



TRANSPORTATION IMPACT ANALYSIS CAROLINA NORTH DEVELOPMENT

May 11, 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 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)
- Consultant Presentation of the TIA
- Preliminary Town Staff Review Comments/Recommendations
- Next Step



Introduction

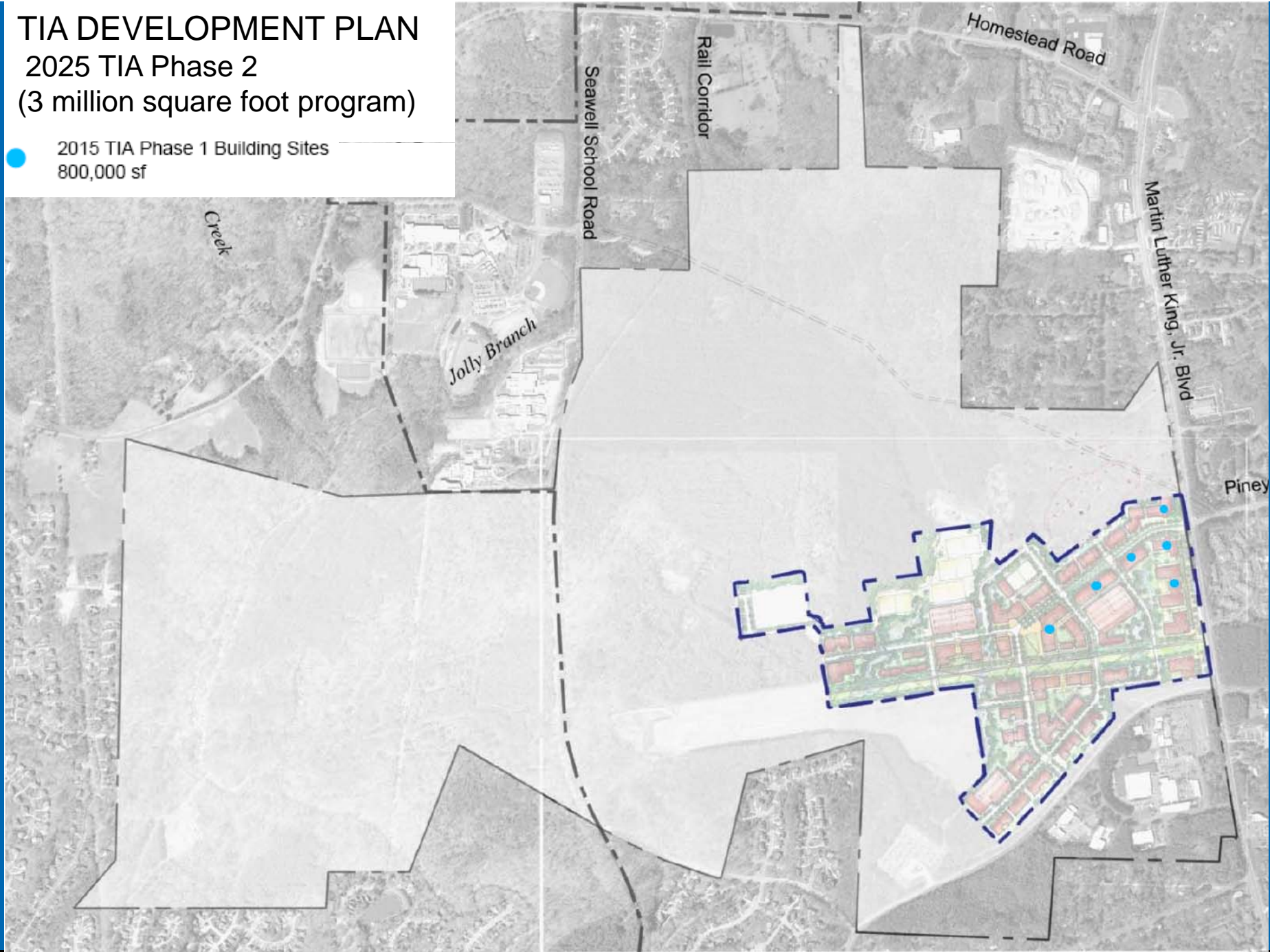
- Topics addressed by the TIA
 - Existing and future conditions assessment (without the project)
 - Trip generation, mode split, and trip distribution
 - Assessment of parking supply on transportation impacts
 - Traffic impacts (traffic operations and neighborhood impacts)
 - Transit impacts
 - Pedestrian 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)

● 2015 TIA Phase 1 Building Sites
800,000 sf





● 2015 TIA Phase 1 Building Sites
800,000 sf



Analysis Scenarios

- 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.



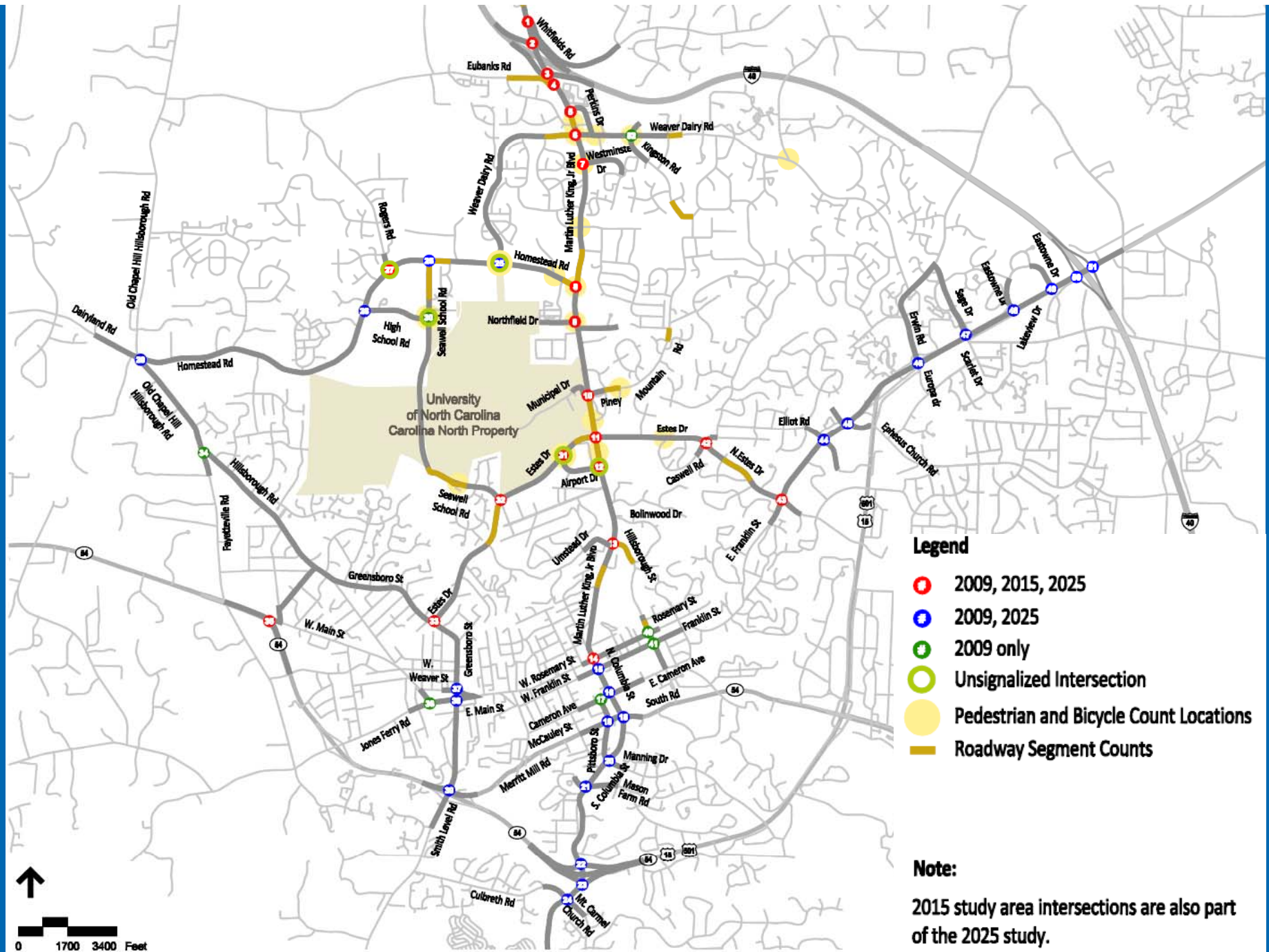
TRANSPORTATION IMPACT ANALYSIS (TIA) CAROLINA NORTH DEVELOPMENT

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



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.





Existing Traffic Volumes

Martin Luther King, Jr. Blvd. +/- 28,000 vpd
(near Homestead Road)

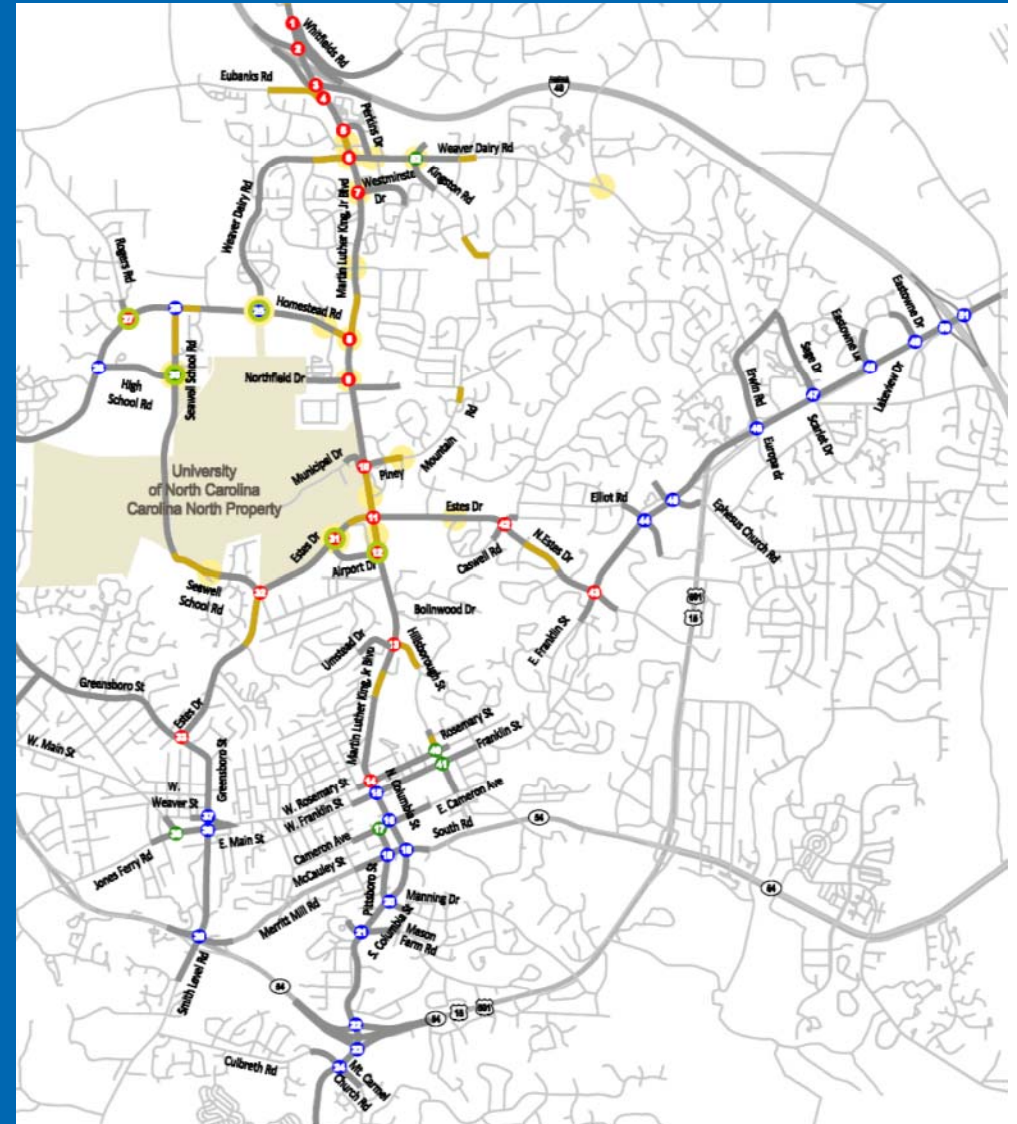
Estes Drive +/- 13,000 vpd
(near Caswell Road)

Homestead Road +/- 9,500 vpd
(west of Martin Luther King, Jr. Blvd)

Hillsborough Street +/- 7,800 vpd
(east of Martin Luther King, Jr. Blvd)

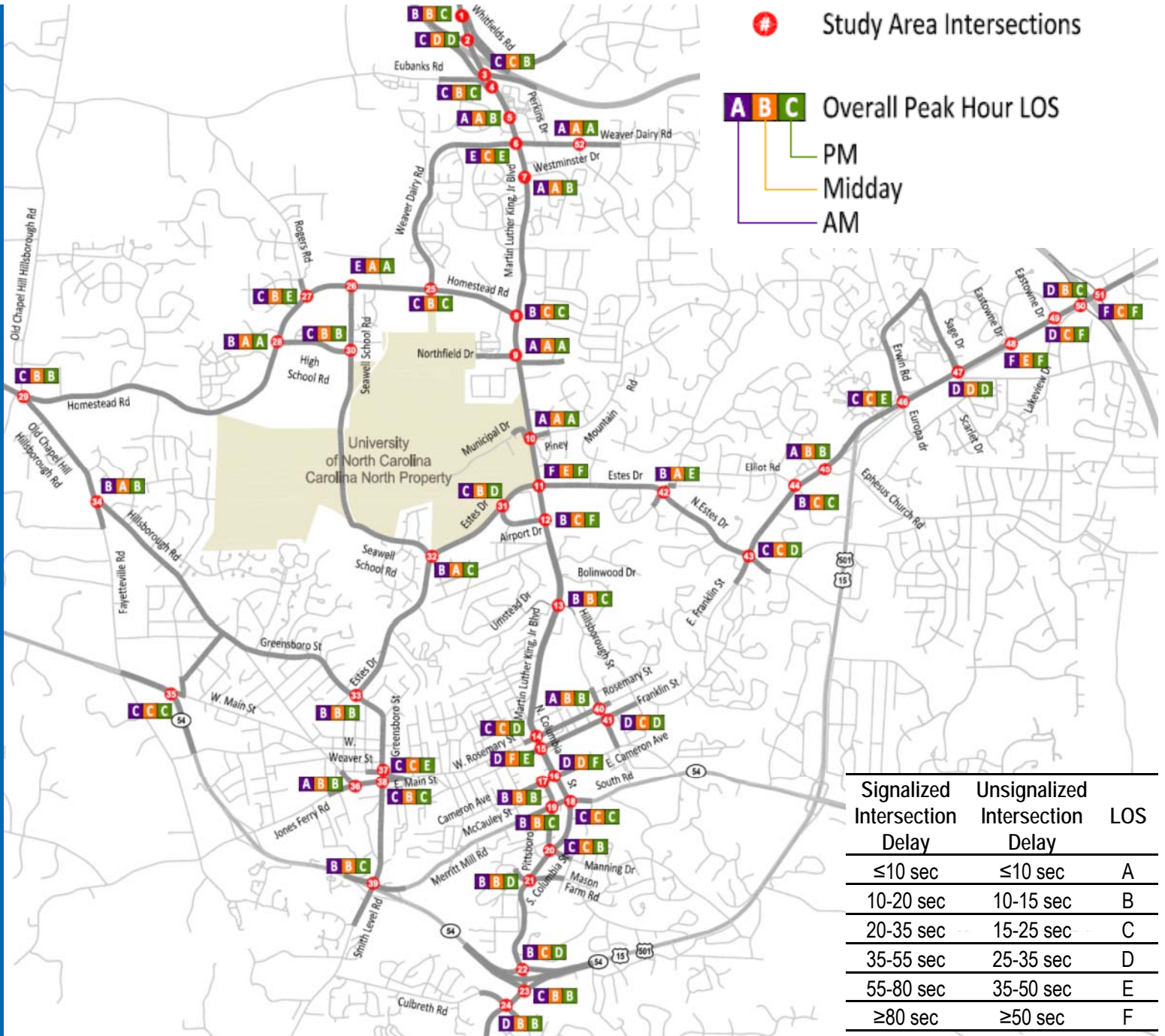
Seawell School Road +/- 4,500 vpd
(west of Martin Estes Drive)

Piney Mountain Road +/- 2,900 vpd
(east of Martin Luther King, Jr. Blvd)



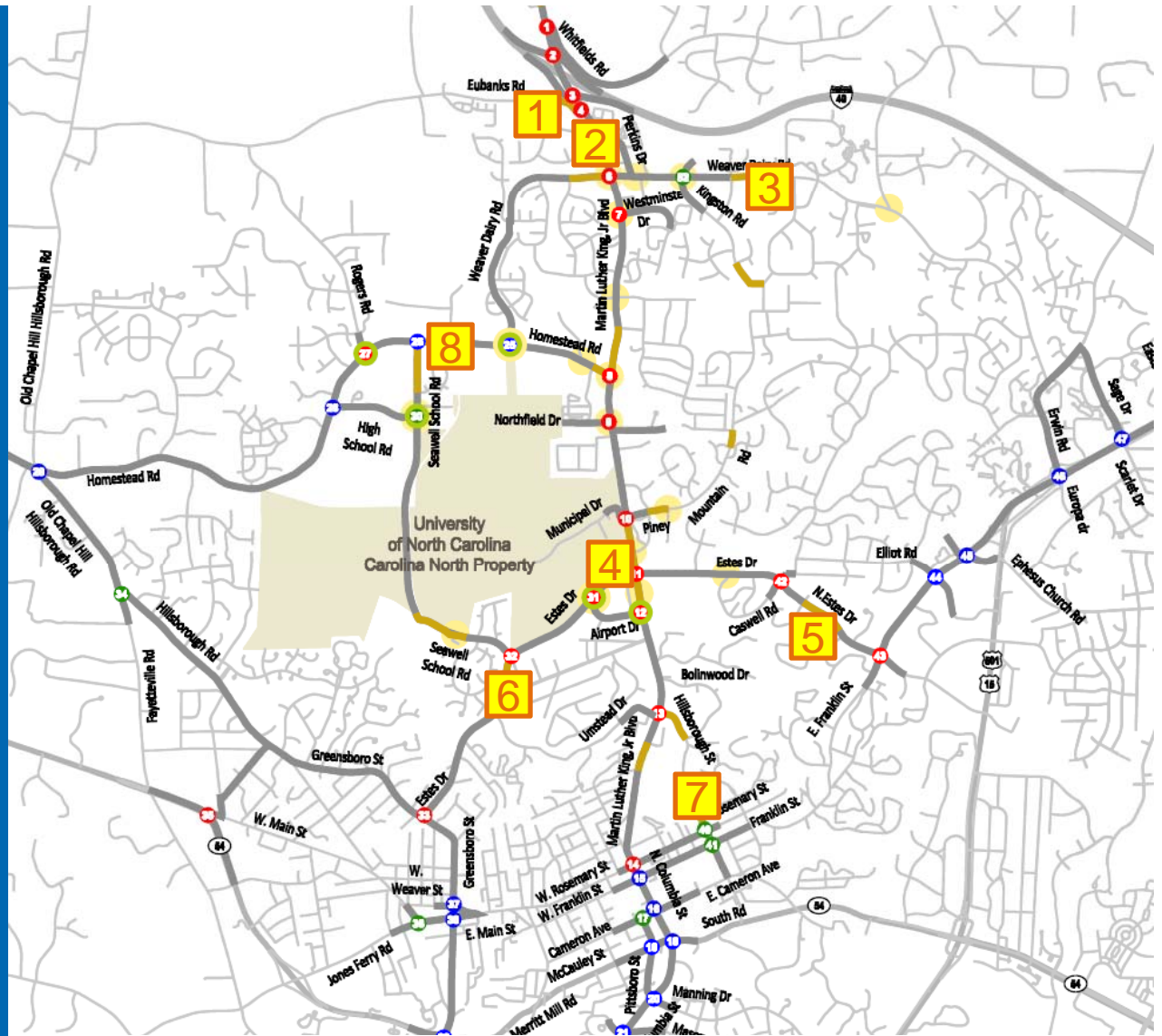


Existing Traffic Operations





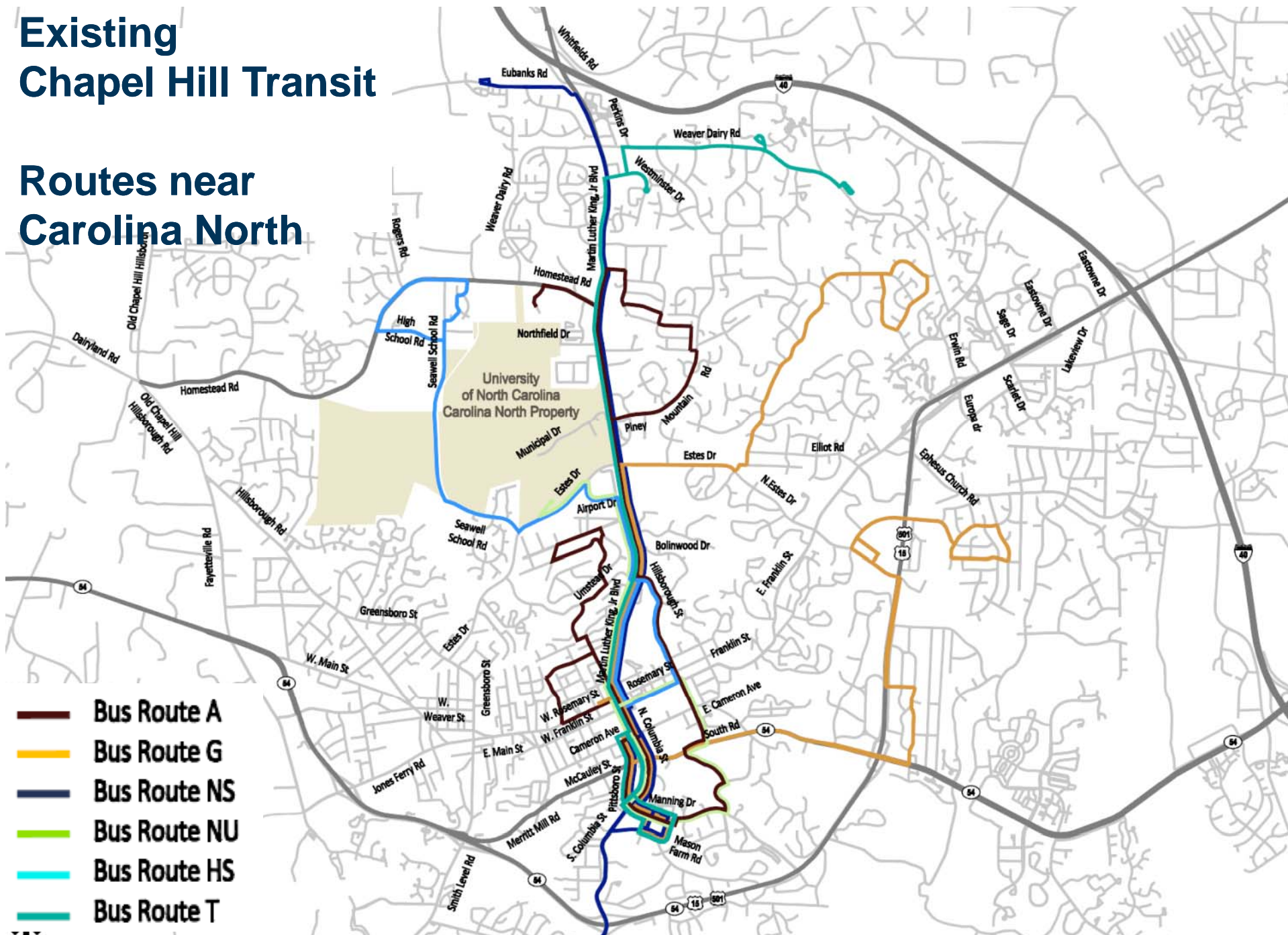
1. Eubanks Road @
2. Martin Luther King, Jr.
3. Martin Luther King, Jr. Blvd @ Northwoods Dr
4. Weaver Dairy Road @ Timberlyne Road
5. N. Estes Drive @ Halifax Road
6. N. Estes Drive @ Airport Drive
7. Estes Drive Ext @ Seawell School Road
8. Hillsborough Street @ Rosemary Street
9. Homestead Road @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

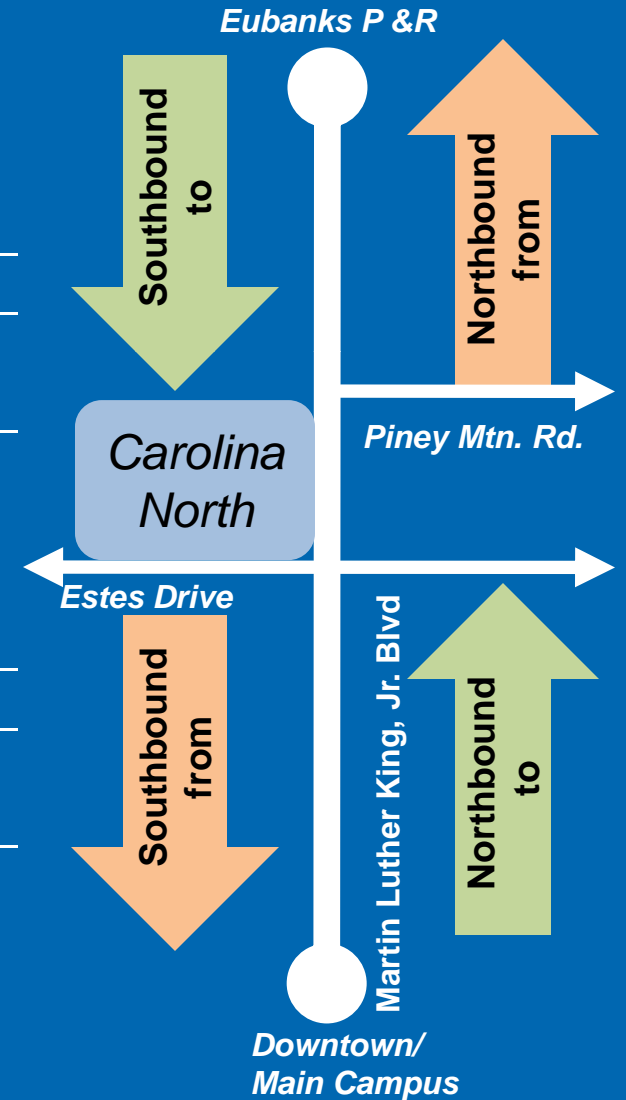
AM PEAK HOUR

To Carolina North

	Total Capacity	Existing Load	Remaining Capacity
Northbound	540	30	510
Southbound	308	157	151

From Carolina North

	Total Capacity	Existing Load	Remaining Capacity
Northbound	360	44	316
Southbound	488	252	236



For Routes A, G, NS, NU, and T only. Route HS excluded..



Existing Available Transit Capacity to & from Carolina North

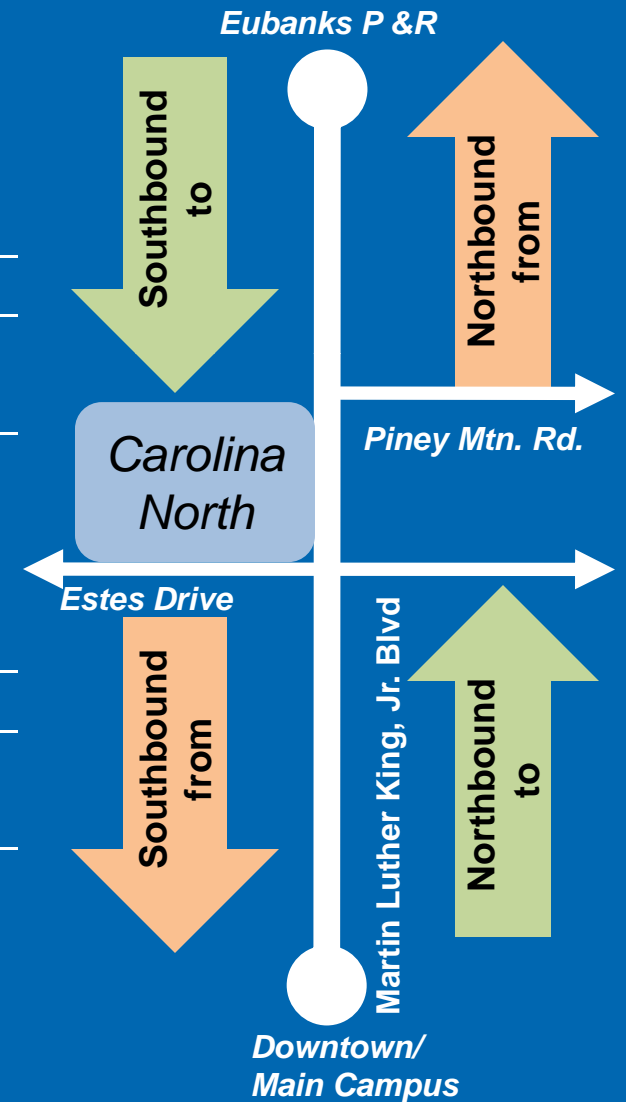
MIDDAY PEAK HOUR

To Carolina North

	Total Capacity	Existing Load	Remaining Capacity
Northbound	433	119	314
Southbound	450	87	363

From Carolina North

	Total Capacity	Existing Load	Remaining Capacity
Northbound	315	67	248
Southbound	510	140	370



For Routes A, G, NS, NU, and T only. Route HS excluded..



Existing Available Transit Capacity to & from Carolina North

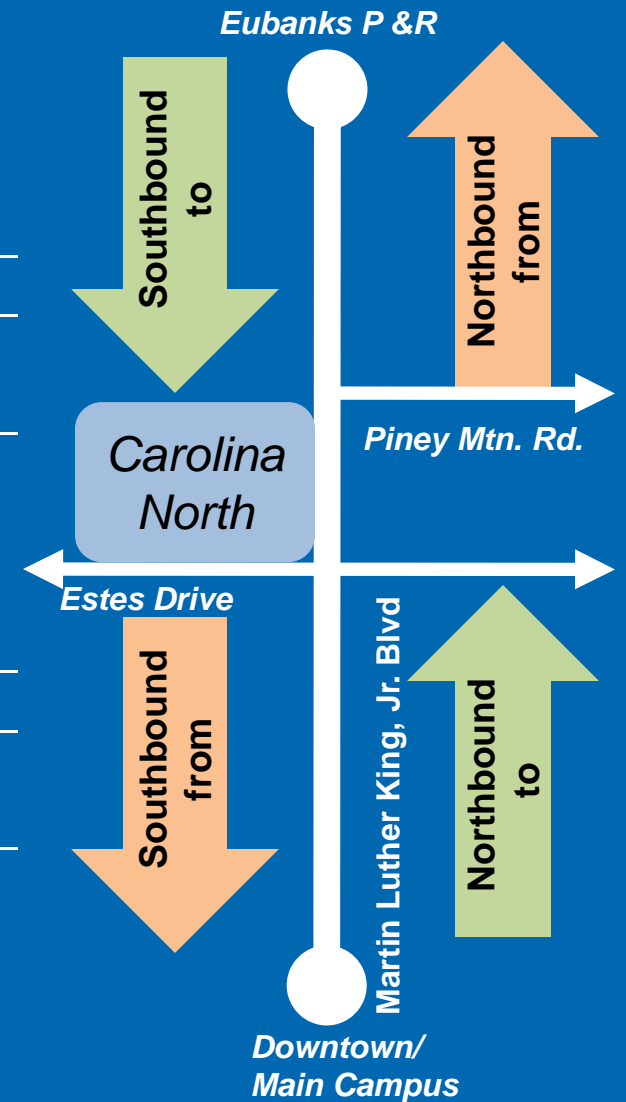
PM PEAK HOUR

To Carolina North

	Total Capacity	Existing Load	Remaining Capacity
Northbound	339	189	150
Southbound	240	34	206

From Carolina North






	Total Capacity	Existing Load	Remaining Capacity
Northbound	219	112	107
Southbound	420	49	371

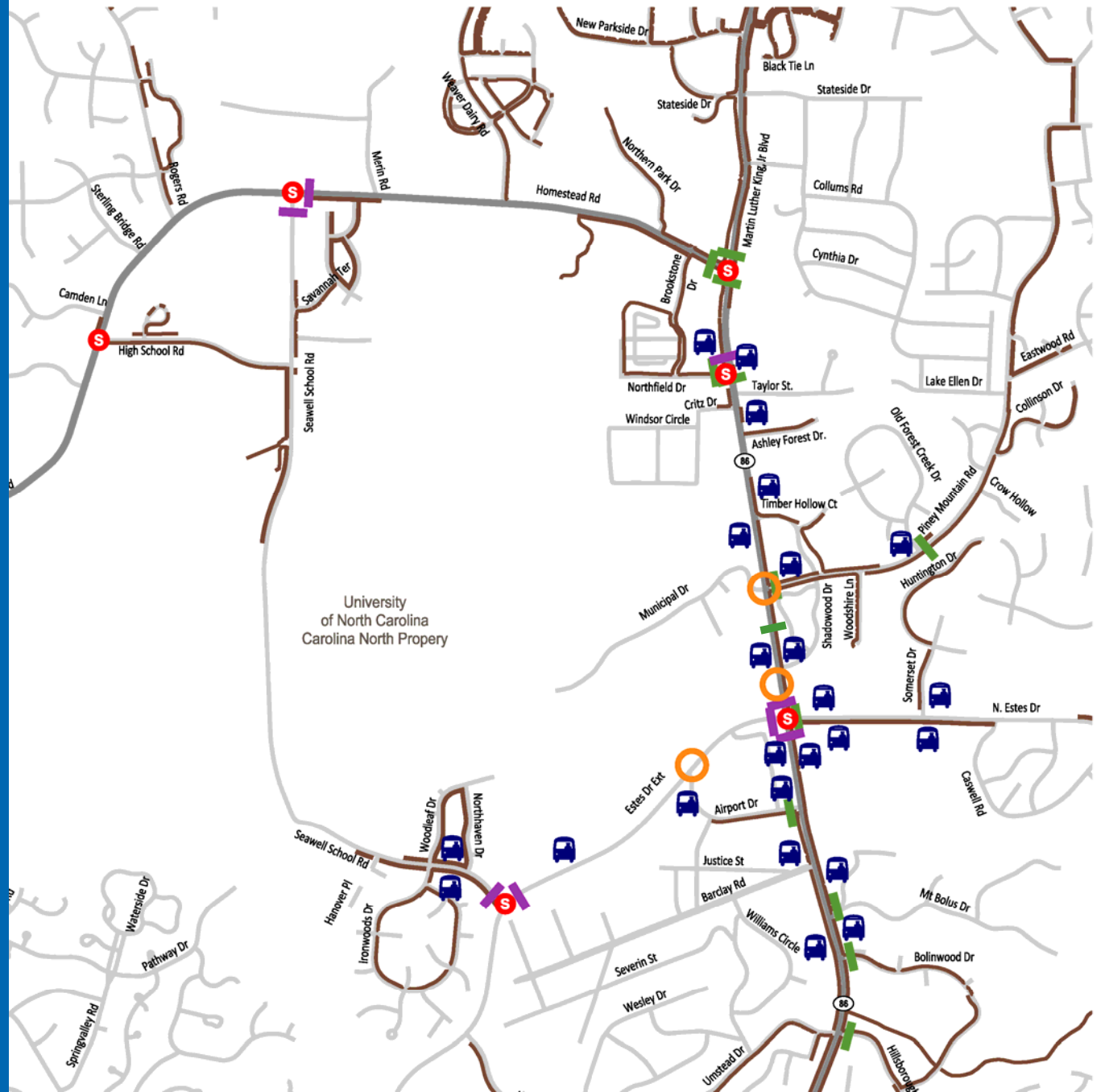


For Routes A, G, NS, NU, and T only. Route HS excluded..



Pedestrian Facilities

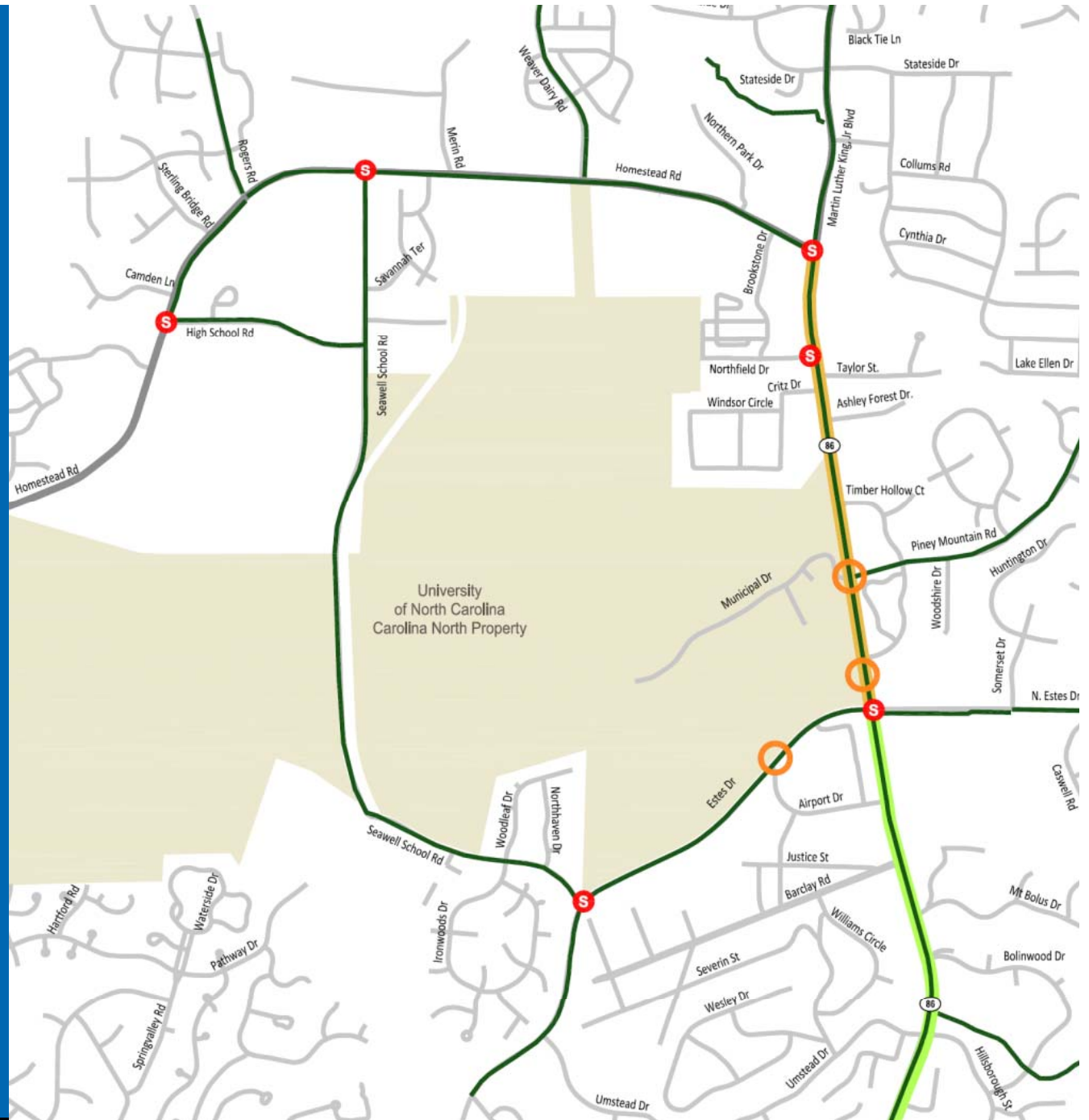
-  Signalized Intersections
-  Existing Sidewalk
-  Existing Crosswalk
-  Access Points
-  Existing Bus Stop





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



2015 (800,000 sf) Parking Ratios for Alternative Parking Analysis

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 for Alternative Parking Analysis

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



Baseline Mode Split

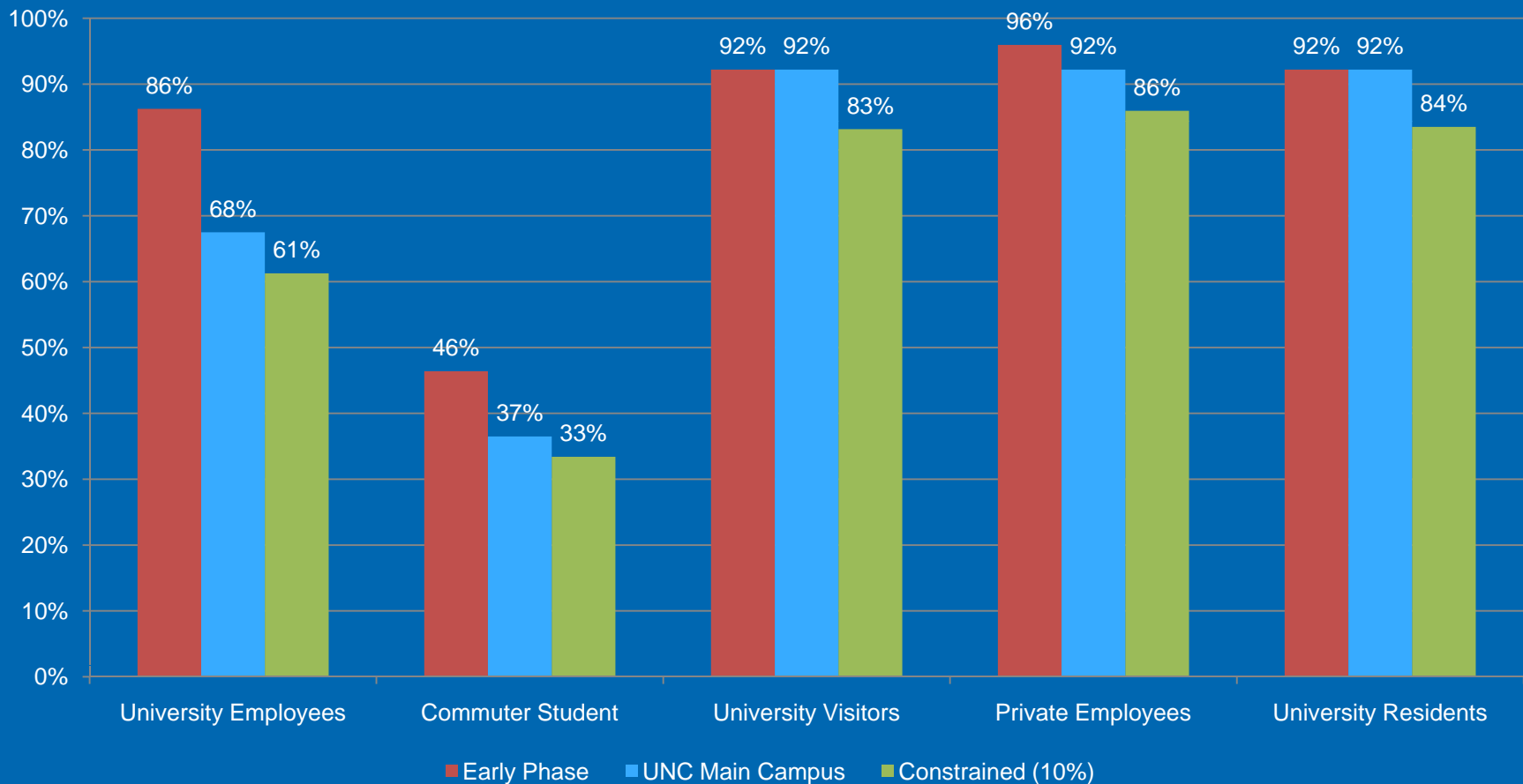
2007 University and Town-wide Employee Data

Mode	Univ. Employee	Univ. Student	Other
Drive to Site	68 %	36 %	92 %
Transit	9 %	32 %	3 %
Park & Ride	15 %	9 %	4 %
Walk/Bike	8 %	23 %	1 %
Total	100 %	100 %	100 %



Alternative Parking Analysis Mode Choice Implications

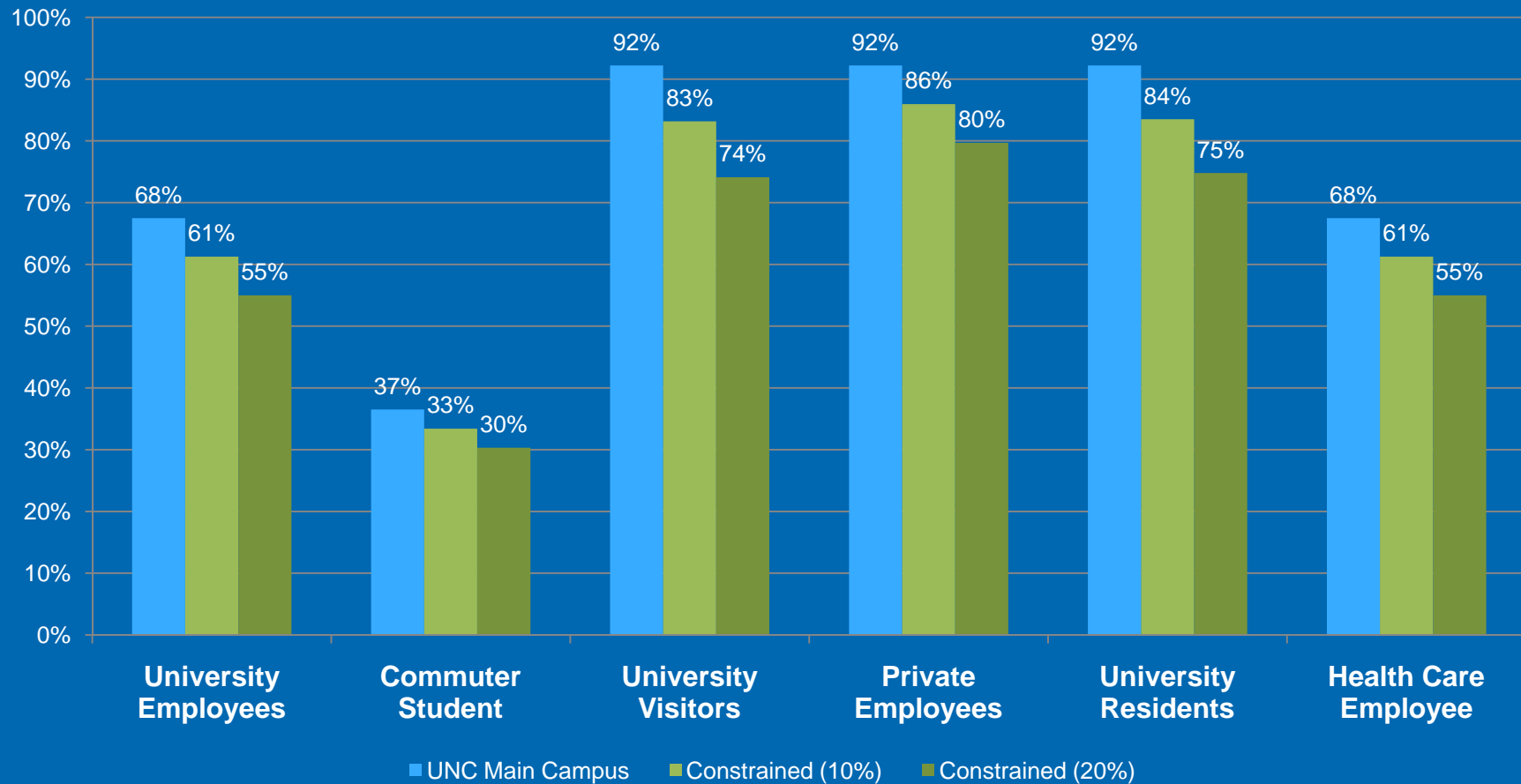
TIA Phase 1 Auto Mode Shift Due to Changes in Parking Ratio





Alternative Parking Analysis Mode Choice Implications

TIA Phase 2 Auto Mode Shift Due to Changes in Parking Ratio





Trip Generation - Baseline

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



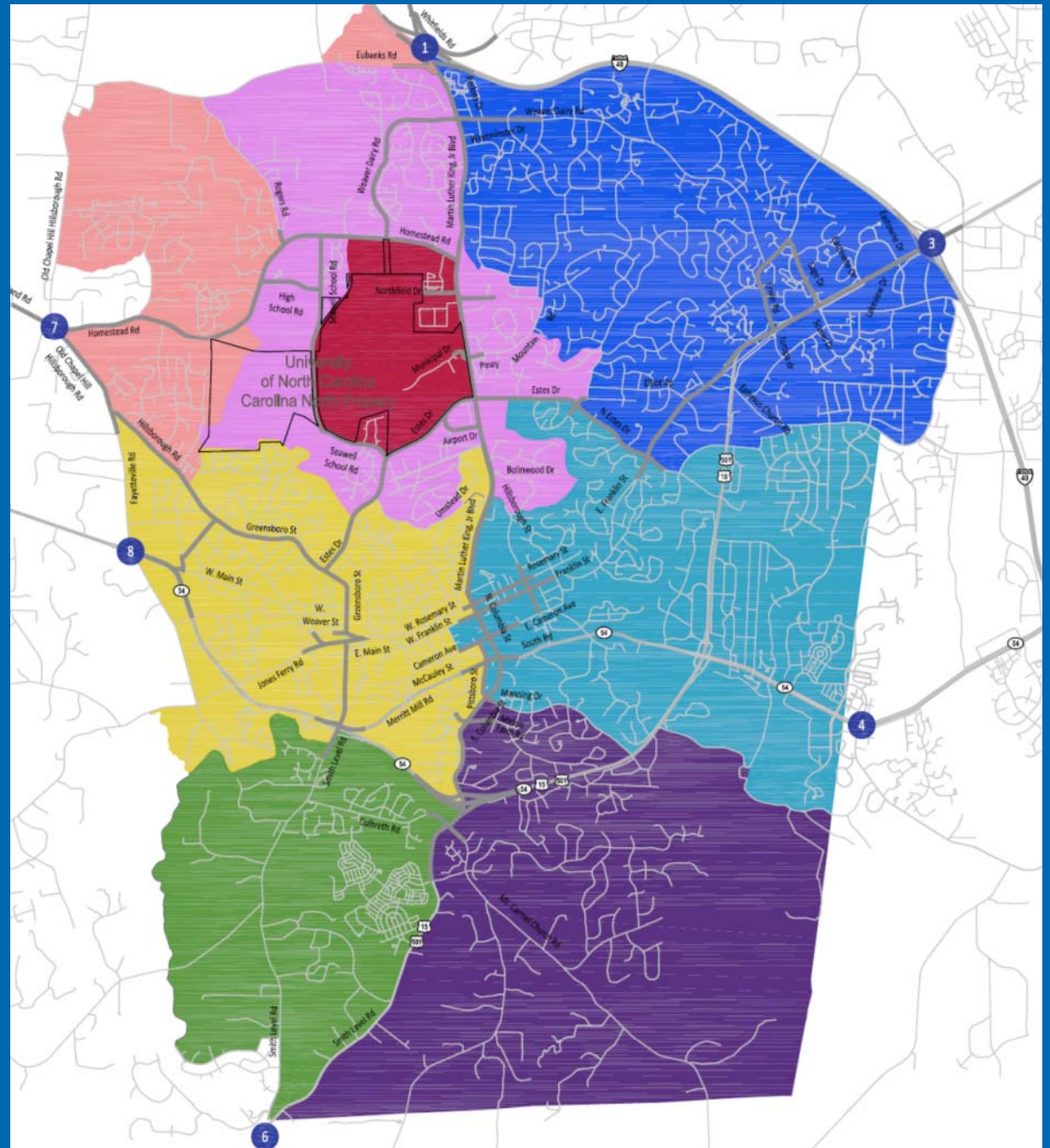
Trip Distribution

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

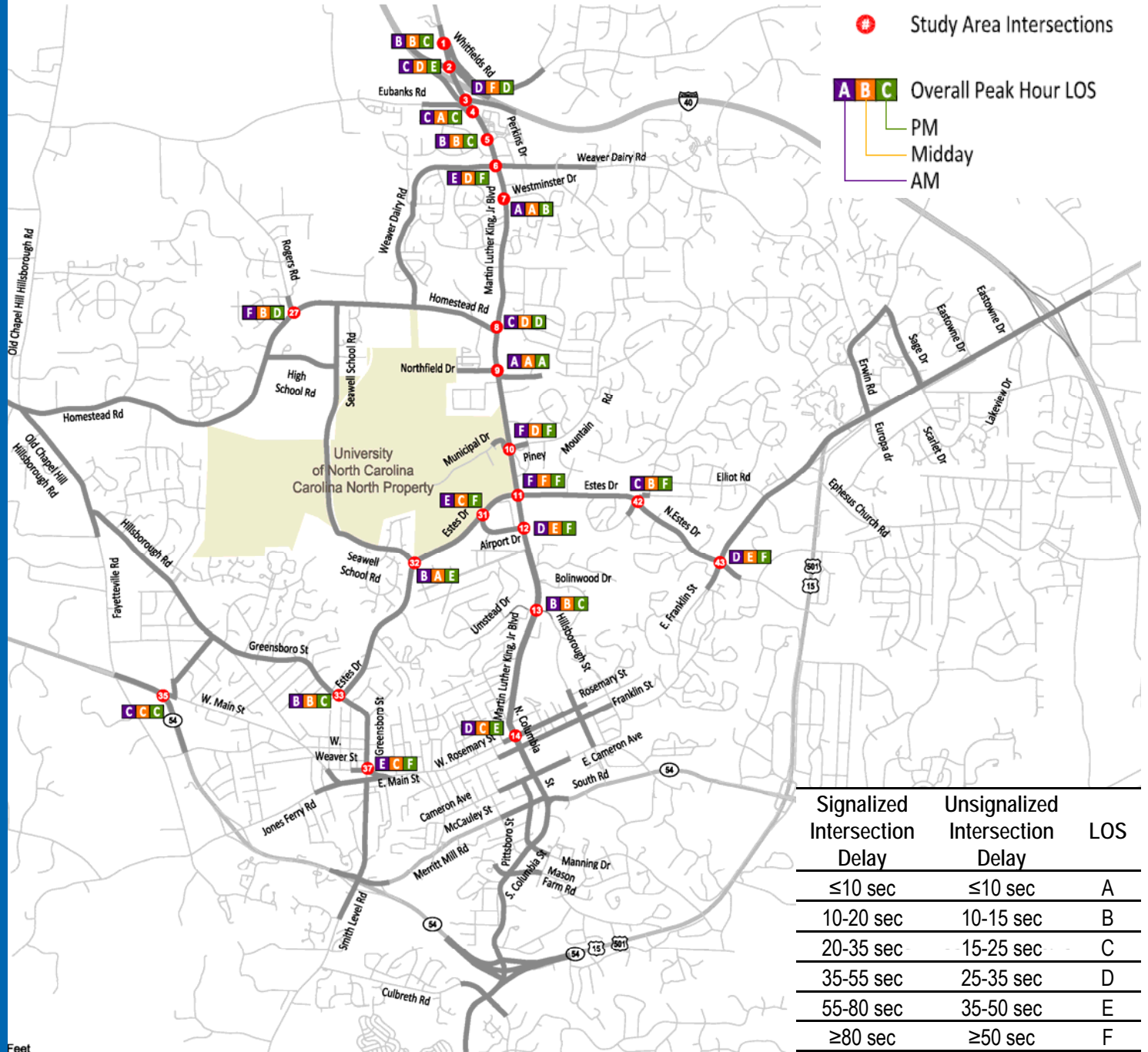
40 % within
Chapel Hill – Carrboro

60 % external to
Chapel Hill - Carrboro



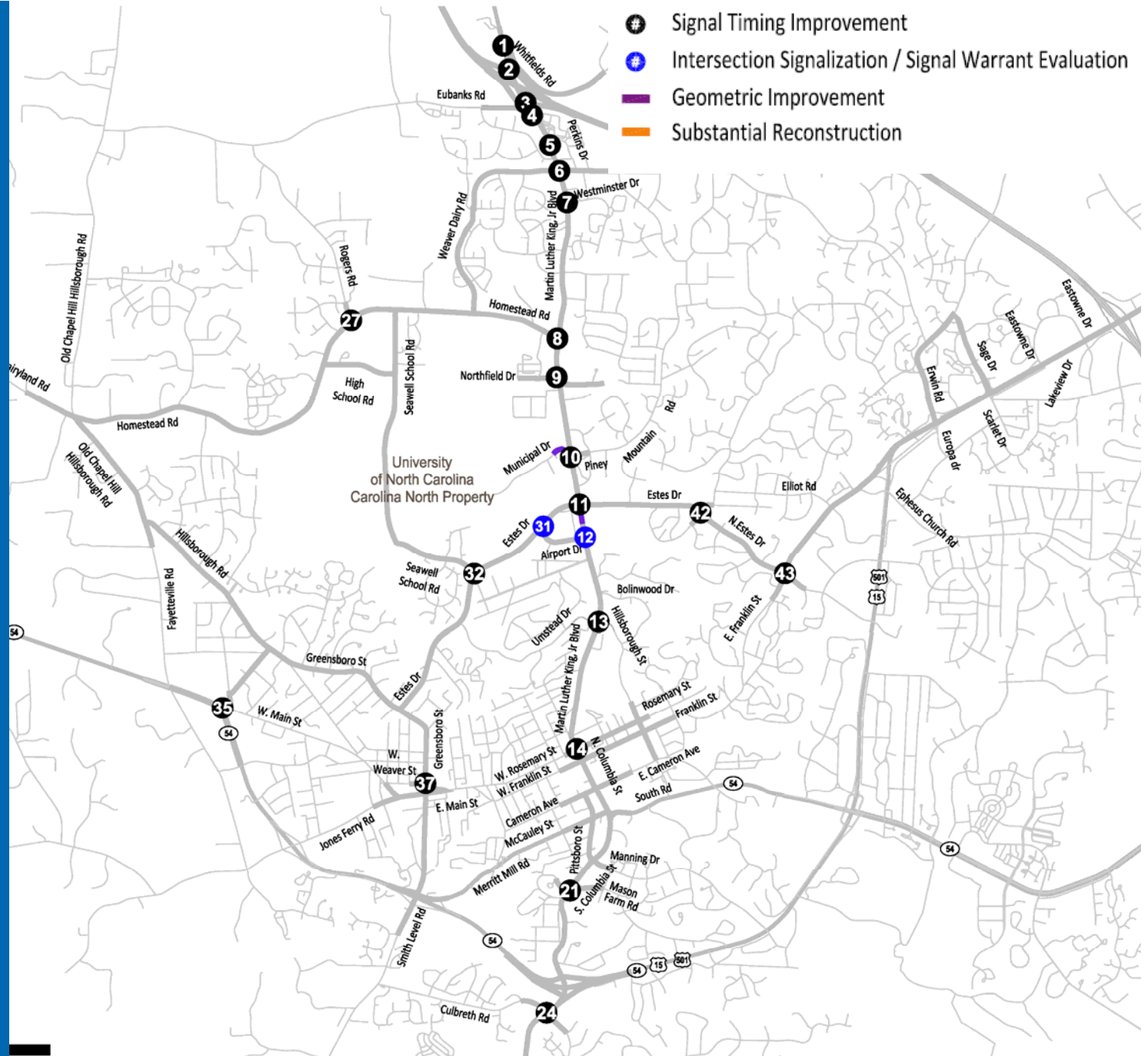


2015 Build Intersection Level-of-Service



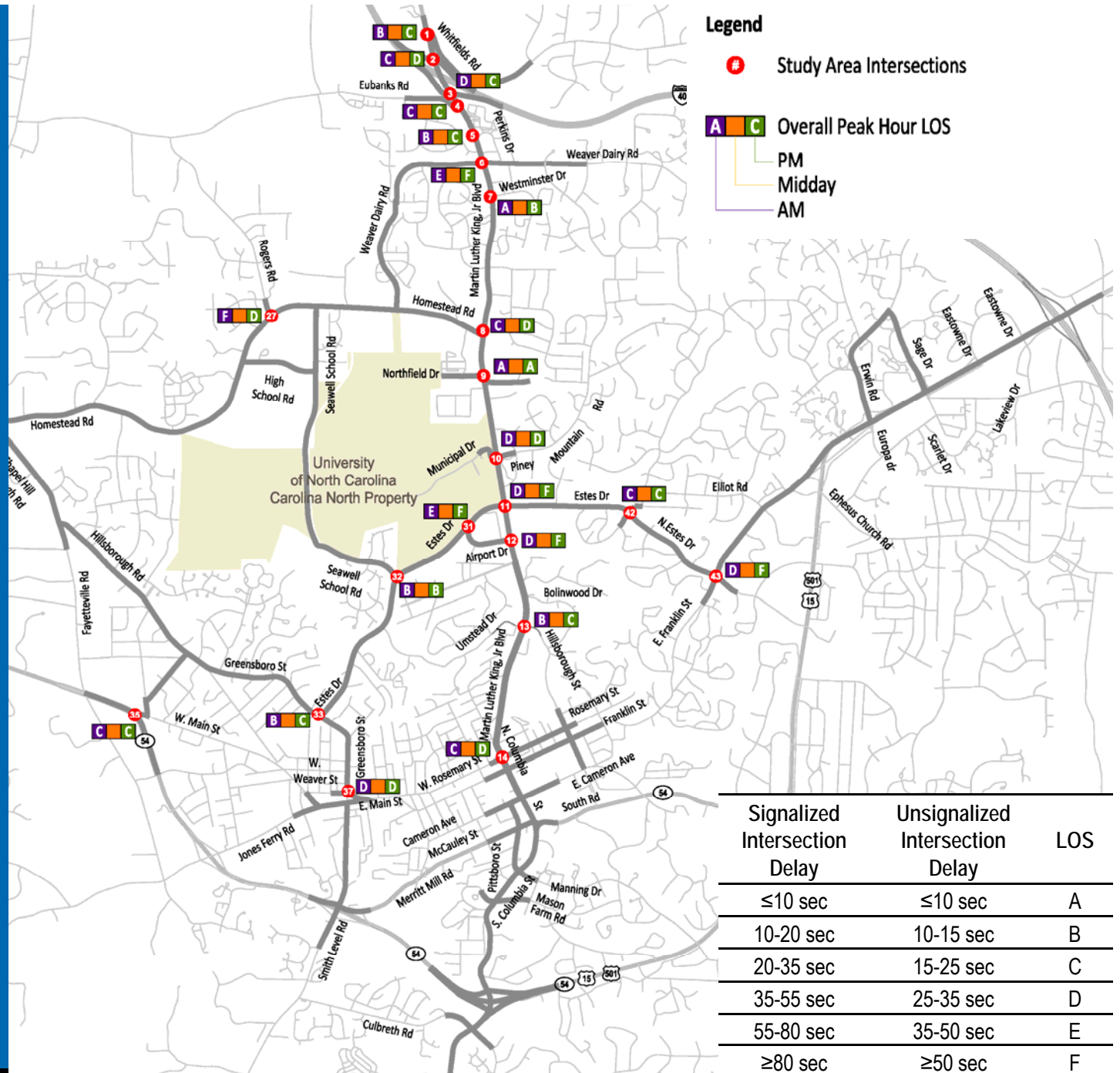


2015 Intersection Impacts and Potential Mitigation



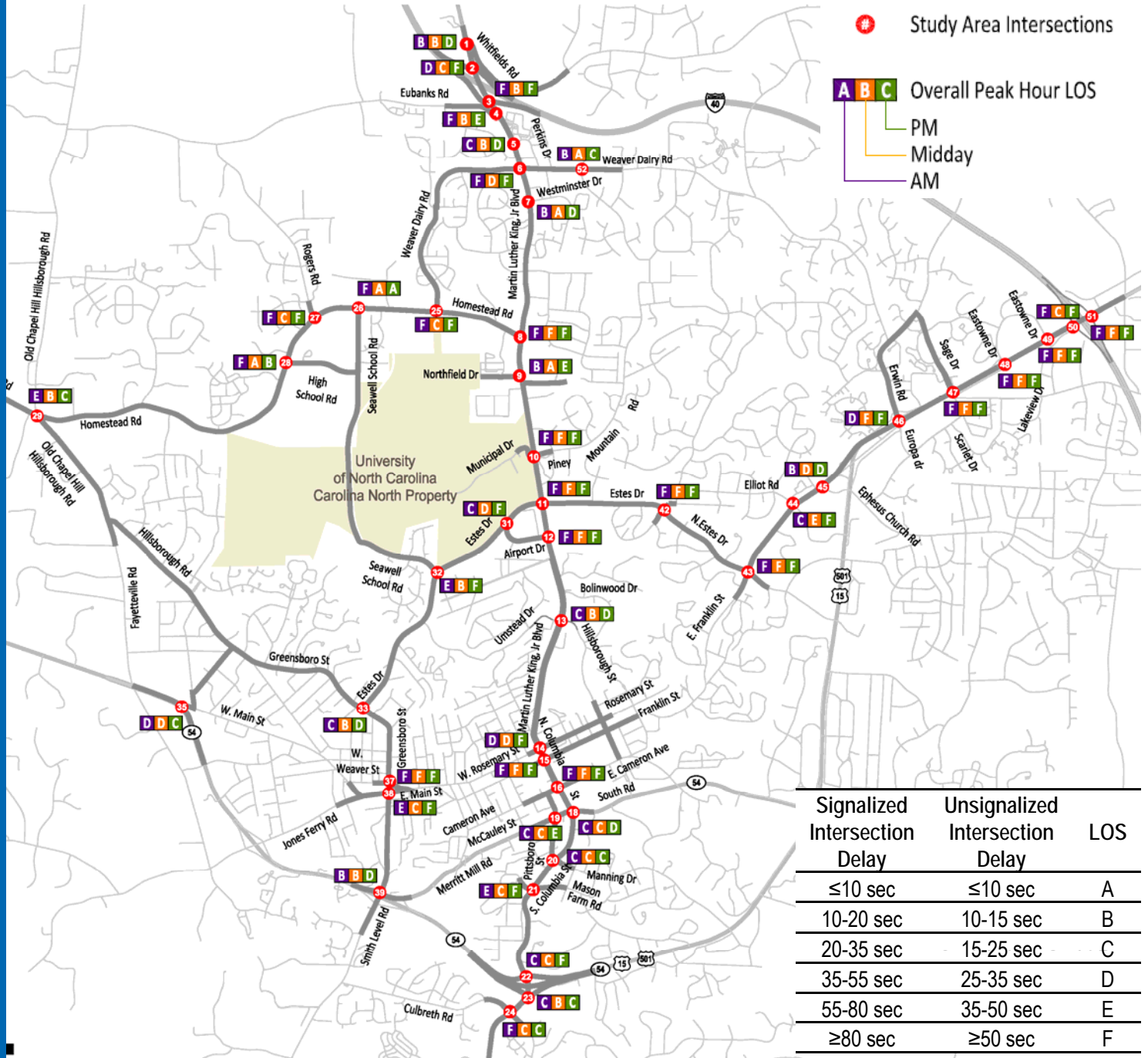


2015 Build with Mitigation Intersection Level-of-Service AM & PM



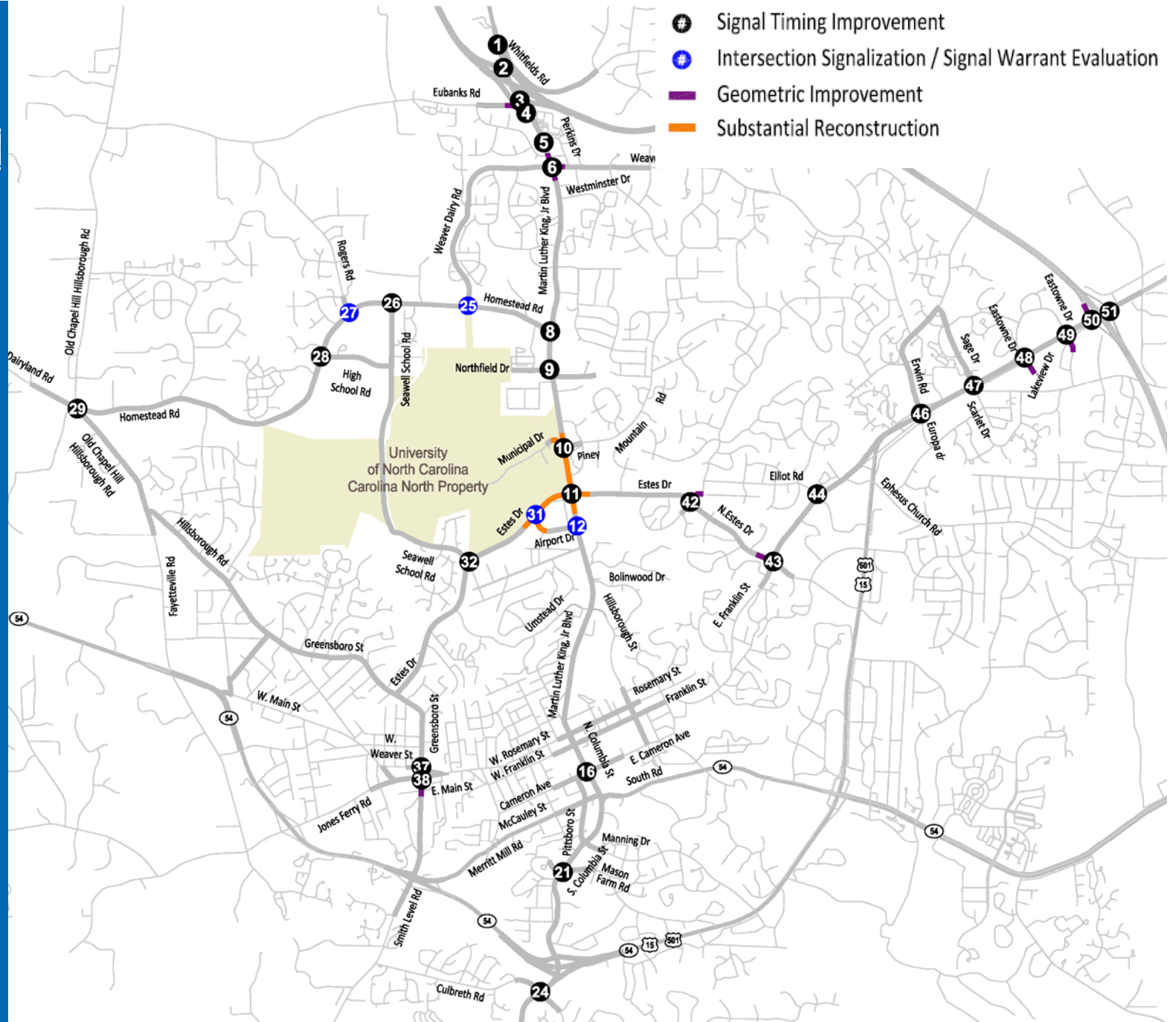


2025 Build Intersection Level-of-Service



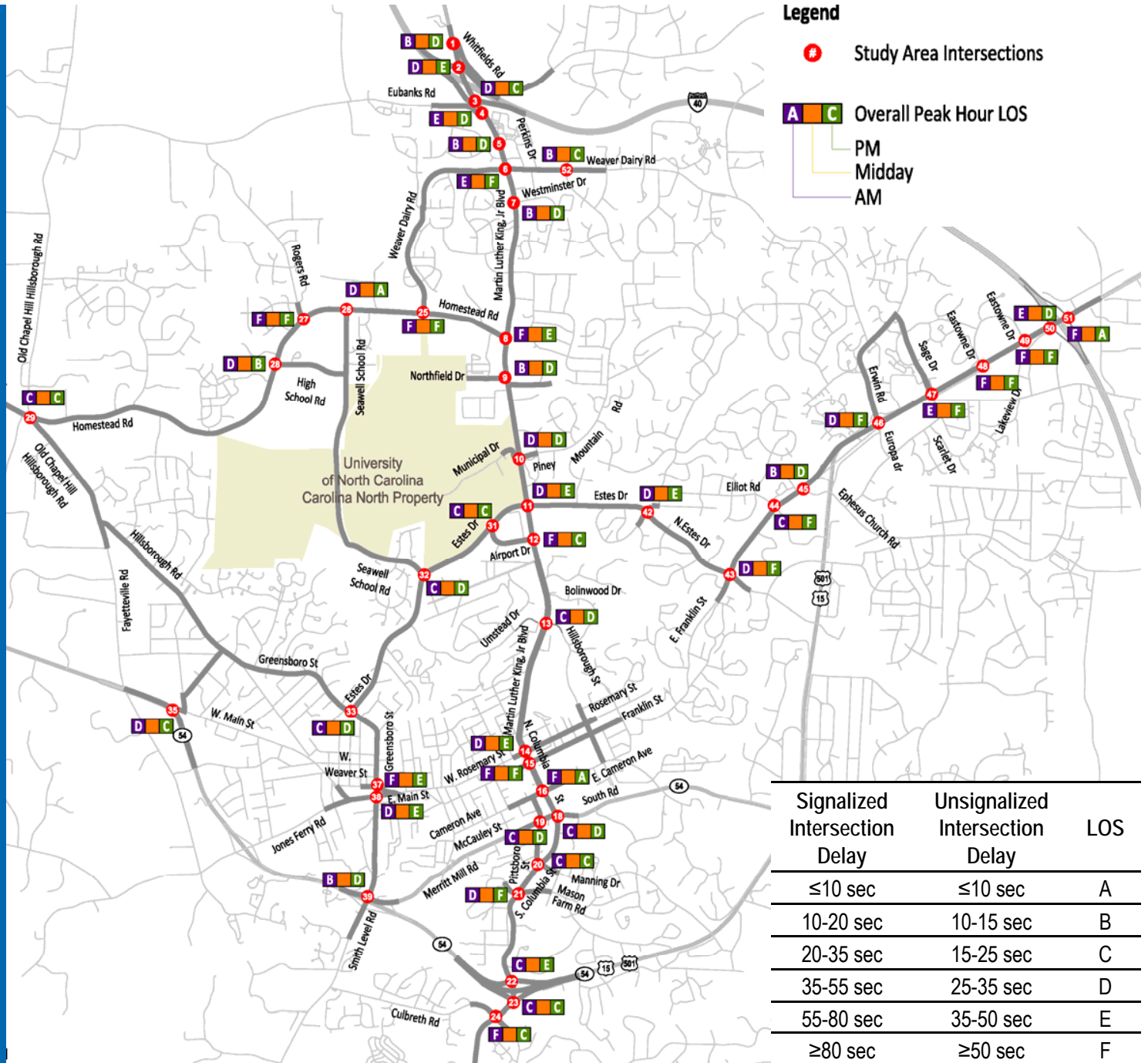


2025 Intersection Impacts and Potential Mitigation





2025 Build with Mitigation Intersection Level-of-Service AM & PM





Streets Evaluated for Traffic Calming Implementation

Carolina North Traffic Expected

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

Carolina North Traffic Possible

- Northwoods Road
- North Lakeshore Drive
- Barclay Road

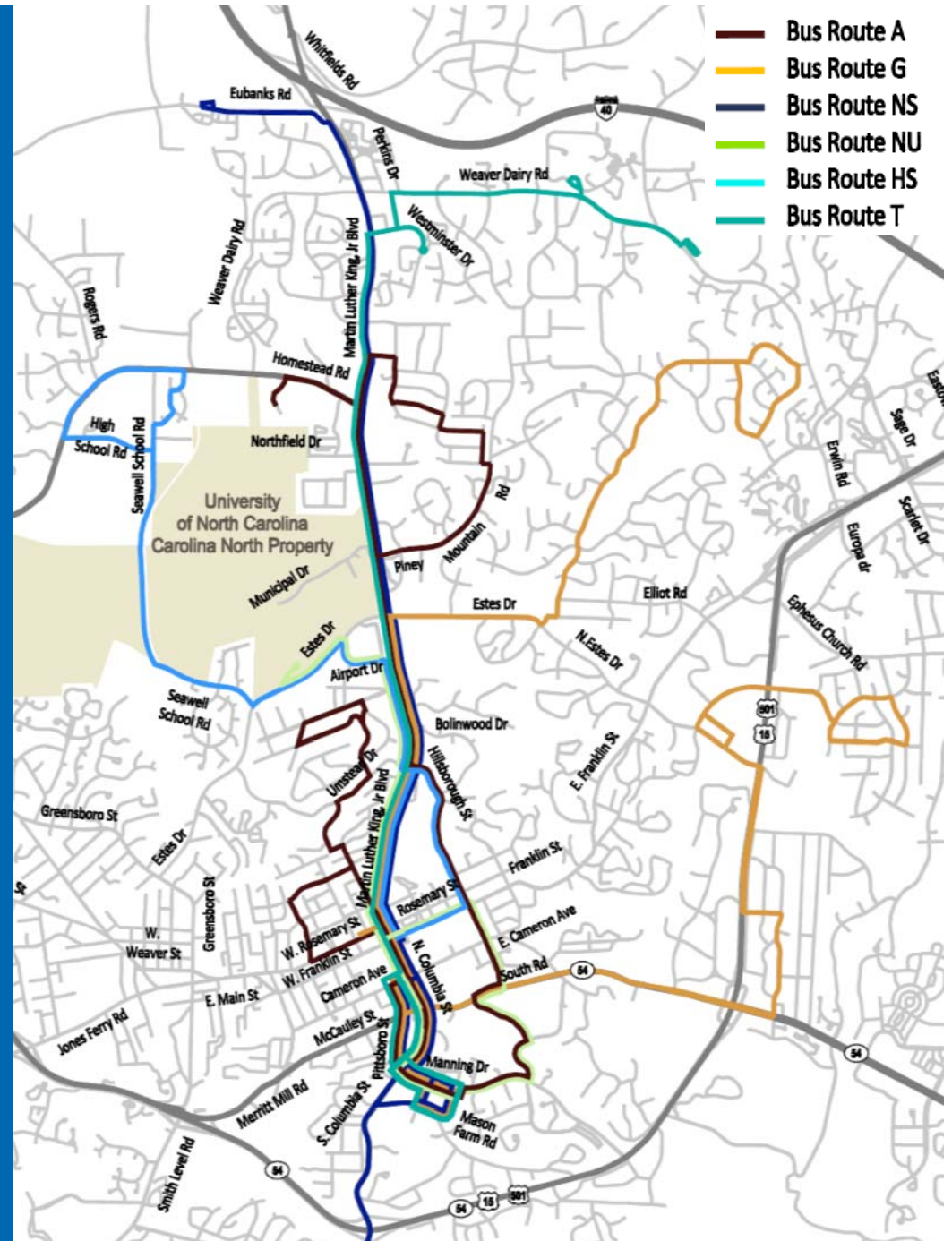




Transit Impacts

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

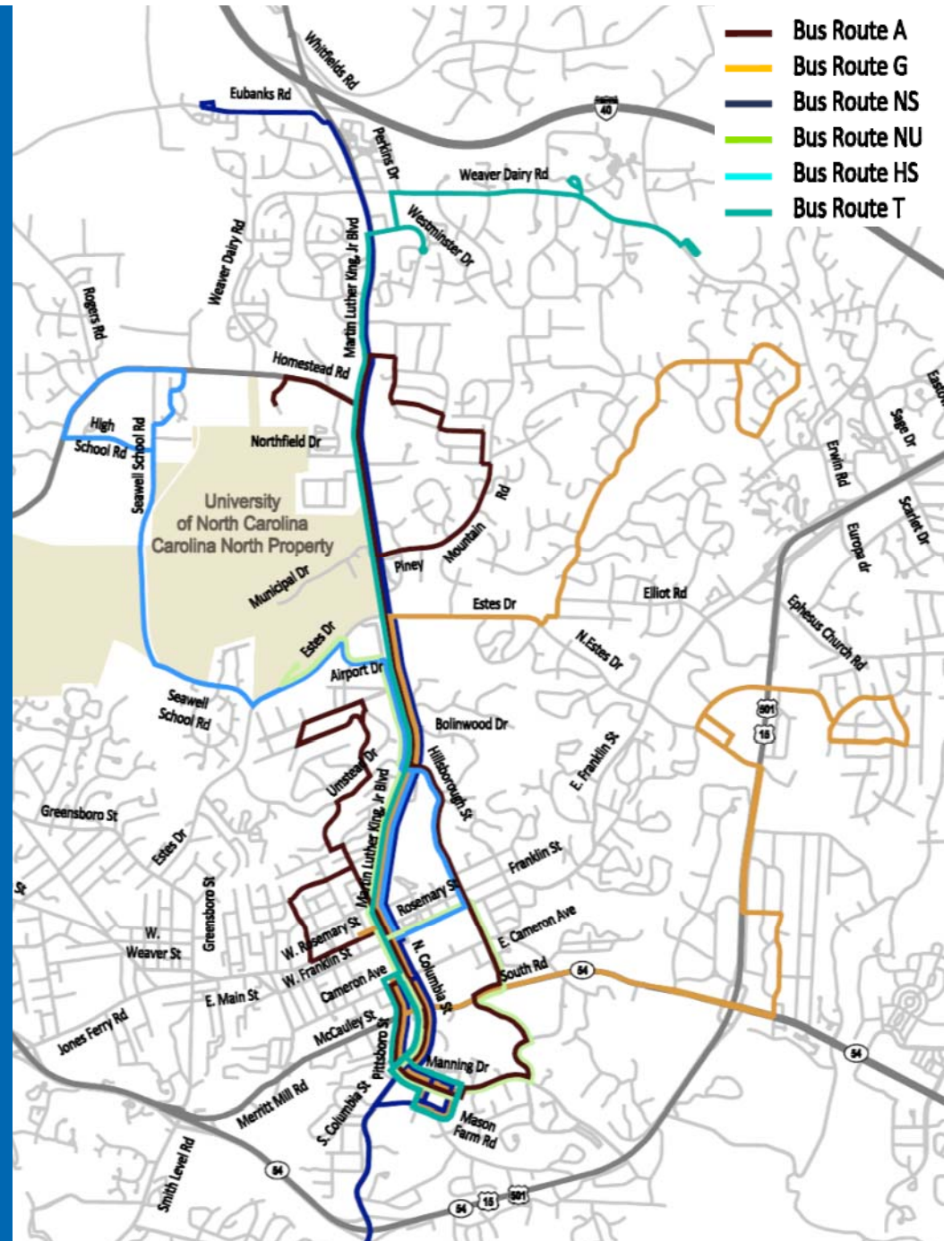




Transit Impacts

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





Travel Time Changes

Martin Luther King, Jr. Blvd
from Eubanks Road to Carolina North

2015 Travel Time Impacts from Existing and No Build (minutes)








Year	Direction	Change from Existing		Change from No Build	
		AM	PM	AM	PM
2015	NB	0.2	4.0	0.0	0.7
2015	SB	0.8	1.8	0.2	0.7

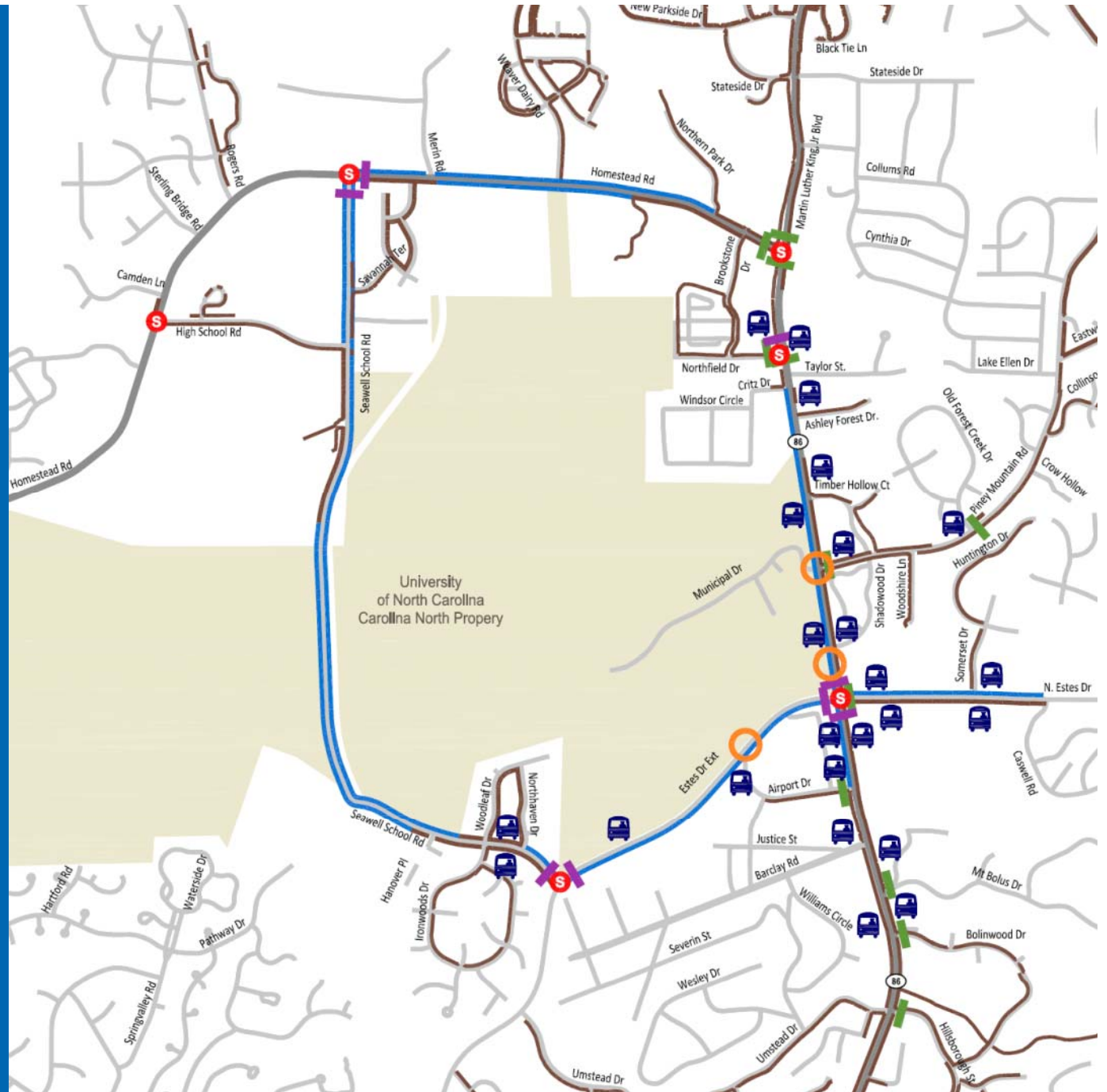
2025 Travel Time Impacts from Existing and No Build (minutes)

Year	Direction	Change from Existing		Change from No Build	
		AM	PM	AM	PM
2025	NB	0.6	11.4	0.0	6.3
2025	SB	6.4	6.8	5.0	3.8



Pedestrian Facility Needs

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

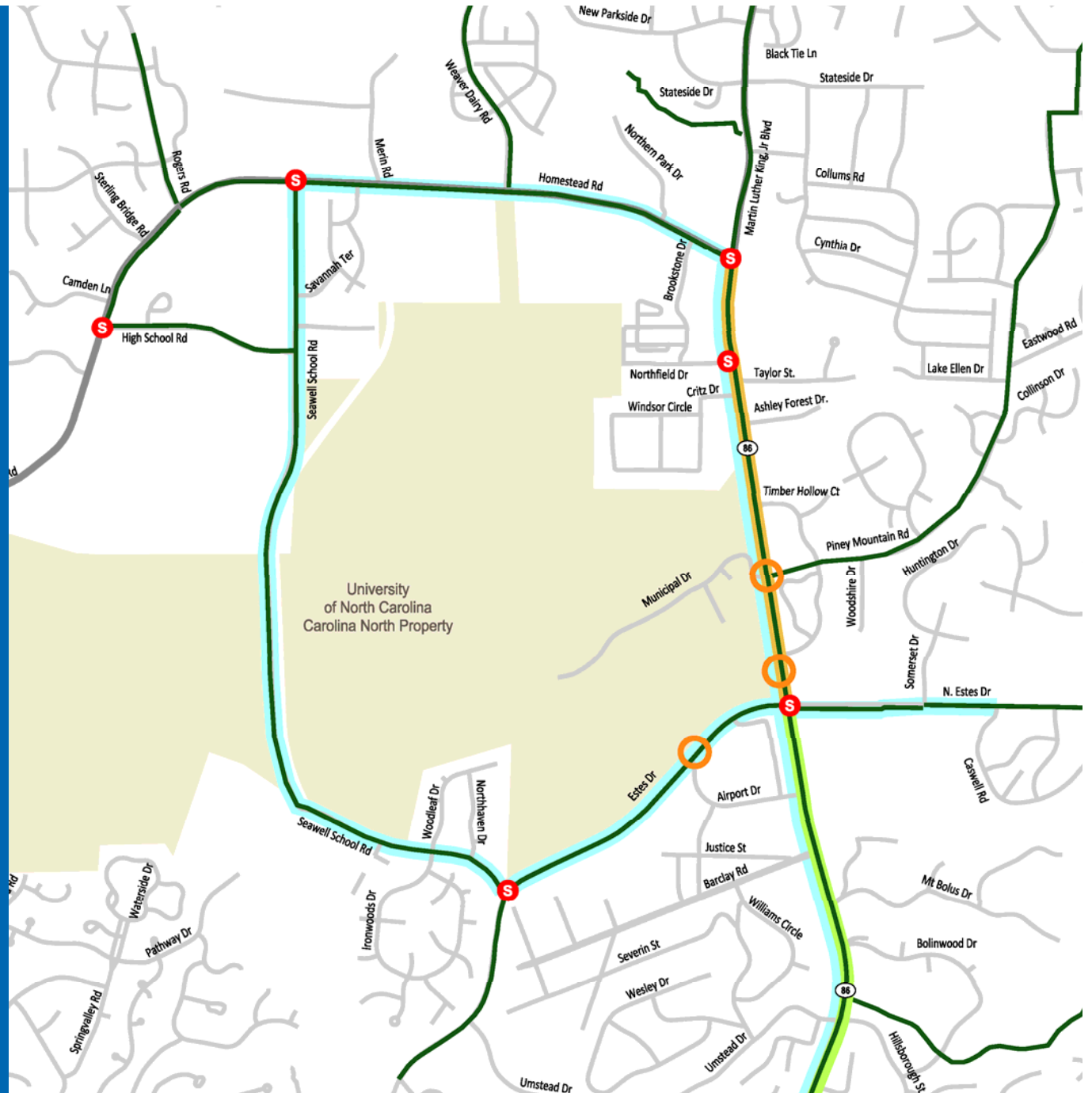




Bicycle Facility Needs

Legend

- Study Area Intersections
- Existing Bicycle Network
- Proposed Bicycle Lanes
- Existing Bicycle Network - Paved Striped Shoulders
- Existing Bicycle Network - Shared Lane Pavement Markings
- Access Points





Alternative Parking Analysis

- 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



Alternative Parking Analysis

- 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



Alternative 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
 - Reconstruct Municipal Drive as Site Access Road
 - Signalized site access from Estes Drive aligned with Airport Drive
 - Signalize Martin Luther King, Jr. Blvd and Airport Drive (for transit connection)
- 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



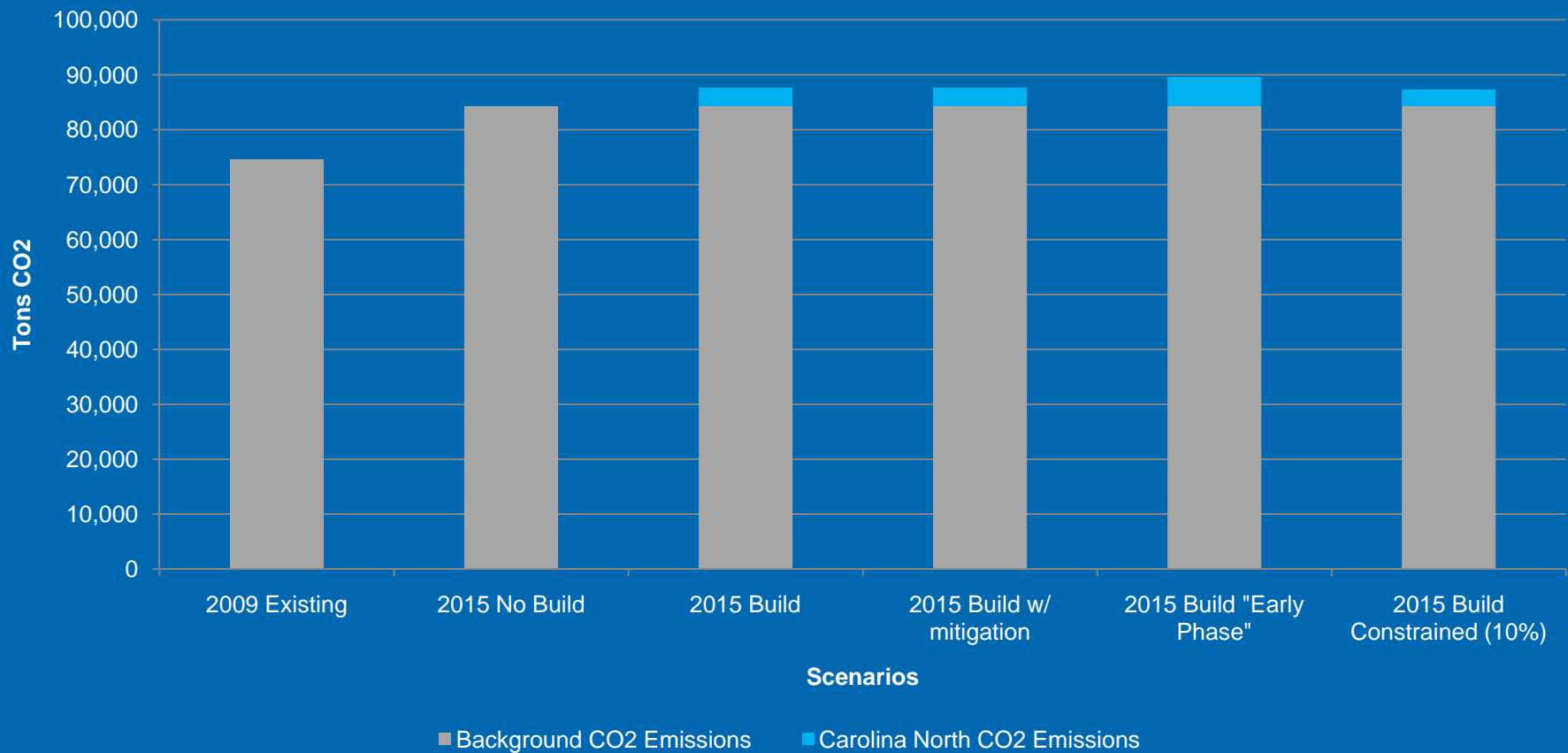
2025 Mitigation Summary

- 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



Air Quality/Greenhouse Gas

Phase 1 Greenhouse Gas Emissions*

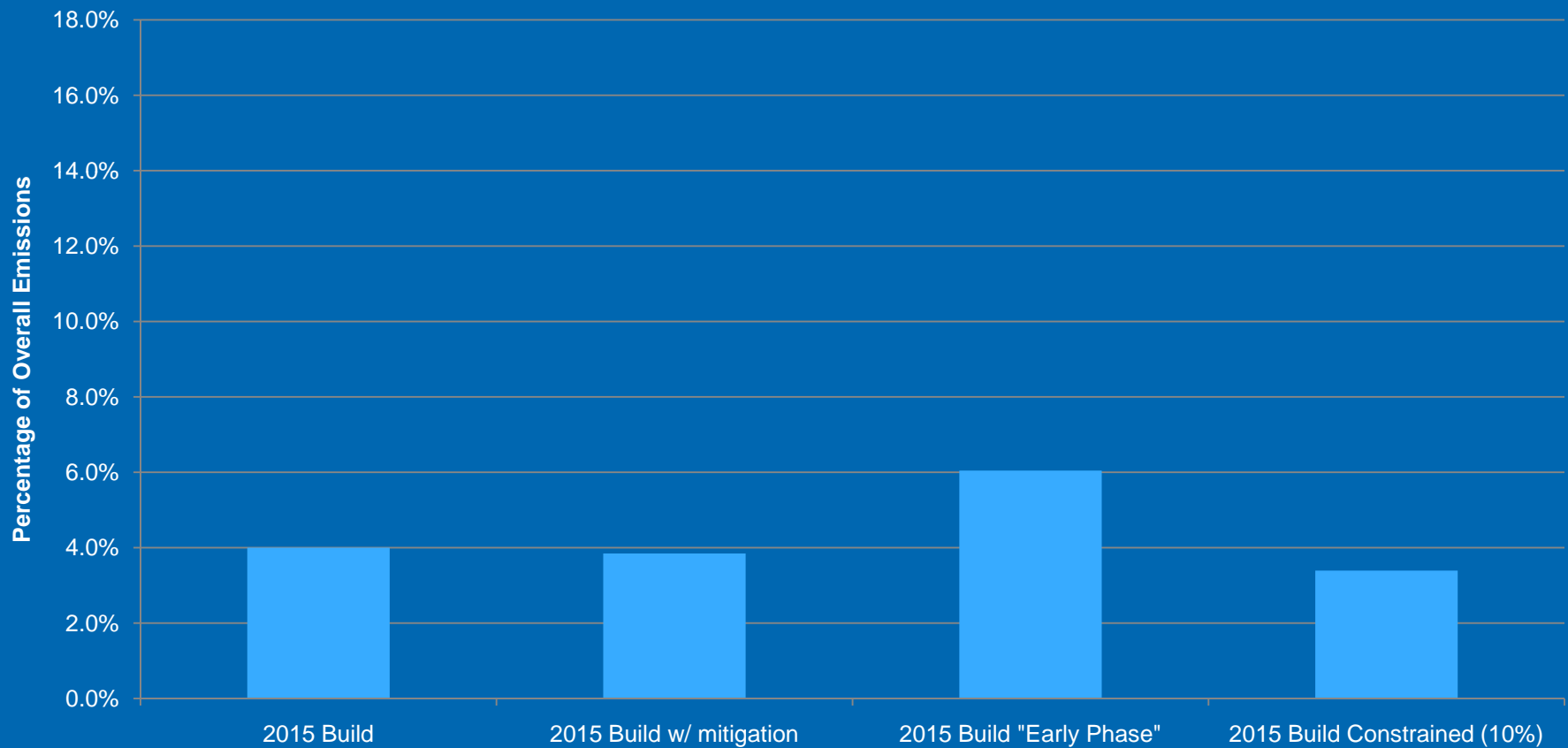


*Based on 21 key study area roadway links



Air Quality/Greenhouse Gas

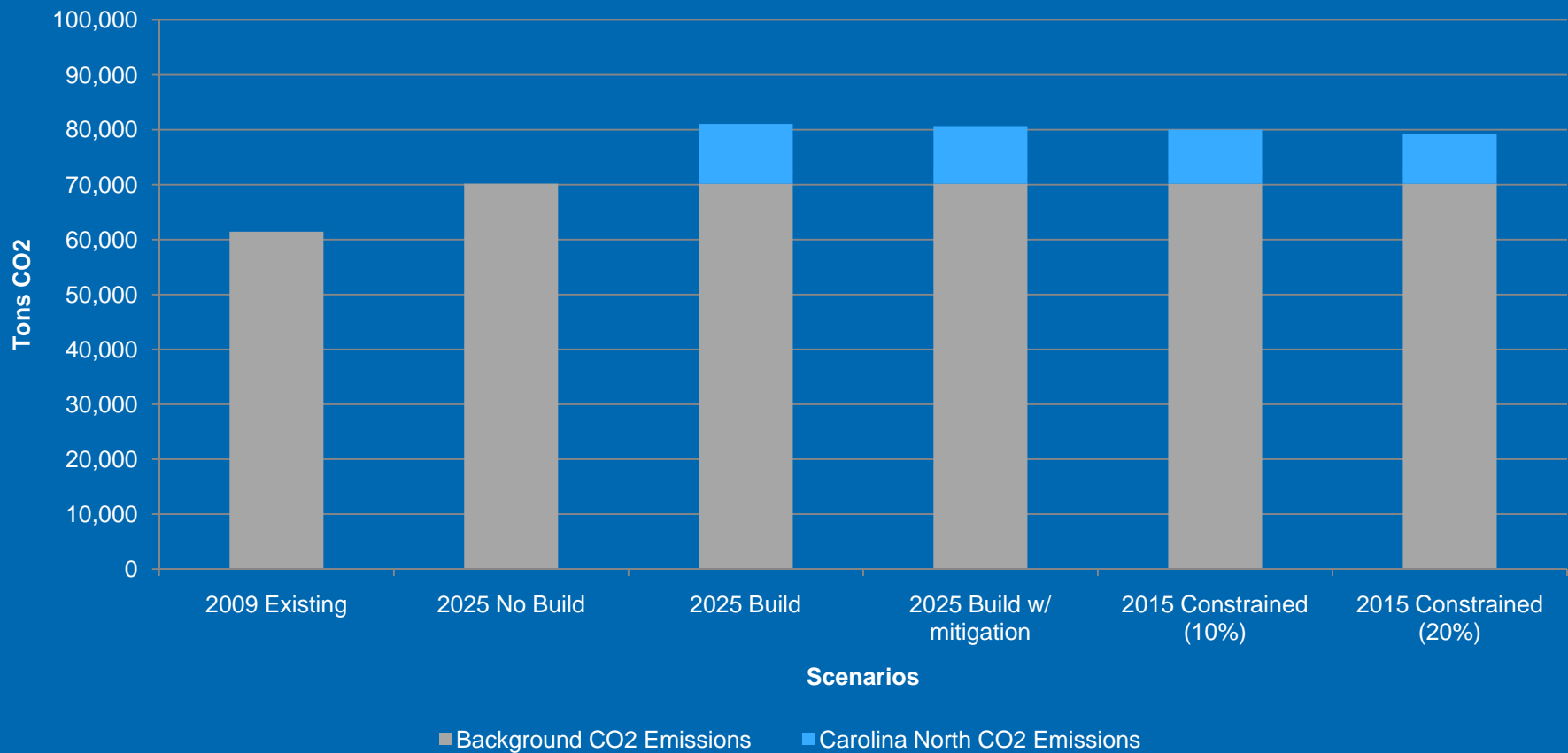
Phase 1 Carolina North Percentage of Overall Emissions





Air Quality/Greenhouse Gas

Phase 2 Greenhouse Gas Emissions*

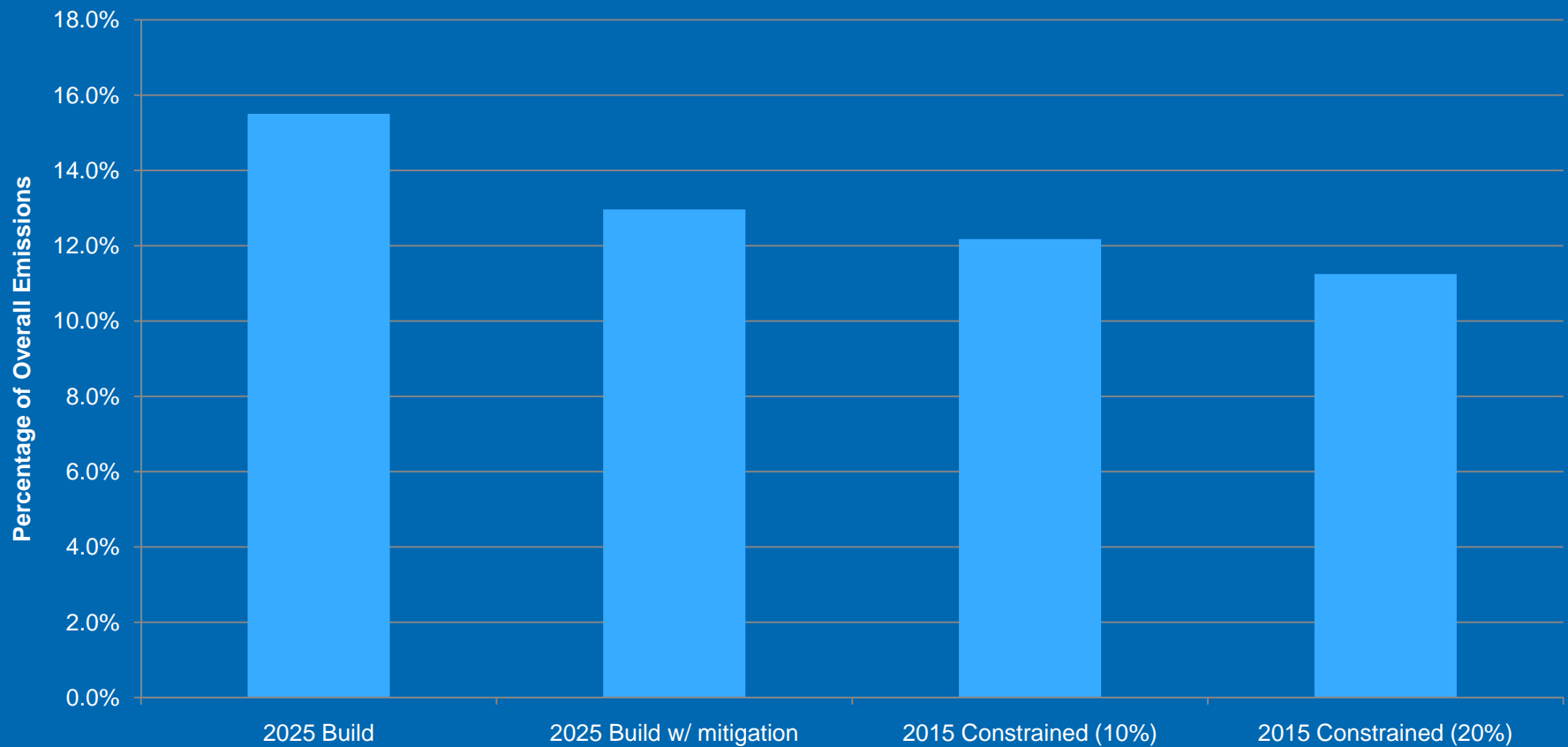


*Based on 18 key study area roadway links



Air Quality/Greenhouse Gas

Phase 2 Carolina North Percentage of Overall Emissions

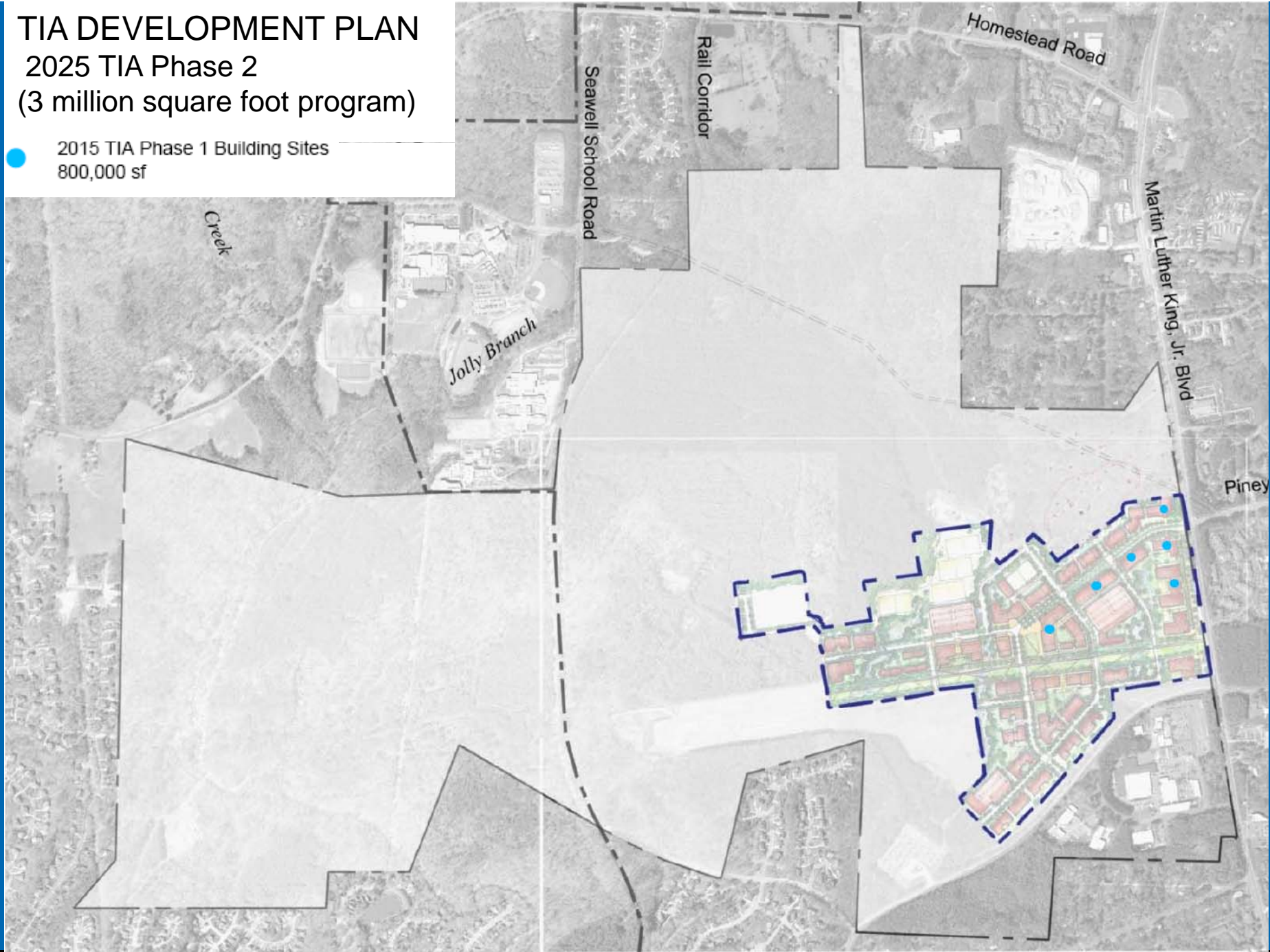


TIA DEVELOPMENT PLAN

2025 TIA Phase 2

(3 million square foot program)

● 2015 TIA Phase 1 Building Sites
800,000 sf







Next Steps

- Get input from the Town Council and Public on Draft TIA
- Finalize TIA report
- Recommendations for the Development Plan Agreement
 - Determine improvements associated with 800,000 sf, 3,000,000 sf and other development milestones
 - Update TIA in Fall 2009
 - Prepare Transportation Management Plan
 - Develop Short Range Transit Plan



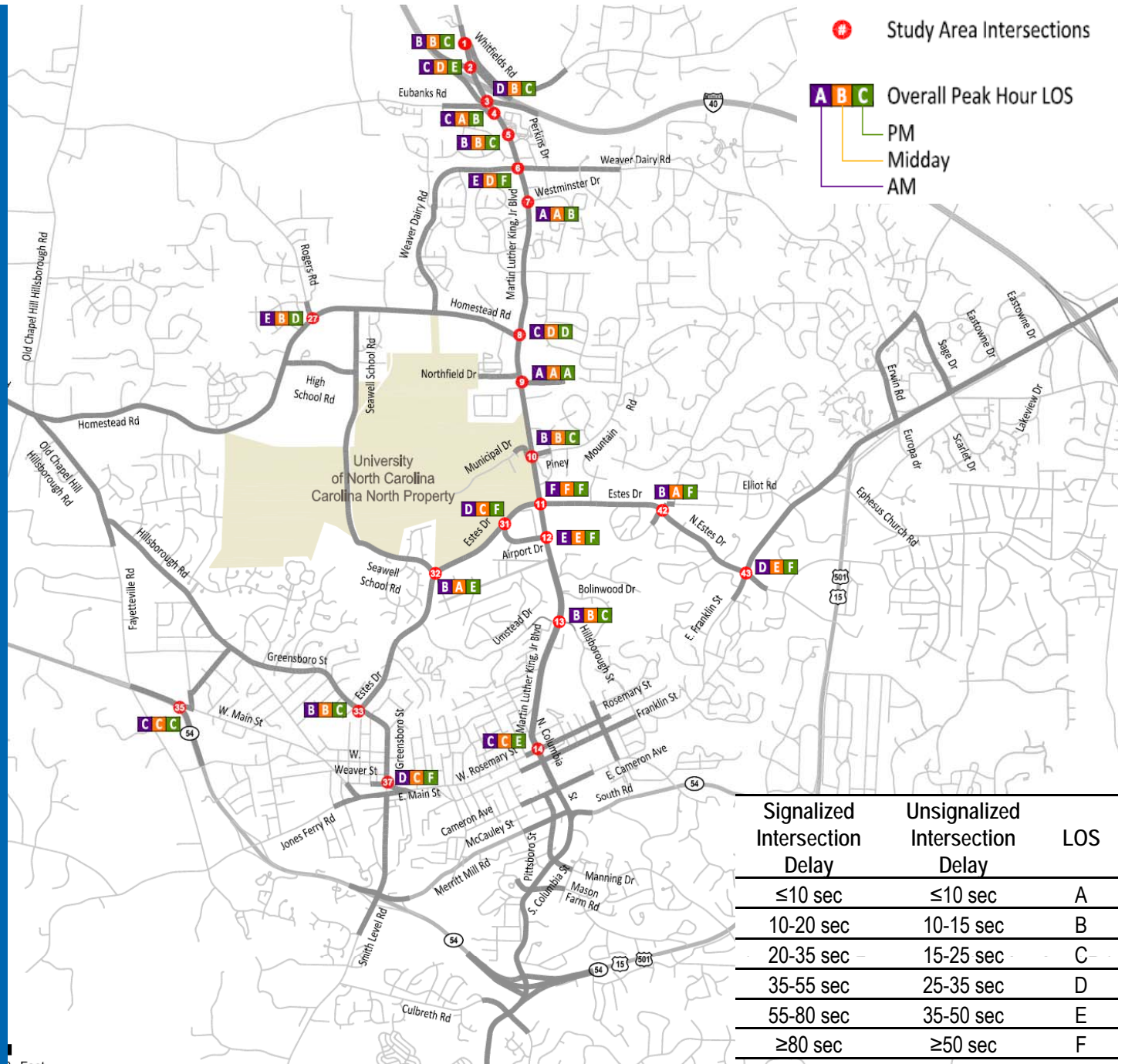
TRANSPORTATION IMPACT ANALYSIS CAROLINA NORTH DEVELOPMENT

Question and Comments



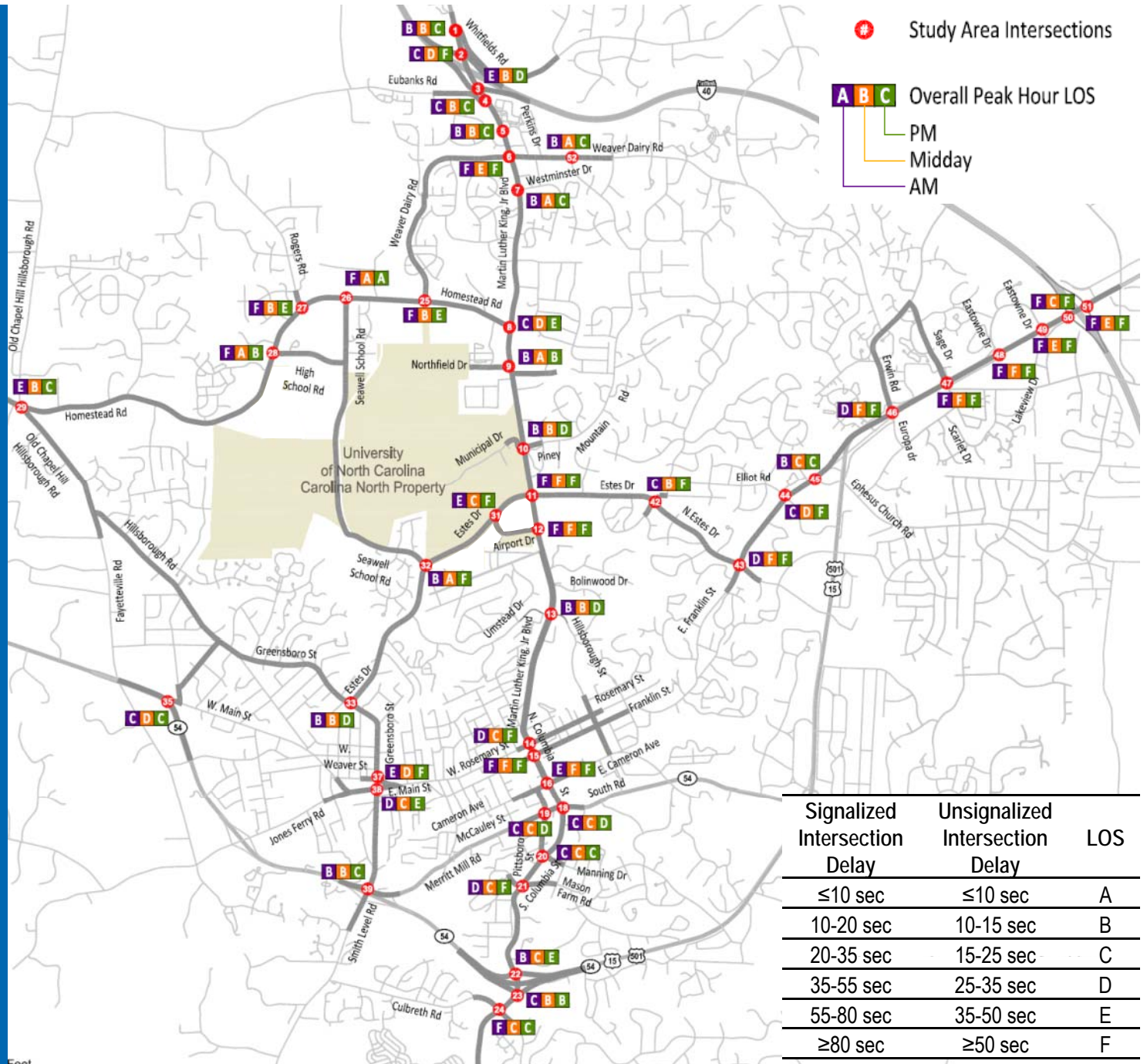


2015 No-Build Intersection Level-of-Service



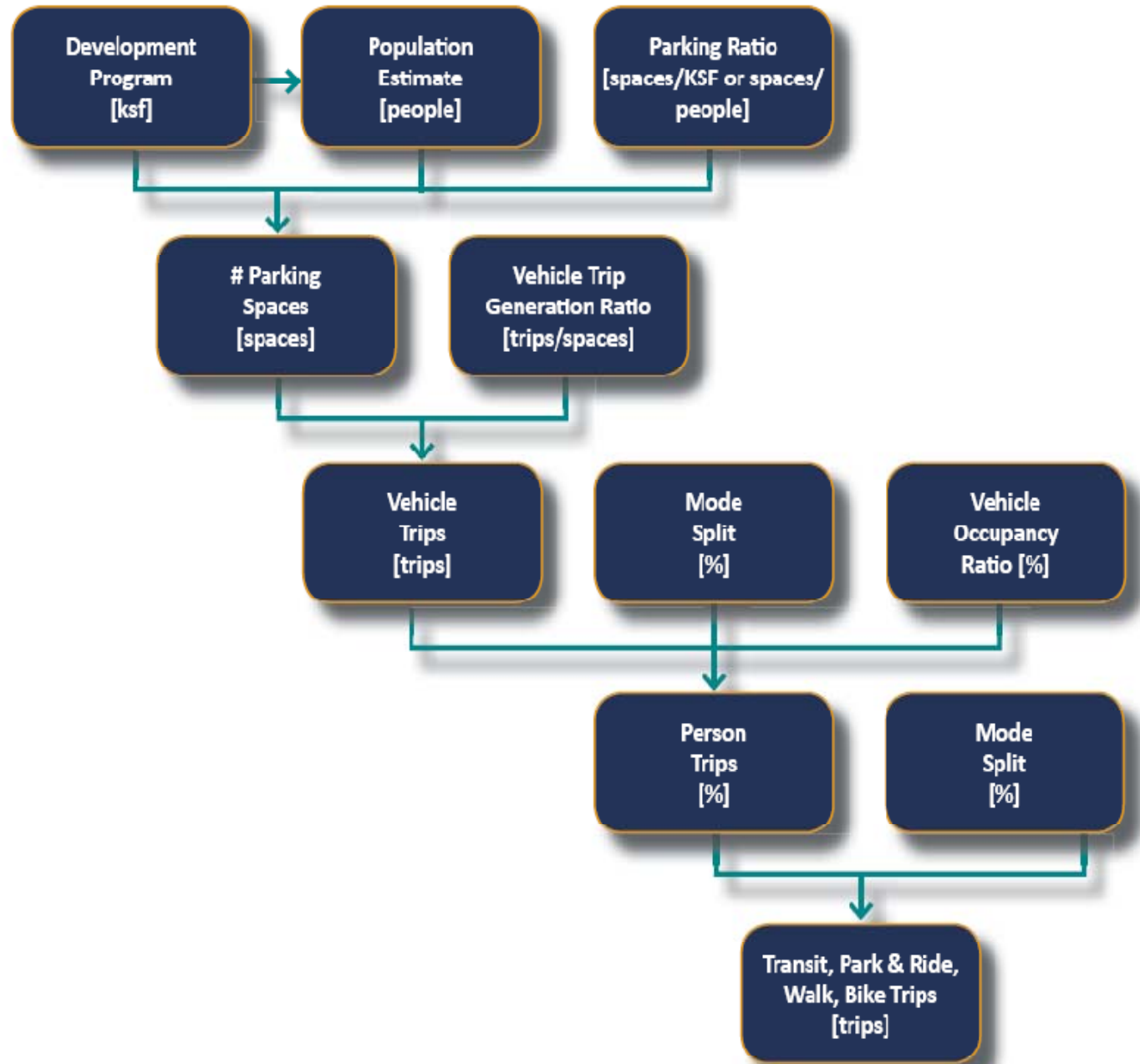


2025 No-Build Intersection Level-of-Service





TRIP GENERATION METHODOLOGY

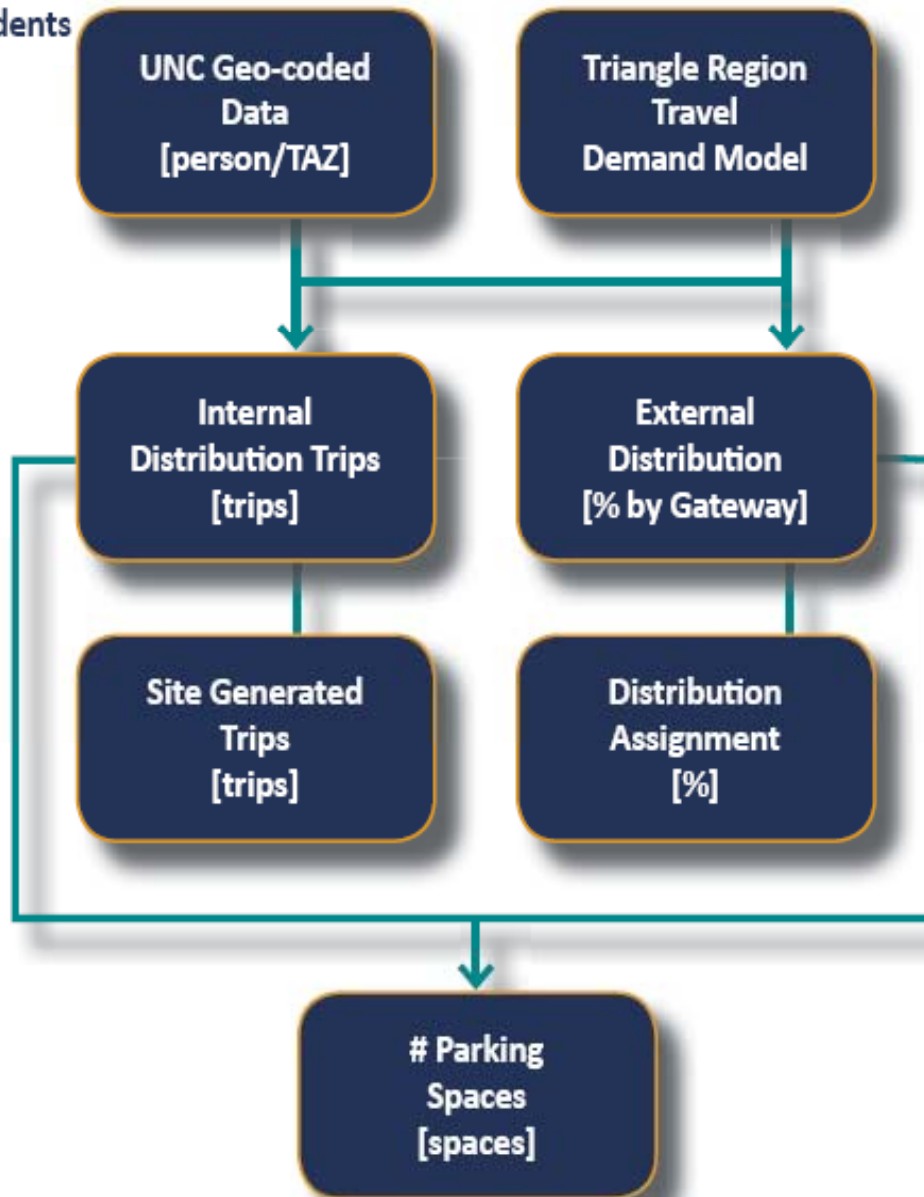




TRIP DISTRIBUTION METHODOLOGY

♦ CN Students

♦ CN Employees
♦ CN Residents





MODE SPLIT METHODOLOGY

