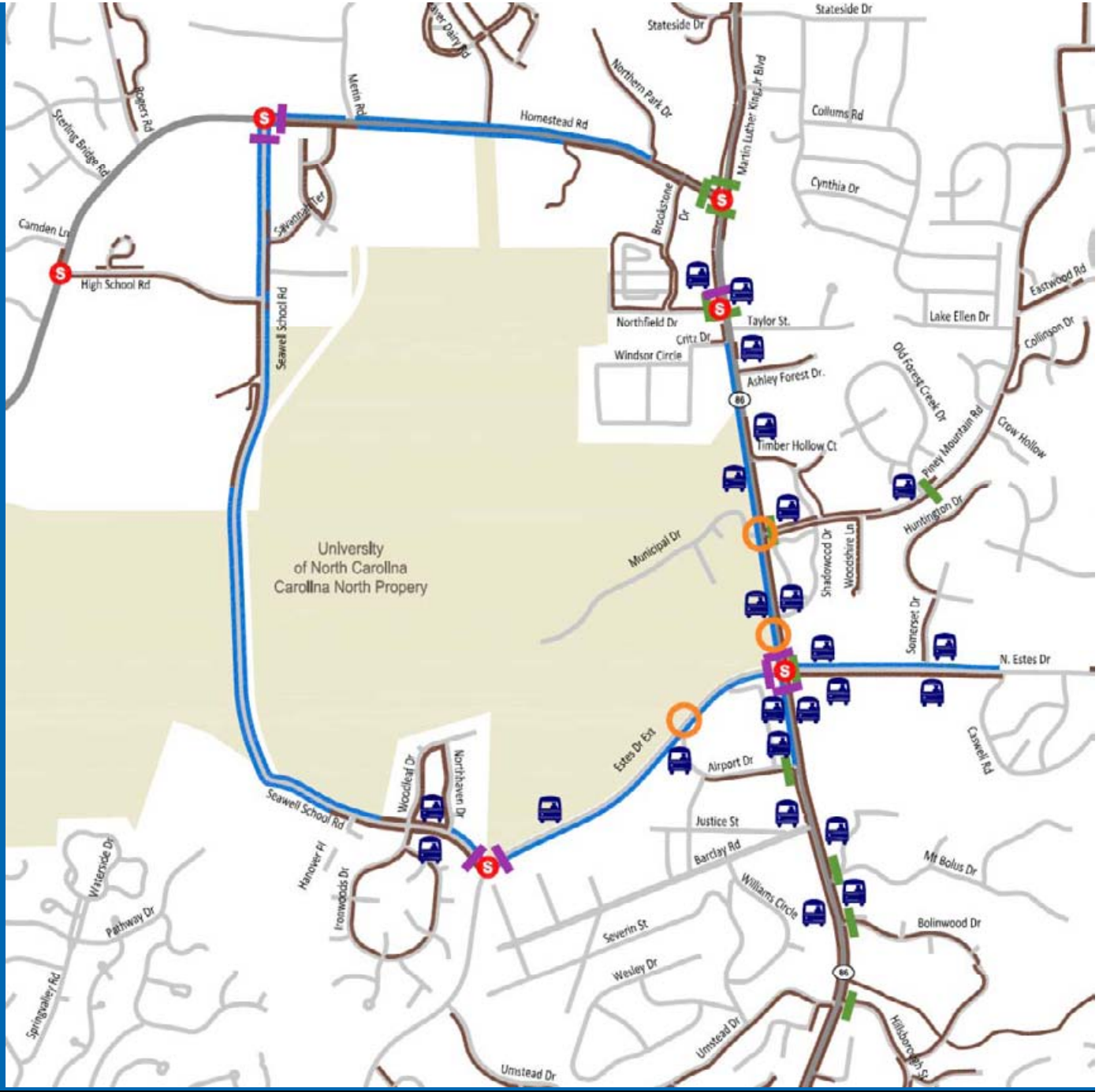
Pedestrian Facility Needs

- Signalized Intersections
- Existing Sidewalk
- Proposed Sidewalk
- Existing Crosswalk
- Proposed Crosswalk
- Access Points
- Existing Bus Stop



Bicycle Facility Needs

- Signalized Intersections
- Existing Sidewalk
- Proposed Sidewalk
- Existing Crosswalk
- Proposed Crosswalk
- Access Points
- Existing Bus Stop



Sensitivity Analysis
Different Parking Ratios

- TIA Phase 1 (800,000 sf)
  - Early Phase Ratios (15 % more parking)
  - Constrained Ratios (10 % less parking)

- TIA Phase 2 (3,000,000 sf)
  - Constrained Ratios (A) 10 % less parking
  - Constrained Ratios (B) 20 % less parking

Sensitivity Analysis
Different Parking Ratios

- TIA Phase 1 (800,000 sf)
  - No substantial change in traffic findings
  - Fewer park & ride spaces (reduced from 460 to 290) with early phase parking ratios
  - More park & ride spaces (increased from 460 to 570) with 10 % reduction in on-site parking
  - One additional bus needed

Sensitivity Analysis
Different Parking Ratios

- TIA Phase 2 (3,000,000 sf)
  - Site-generated volumes are reduced through study area intersections, but does not change mitigation measures
  - More park & ride spaces needed
    - Increased from 1,520 to 2,030 with 10 % reduction in on-site parking
    - Increased from 1,520 to 2,540 with 20 % reduction in on-site parking
  - More transit service needed
    - 14 additional buses in service with 10 % reduction
    - 20 additional buses in service with 20 % reduction

2015 Mitigation Summary

- Traffic Mitigation
  - Lane designation and signal system changes
  - Additional turn lane at Martin Luther King, Jr. Blvd and Estes Drive
  - Signalize Martin Luther King, Jr. Blvd and Airport Drive (for transit connection)
  - Signalized site access from Estes Drive aligned with Airport Drive
- Traffic Calming
  - Further exploration with neighborhoods on roadways expected to carry Carolina North traffic

2015 Mitigation Summary

- Pedestrian and Bicycle Facilities
  - Complete sidewalk network near Carolina North
  - Provide more crossing opportunities
  - Complete bicycle lane network near Carolina North
- Transit
  - Route adjustments to provide stops within the site
  - Fleet increases to support additional ridership and longer travel times
  - Signal priority & potential bus lanes on Martin Luther King, Jr. Blvd.
  - Park & ride increases

2025 Mitigation Summary

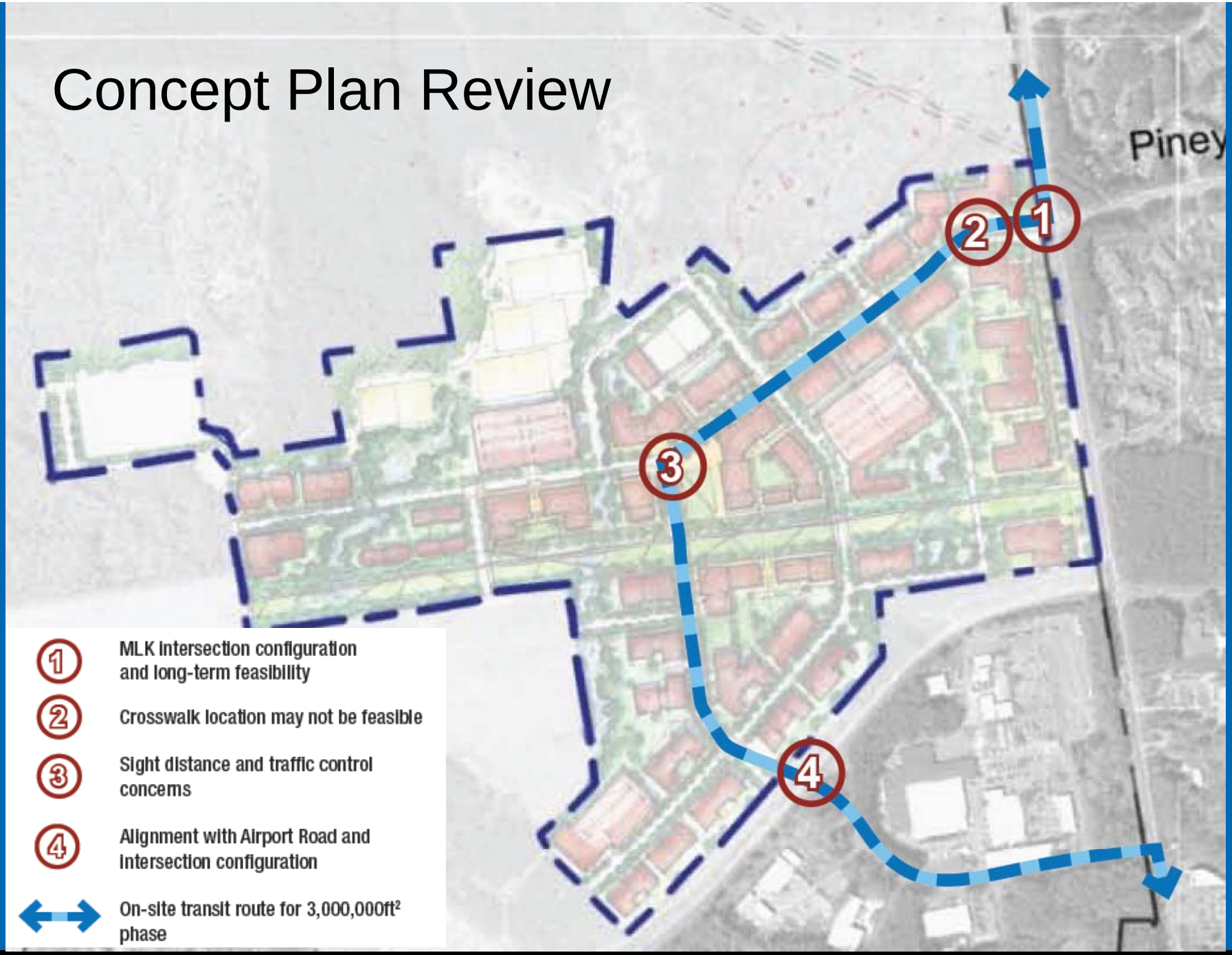
- Traffic Mitigation
  - Reconstruct Martin Luther King, Jr. Blvd from north of Piney Mountain Road to south of Airport Drive
  - Reconstruct Estes Drive from west of Airport Drive to east of Martin Luther King, Jr. Blvd
  - Evaluate potential signalization/roundabout at:
    - Homestead Road at Weaver Dairy Road Extension
    - Homestead Road at Rogers Road
  - Turn lane additions at several other intersections (see map)

- Traffic Calming
  - Monitor traffic conditions in residential neighborhoods for traffic calming implementation

2025 Mitigation Summary

- Pedestrian and Bicycle Facilities
  - Provide improved pedestrian and bicycle facilities with reconstruction of Martin Luther King, Jr. Blvd and Estes Drive
- Transit
  - Additional route adjustments to provide stops within the site
  - Additional fleet increases to support additional ridership and longer travel times
  - Additional park & ride increases
  - Potential route restructuring to provide more direct routes to Carolina North

Concept Plan Review



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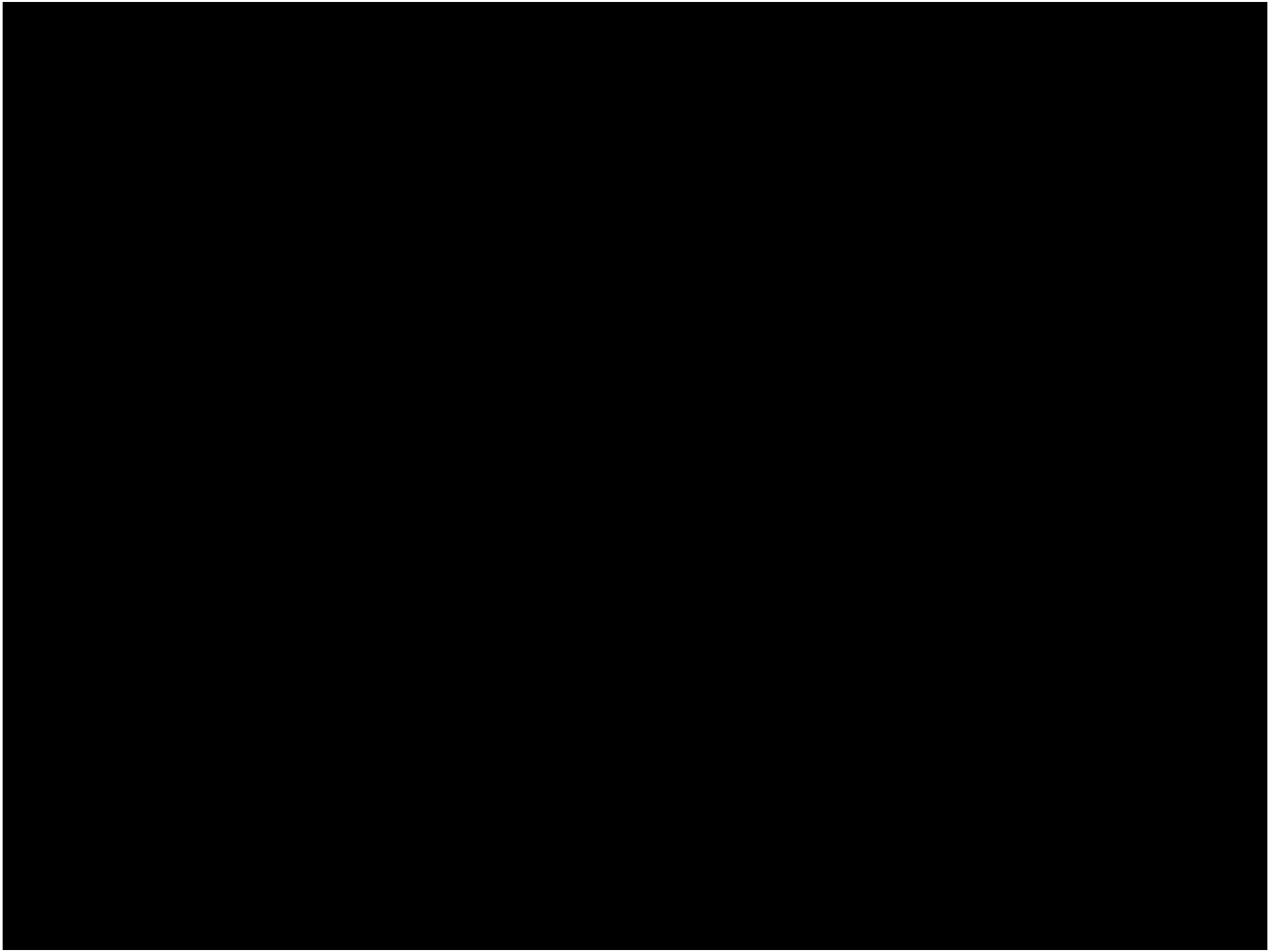
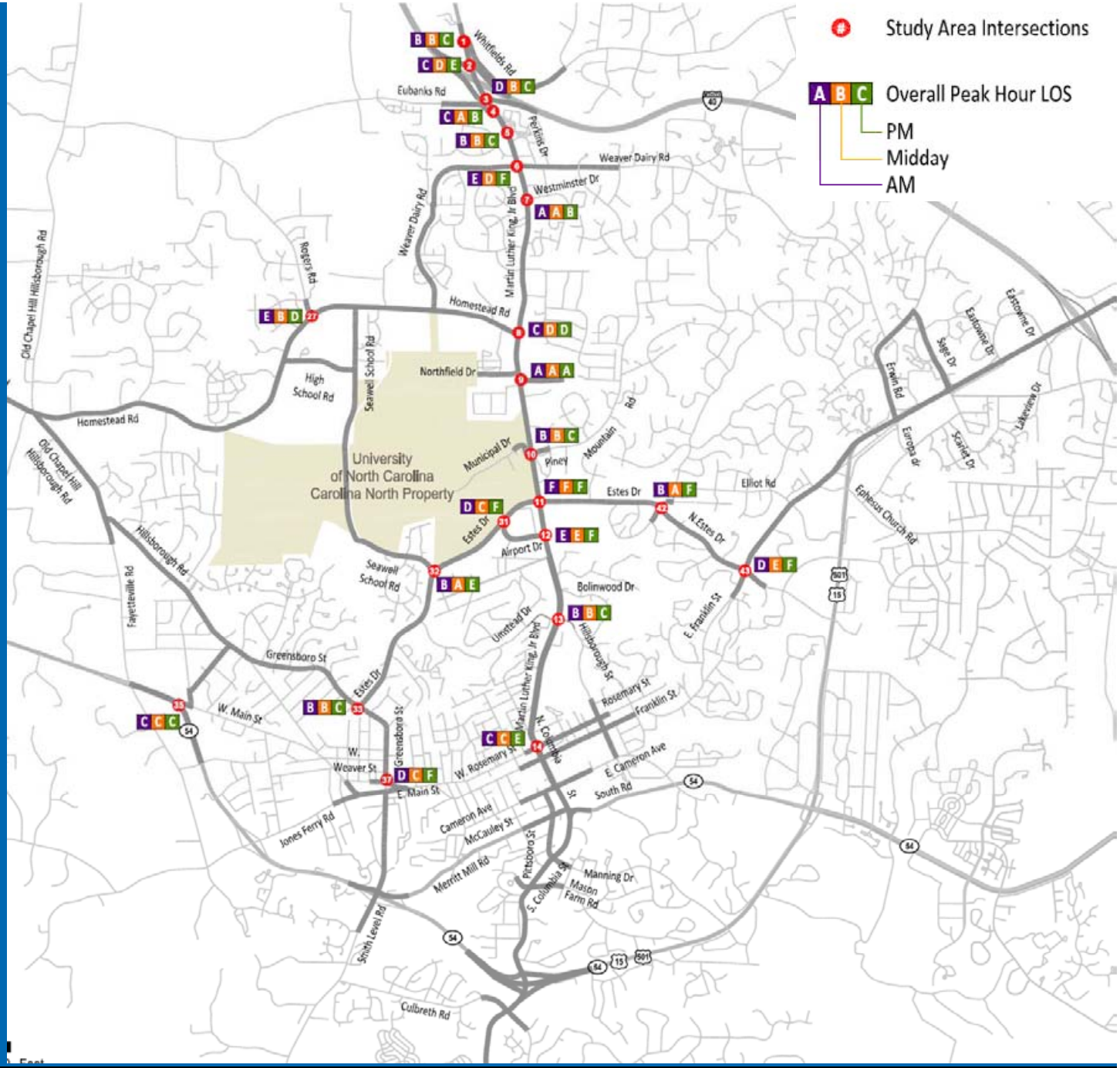
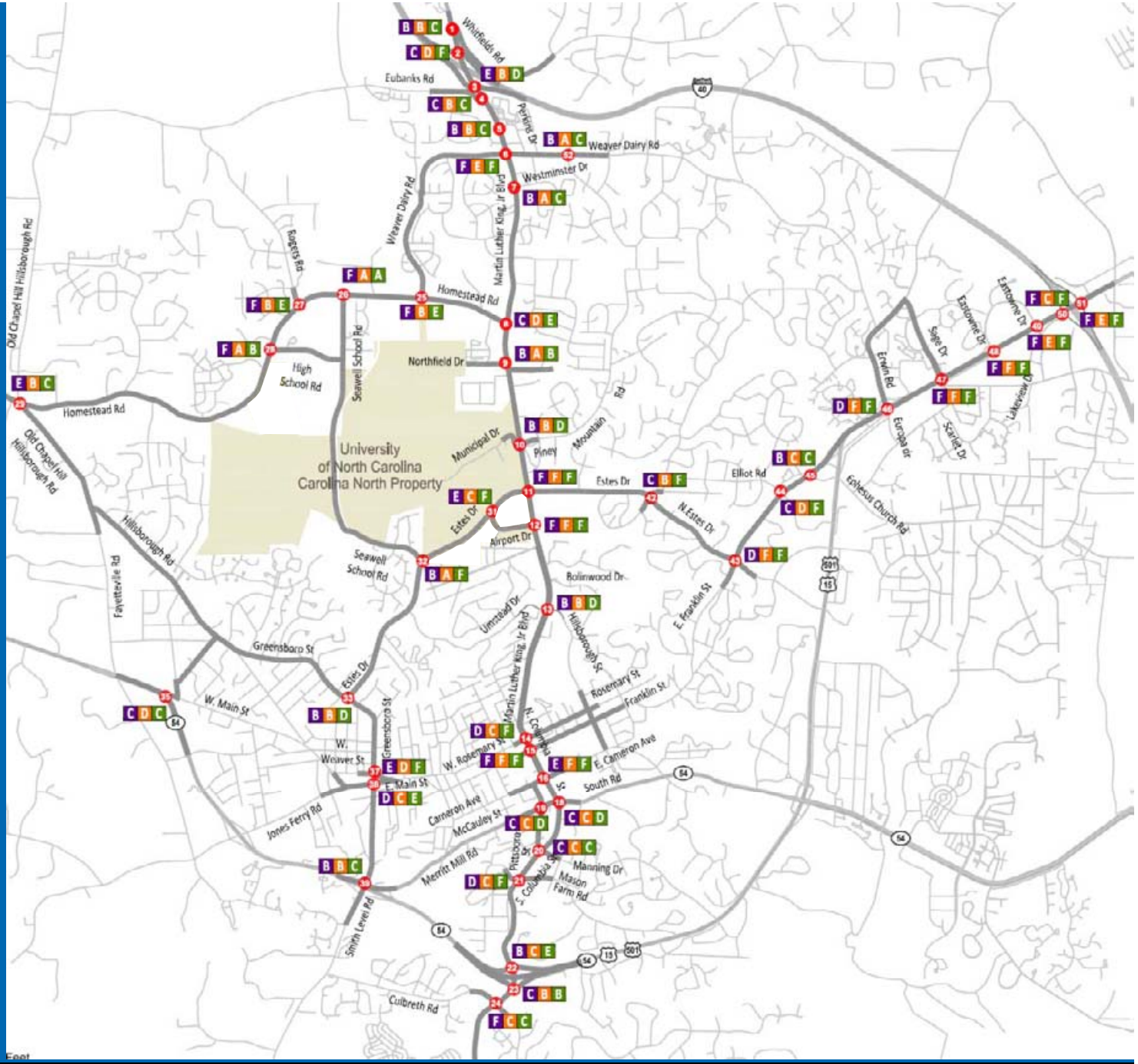
Question and Comments



2015 No-Build Intersection Level-of-Service



2025 No-Build Intersection Level-of-Service



Air Quality/Greenhouse Gas

Pollutant	2009 Existing Condition	2015 No-Build Condition	2015 Build Condition	2015 Build with Mitigation[2]	2015 "Early Phase Ratio" Build[2]	2015 "Constrained Ratio" Build (10%)[2]
Carbon Dioxide (CO_2)[1]	94,096.7	114,600.3	152,322.3	152,297.1	158,427.2	152,216.3
Build vs. Mitigation Scenario Difference				-25.20	+6,104.90	-80.80[3]
Pollutant		**2025 No-Build Condition**	**2025 Build Condition**	**2025 Build with Mitigation[2]**	**2025 "Constrained Ratio" Build (10%)[2]**	**2025 "Constrained Ratio" Build (20%)[2]**
Carbon Dioxide (CO_2)		112,143.1	191,460.0	191,017.6	191,157.0	190,912.0
Build vs. Mitigation Scenario Difference				-442.40	-303.00	-548.00

1 Tons per Day

2 The proposed improvements are described in Chapter 5 – *Mitigation Measures/Recommendations*.

3 Scaled based on 3 msf output due to model inconsistency

Mobile source improvements include the proposed roadway/traffic improvements and parking constraint scenarios.