

July 27, 2017



MEMORANDUM TO: Karen Reynolds
Project Development Engineer
NCDOT PDEA

FROM: Matthew Quesenberry, PE
HNTB North Carolina, PC

SUBJECT: Traffic Forecast for STIP Project R-2577
US 158 (Reidsville Road) Widening, Forsyth/Guilford County

Please find attached the 2017/2040 Project-Level Traffic Forecast for State Transportation Improvement Program (STIP) Project R-2577, US 158 (Reidsville Road) widening in Forsyth and Guilford counties. This forecast for this project was requested by Karen Reynolds of the North Carolina Department of Transportation (NCDOT) Project Development and Environmental Analysis (PDEA) Unit on March 16, 2017 as part of the Traffic Forecasting Limited Services Agreement to be performed by HNTB North Carolina, P.C. This forecast was approved by the NCDOT Transportation Planning Branch on July 25, 2017.

STIP Project R-2577 is located within the Winston-Salem Urban Area Metropolitan Planning Organization (MPO) and Greensboro Urban Area MPO planning boundaries. This project includes the widening of US 158 (Reidsville Road) from north of US 421/I-40 Business in Winston-Salem (Forsyth County) to US 220 (Future I-73) in Stokesdale (Guilford County), approximately 20 miles. STIP Project R-2577 is planned to widen US 158 (Reidsville Road) from two to a four-lane divided facility, including a bypass on new location of Stokesdale. All the build scenarios in this traffic forecast assume that US 158 (Reidsville Road) will be widened to four-lane divided facility.

STIP Project R-2577 is divided into three project segments:

- R-2577A – multi-lane widening from north of US 421/I-40 Business in Winston-Salem to Belews Creek Road (SR 1965) in Walkertown (Forsyth County).
- R-2577B – multi-lane widening from Belews Creek Road (SR 1965) in Walkertown (Forsyth County) to Anthony Road (SR 2034) in Stokesdale (Guilford County).
- R-2577C – multi-lane widening (including a bypass of Stokesdale) from Anthony Road (SR 2034) to US 220 (Future I-73) in Stokesdale (Guilford County).

R-2577A, is tentatively scheduled for construction to begin in fiscal year 2025 in the 2016 – 2025 STIP and for construction to begin in fiscal year 2022 in the Draft 2018 – 2027 STIP. R-2577B is unfunded in the 2016 – 2025 STIP and is funded for construction to begin in fiscal year 2026 in the Draft 2018 – 2027 STIP. R-2577C is unfunded in both STIPs. STIP funding timelines provided are per information collected on July 7, 2017.

The traffic forecast study area includes US 158 (Reidsville Road), including the locations of the potential bypass, and all major intersections and interchanges within the STIP project boundaries (from north of US 421/I-40 Business in Winston-Salem to US 220/Future I-73 in Stokesdale).

The following scenarios are included in this traffic forecast:

- 2017 Base Year No-Build
- 2017 Base Year Build Alternative 2
- 2017 Base Year Build Alternative 3
- 2040 Future Year No-Build
- 2040 Future Year Build Alternative 2
- 2040 Future Year Build Alternative 3

The *R-2577ABC Project Level Traffic Forecast* (NCDOT, August 2012) was previously developed for Base Year 2012 and Future Year 2035.

Travel Demand Model

The Piedmont Triad Regional Model (PTRM) Version 4.2 (Adopted 10/17/16) was used as a tool in the development of the traffic forecast. TransCAD 5, Build 2110 was used to run the PTRM. The PTRM has a BY of 2013 and FY of 2040.

The North Carolina Statewide Travel Demand Model (NCSTM), Generation 2 (delivered in August 2016), was used to examine truck values. The loaded NCSTM network years used in this analysis were 2011 and 2040.

Interpolation

To determine any intermediate years, straight-line interpolation may be used. AADT volumes may be extrapolated for up to two years immediately following 2040.

Certain assumptions were made in the development of the forecast.

Fiscal Constraint

Within an MPO, future year traffic forecasts assume construction of projects listed within an MPO's Metropolitan Transportation Plan (MTP). This traffic forecast is consistent with the current Greensboro Urban Area MPO and Winston-Salem Urban Area MPO 2040 MTPs, which were both adopted in September 2015.

Development Activity

There are multiple potential developments in the study area, but none are anticipated to substantially affect traffic volumes in the study area. All recent and planned development are assumed to be included in the official Base Year and Future Year PTRM socioeconomic data sets.

Forecast Methodology

The 2017 Base Year No-Build (BYNB) traffic estimate volumes and design factors were developed primarily using field collected 2017 traffic count data, followed by comparing traffic count data with historical trend line estimates, extrapolating historical AADT volumes to 2017 using 10- and 20-year historic traffic growth rates, and applying engineering judgment. The 2017 Base Year Build (BYB) traffic forecast scenarios (for both Alternative 2 and Alternative 3) were completed by calculating the 2013 No-Build to 2013 Build PTRM diversion percentages. The model diversion percentages were then applied to the 2017 BYNB AADT to calculate unbalanced 2017 BYB AADT volumes, which were then balanced.

The 2040 Future Year No-Build (FYNB) traffic forecast volumes were developed using extrapolations of historic AADT data in the traffic forecast study area, 2040 PTRM model data, and by applying comparisons/adjustments from the 2017 BYNB volumes as applicable to the historic and model information. The 2040 Future Year Build (FYB) traffic forecast scenarios (for both Alternative 2 and Alternative 3) were completed by calculating the 2040 No-Build to 2040 Build PTRM model run diversion percentages. The model diversion percentages were then applied to the 2040 FYNB AADT to calculate unbalanced 2040 FYB AADT volumes, which were then balanced.

If it is determined that any of these assumptions have become inconsistent with the project and surrounding area activity, please request updated projections.

If you have any questions or I can be of further assistance, please do not hesitate to call me at (919) 424-0449 or e-mail me at mquesenberry@hntb.com.

cc:

Keith Dixon, NCDOT Transportation Planning Branch

Michael L Orr, NCDOT Transportation Planning Branch

Diane K Hampton, PE, NCDOT Division 9

Ed Lewis, NCDOT Division 7

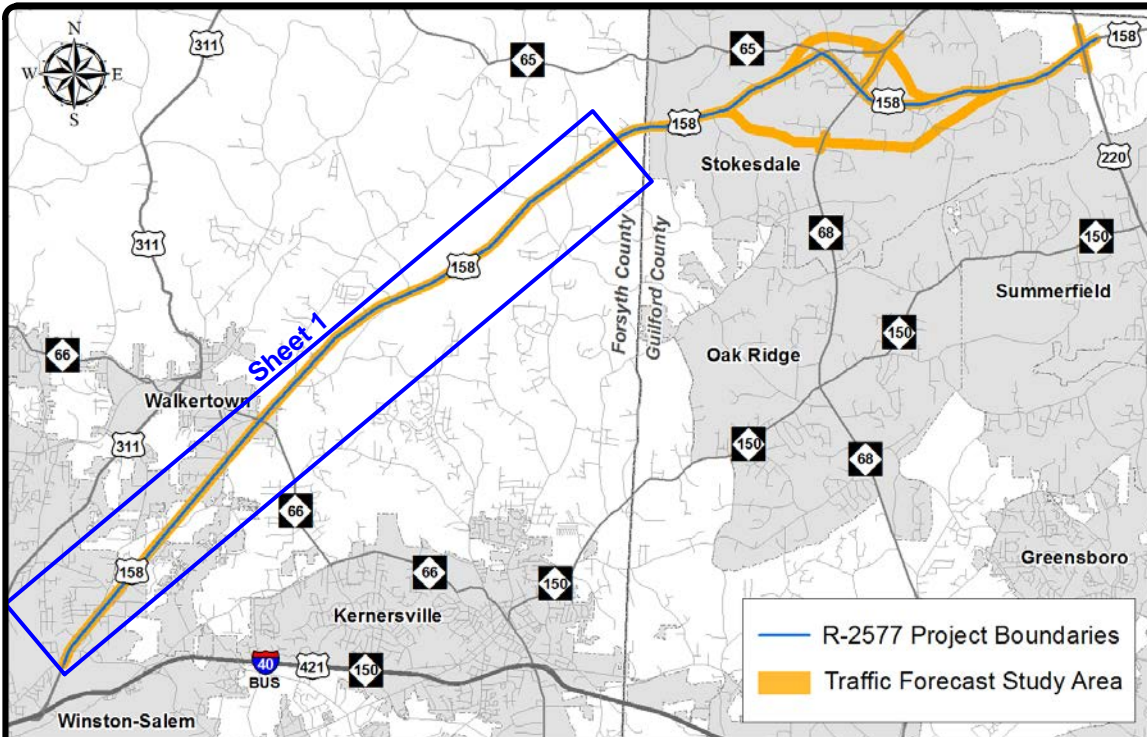
Jim Dunlop, PE, NCDOT Congestion Management Section

Glenn Mumford, PE, NCDOT Roadway Design Unit

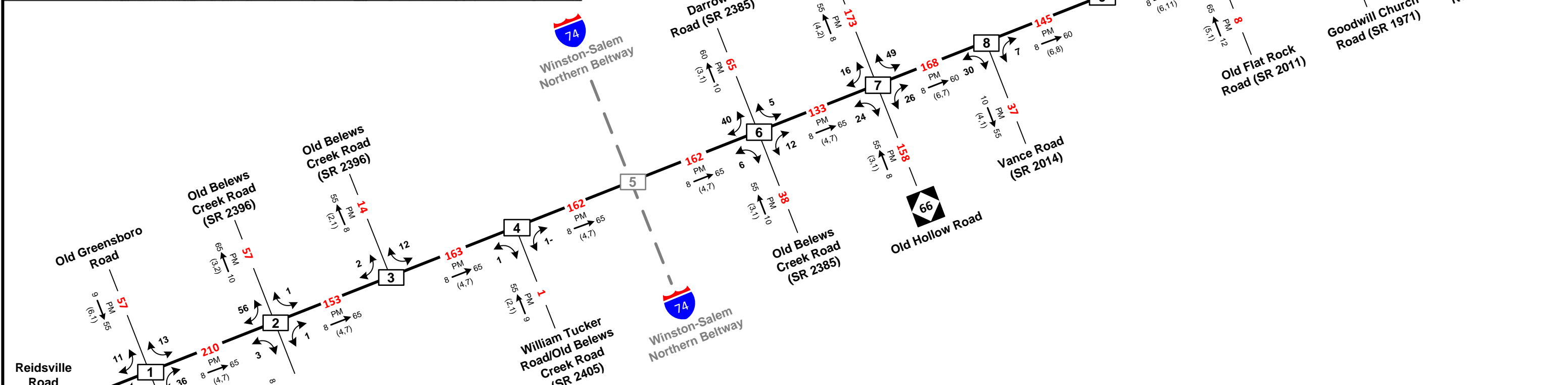
Clark Morrison, PhD, PE, NCDOT Pavement Management Unit

Fredrick Haith, Winston-Salem Urban Area MPO

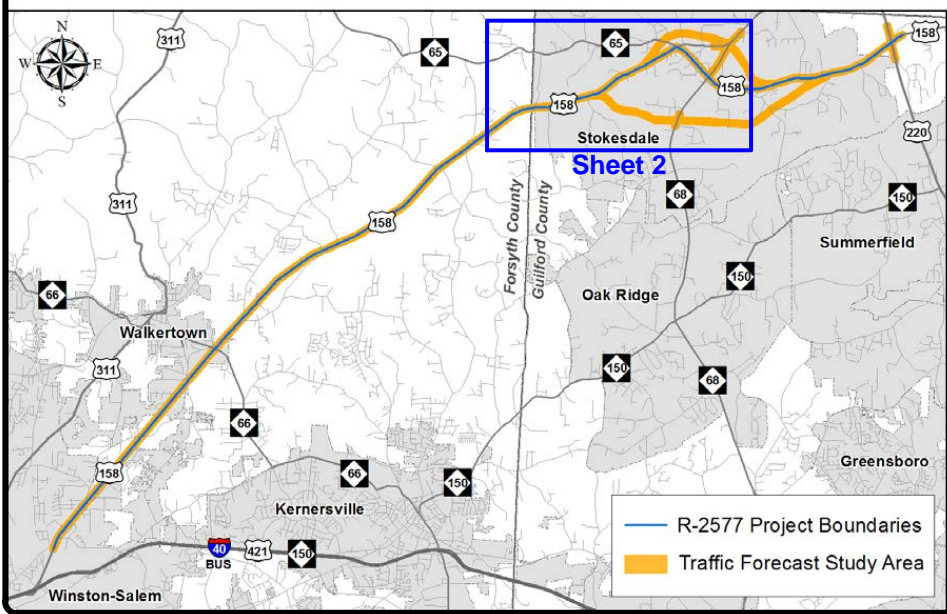
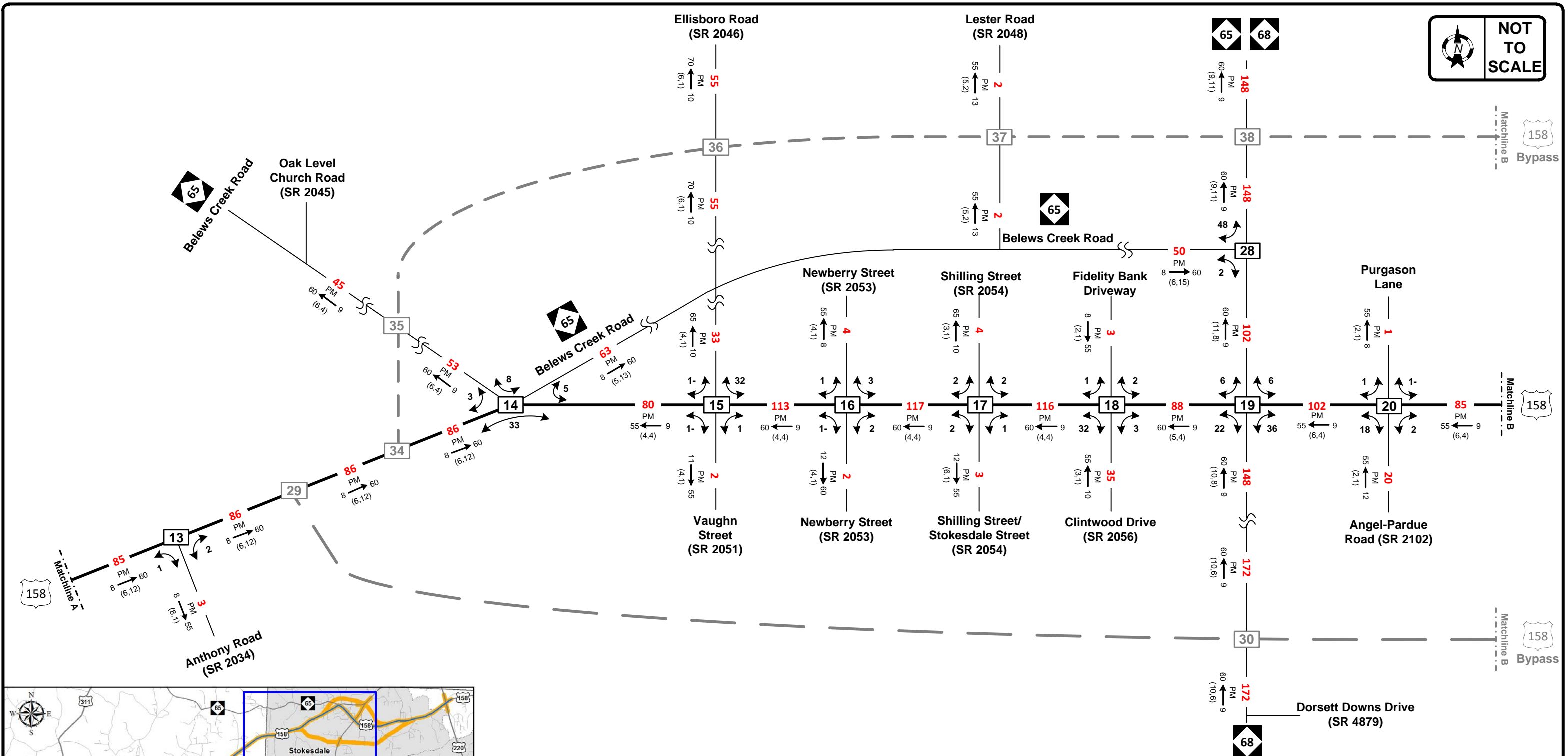
Craig McKinney, Greensboro Urban Area MPO



NOT TO SCALE

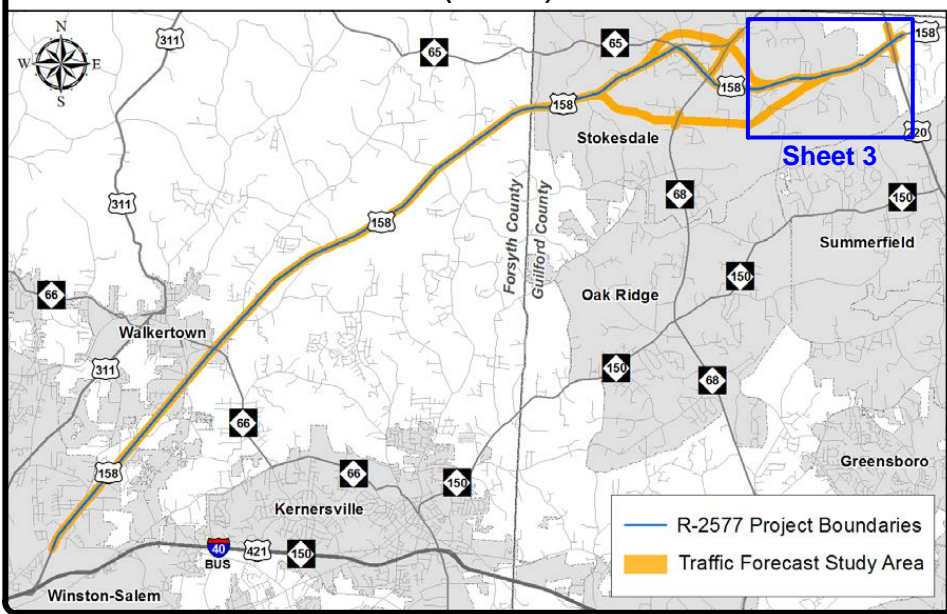
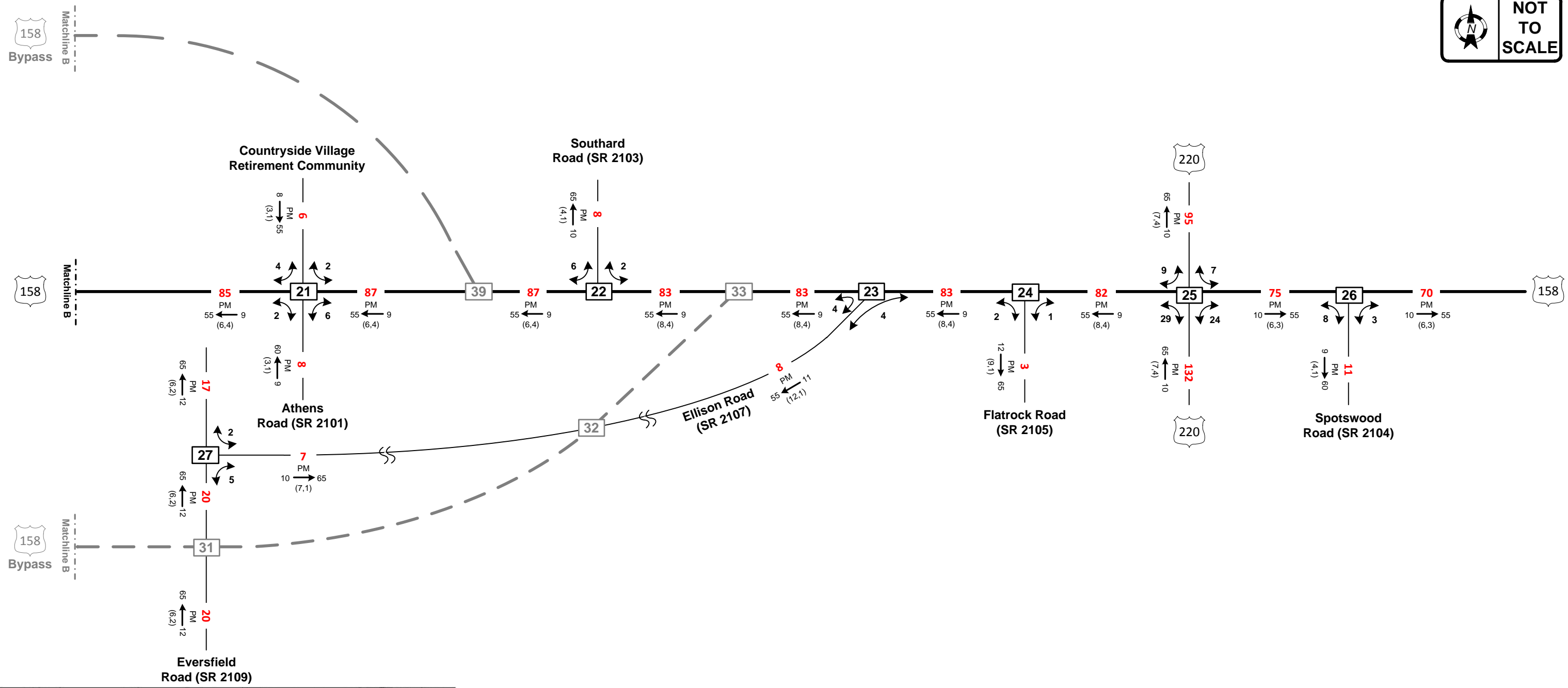


<h1>2017</h1> <p>ANNUAL AVERAGE DAILY TRAFFIC</p>	BASE YEAR NO-BUILD Sheet 1 of 3	
	LEGEND	STIP: R-2577 COUNTY: Forsyth/Guilford PREPARED BY: HNTB North Carolina, PC PROJECT: US 158 (Reidsville Road) Widening LOCATION: North of US 421/I-40 Business to US 220 (Future I-73) DATE: July 2017
<p>X = Study Area Intersection ID</p> <p>### No. of Vehicles Per Day (VPD) in 100s</p> <p>1- Less than 50 VPD</p> <p>----- Proposed Roadway</p>	<p>$K \frac{PM}{(d,t)} \rightarrow D$</p> <p>K Design Hour Factor (%)</p> <p>PM PM Peak Period</p> <p>D Peak Hour Directional Split (%)</p> <p>\rightarrow Indicates Direction of D</p> <p>(d,t) Duals, TT-STs (%)</p>	WBS: 37405.1.1 DIVISION: 7/9

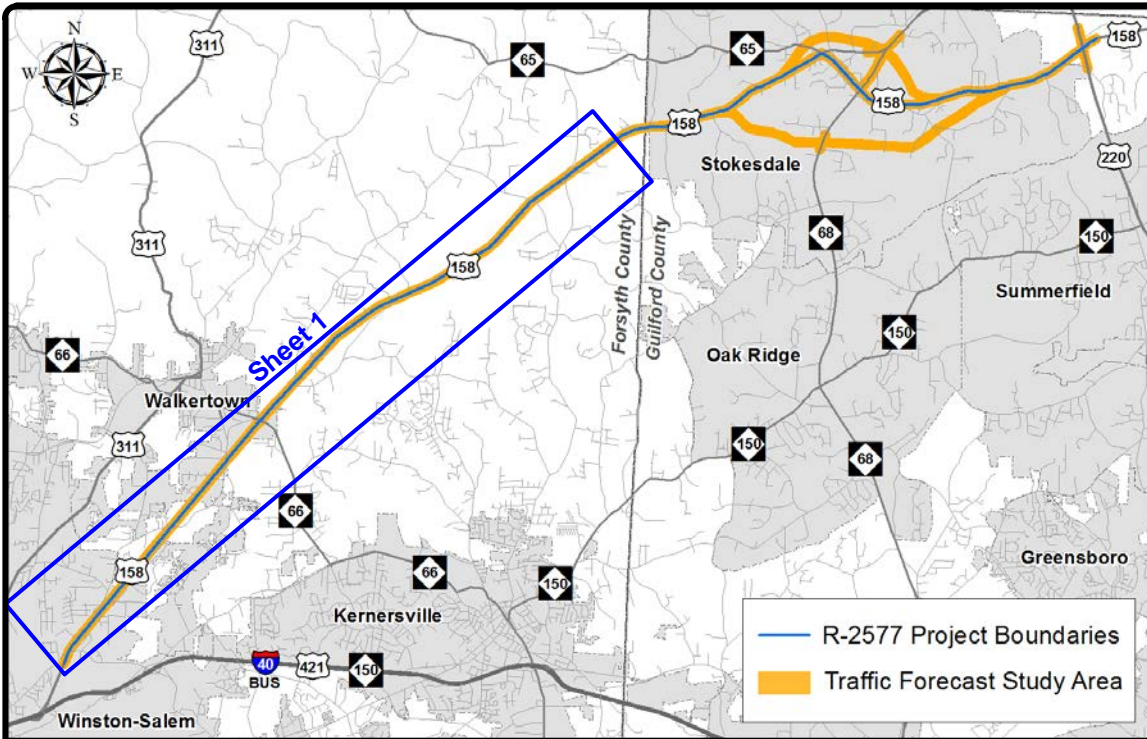


<h1>2017</h1> <p>ANNUAL AVERAGE DAILY TRAFFIC</p>	<h2>BASE YEAR NO-BUILD</h2> <p>Sheet 2 of 3</p>	
	STIP: R-2577	WBS: 37405.1.1
	COUNTY: Forsyth/Guilford	DIVISION: 7/9
	PREPARED BY: HNTB North Carolina, PC	
	PROJECT: US 158 (Reidsville Road) Widening	
LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)		
DATE: July 2017		

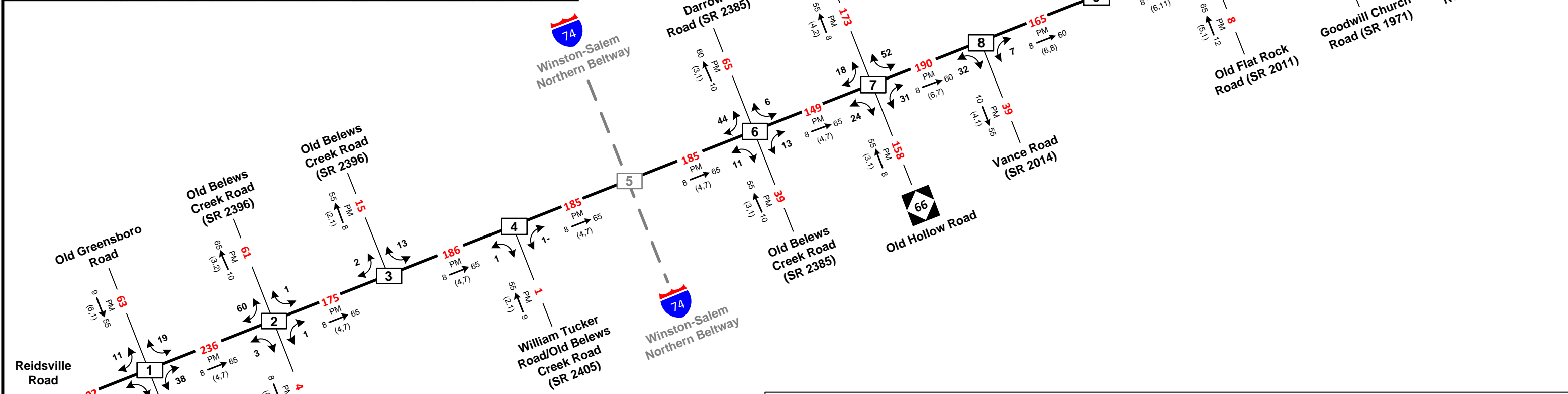
LEGEND	
X	= Study Area Intersection ID
###	No. of Vehicles Per Day (VPD) in 100s
1-	Less than 50 VPD
-----	Proposed Roadway
K	Design Hour Factor (%)
PM	PM Peak Period
D	Peak Hour Directional Split (%)
→	Indicates Direction of D
(d,t)	Duals, TT-STs (%)



<h1>2017</h1> <p>ANNUAL AVERAGE DAILY TRAFFIC</p>	BASE YEAR NO-BUILD Sheet 3 of 3	
	LEGEND	STIP: R-2577 WBS: 37405.1.1
X = Study Area Intersection ID	$K \xrightarrow{PM} D$ (d, t)	COUNTY: Forsyth/Guilford DIVISION: 7/9
### No. of Vehicles Per Day (VPD) in 100s	K Design Hour Factor (%) PM PM Peak Period D Peak Hour Directional Split (%)	PREPARED BY: HNTB North Carolina, PC
1- Less than 50 VPD	→ Indicates Direction of D (d,t) Duals, TT-STs (%)	PROJECT: US 158 (Reidsville Road) Widening
----- Proposed Roadway		LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)
		DATE: July 2017



NOT TO SCALE



2017 ANNUAL AVERAGE DAILY TRAFFIC

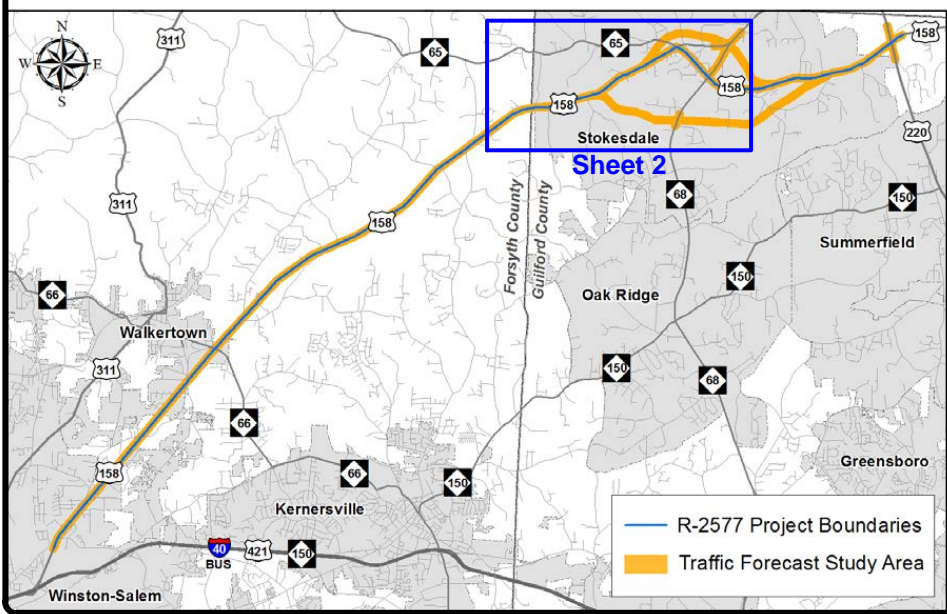
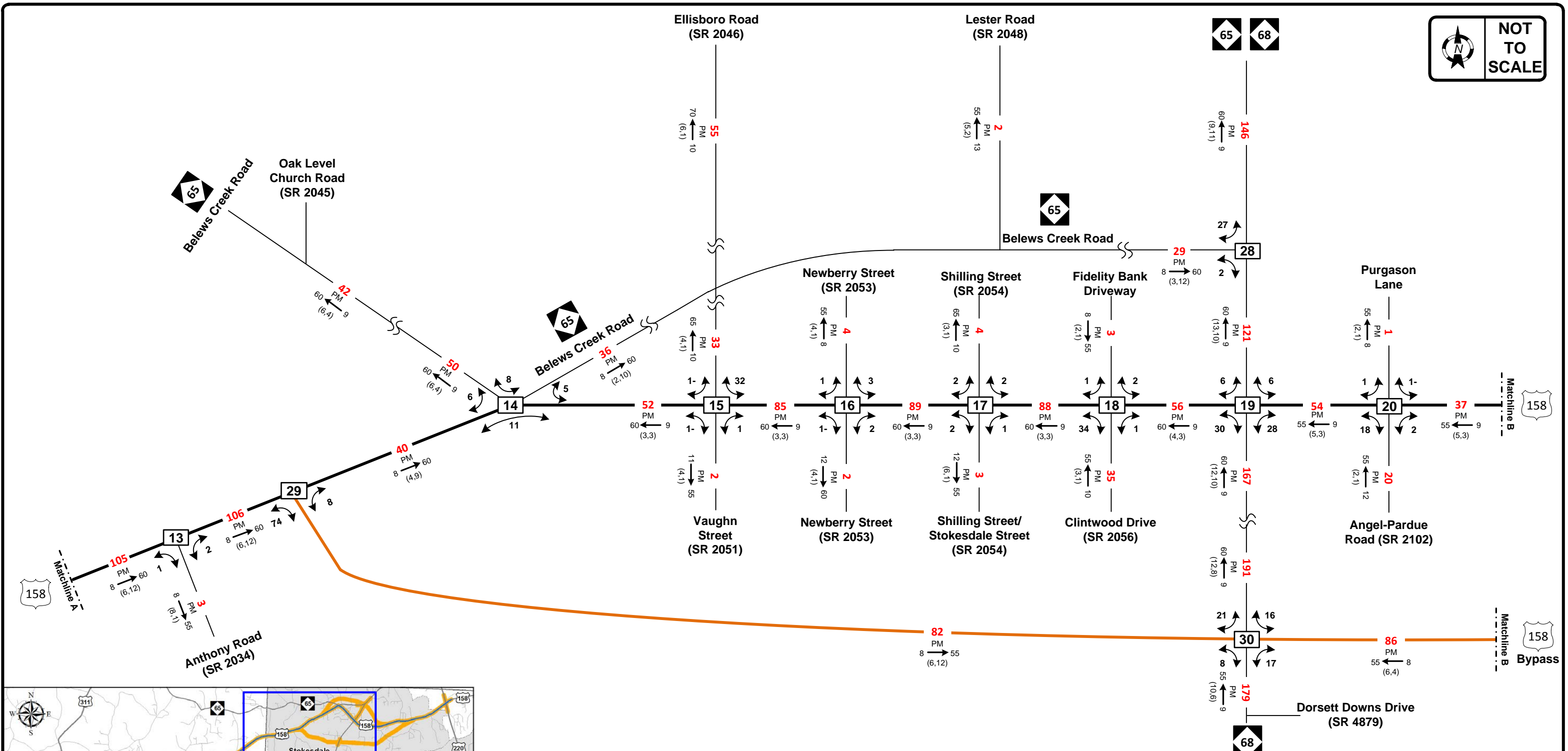
BASE YEAR BUILD ALTERNATIVE 2

Sheet 1 of 3

LEGEND

X	= Study Area Intersection ID	$K \frac{PM}{(d,t)} \rightarrow D$
###	No. of Vehicles Per Day (VPD) in 100s	K Design Hour Factor (%)
1-	Less than 50 VPD	PM PM Peak Period
-----	Proposed Roadway	D Peak Hour Directional Split (%)
		→ Indicates Direction of D
		(d,t) Duals, TT-STs (%)

STIP: R-2577	WBS: 37405.1.1
COUNTY: Forsyth/Guilford	DIVISION: 7/9
PREPARED BY: HNTB North Carolina, PC	
PROJECT: US 158 (Reidsville Road) Widening	
LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)	
DATE: July 2017	

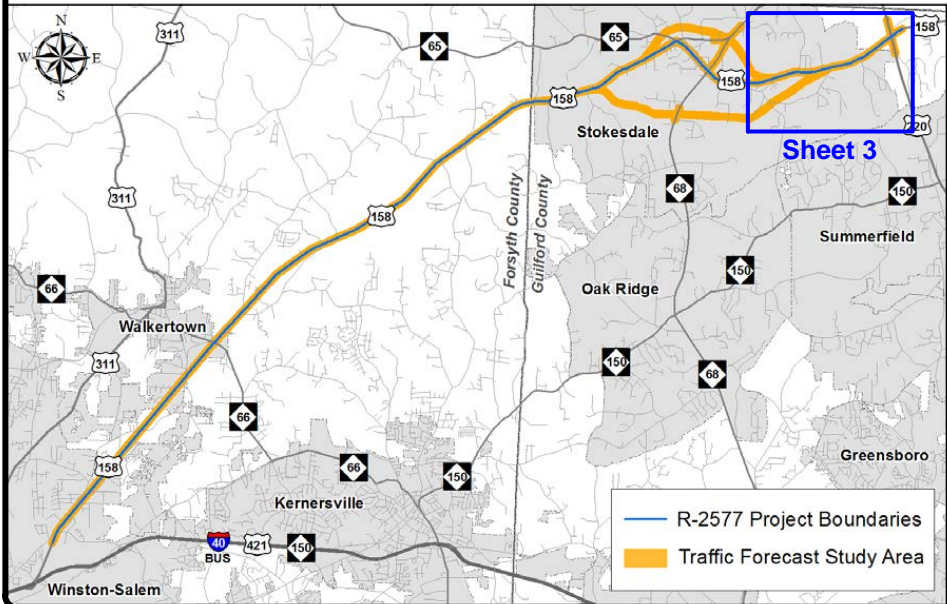
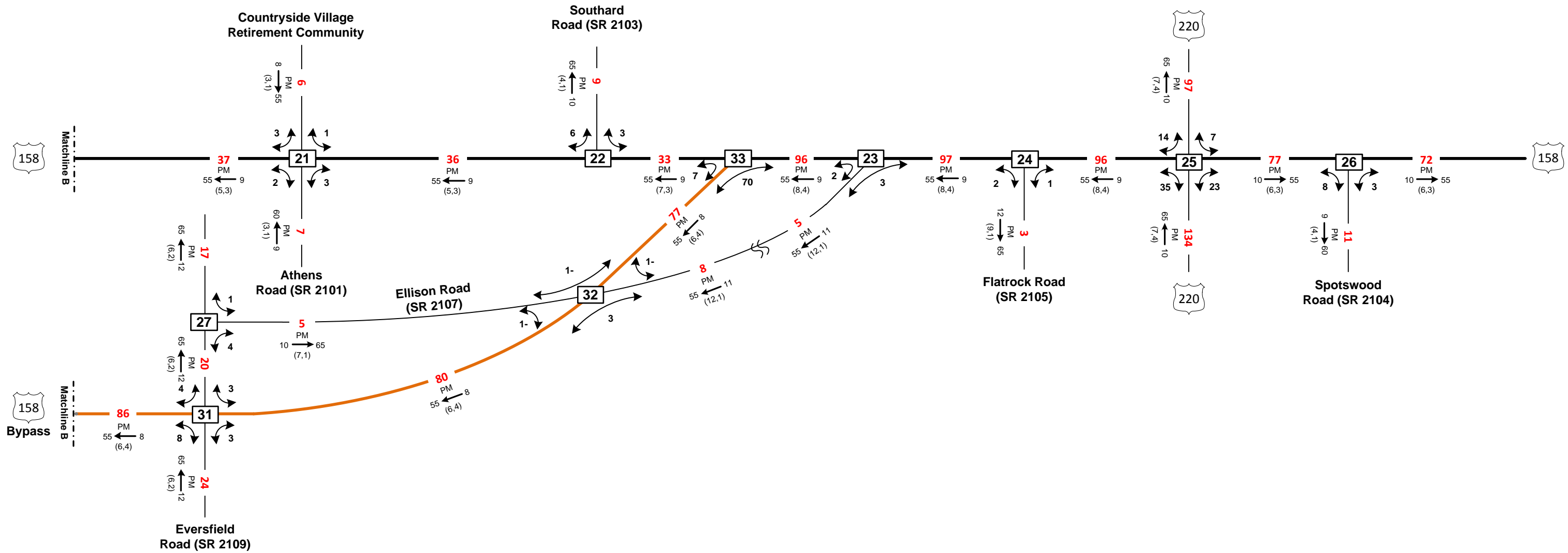


2017 ANNUAL AVERAGE DAILY TRAFFIC

BASE YEAR BUILD ALTERNATIVE 2

Sheet 2 of 3

LEGEND		STIP: R-2577	WBS: 37405.1.1
X = Study Area Intersection ID ### No. of Vehicles Per Day (VPD) in 100s 1- Less than 50 VPD ----- Proposed Roadway		COUNTY: Forsyth/Guilford	DIVISION: 7/9
$K \xrightarrow{\text{PM}} D$ K Design Hour Factor (%) PM PM Peak Period D Peak Hour Directional Split (%) \rightarrow Indicates Direction of D (d,t) Duals, TT-STs (%)		PREPARED BY: HNTB North Carolina, PC	PROJECT: US 158 (Reidsville Road) Widening
		LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)	DATE: July 2017



2017 ANNUAL AVERAGE DAILY TRAFFIC

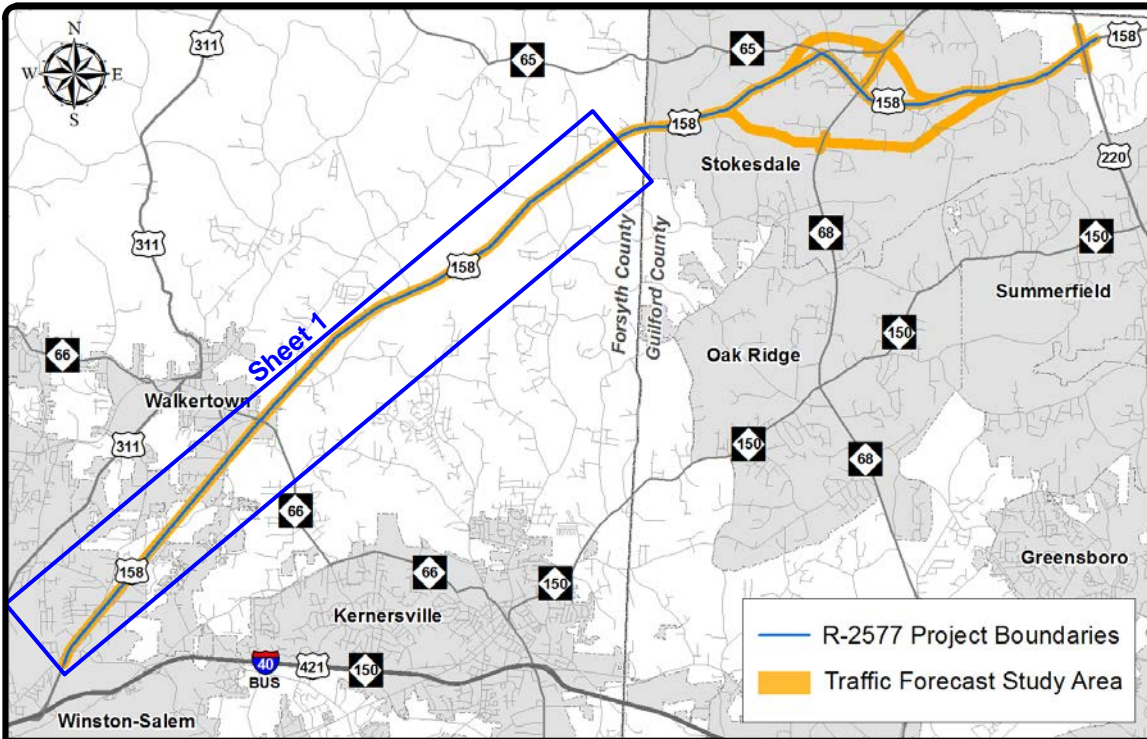
BASE YEAR BUILD ALTERNATIVE 2

Sheet 3 of 3

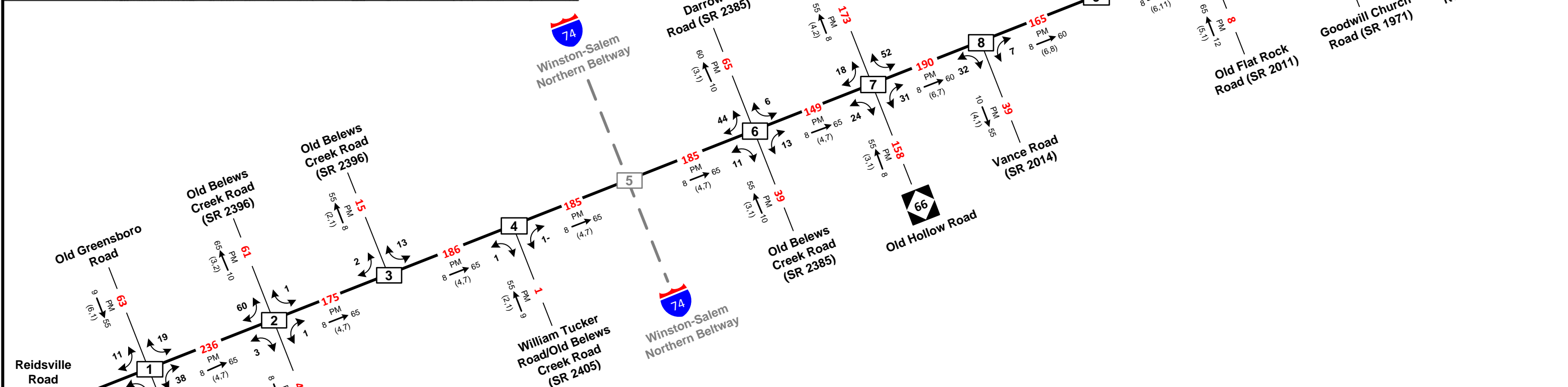
LEGEND

X	= Study Area Intersection ID	$K \xrightarrow{PM} D$	$\frac{PM}{(d,t)}$
###	No. of Vehicles Per Day (VPD) in 100s	K	Design Hour Factor (%)
1-	Less than 50 VPD	PM	PM Peak Period
-----	Proposed Roadway	D	Peak Hour Directional Split (%)
		→	Indicates Direction of D
		(d,t)	Duals, TT-STs (%)

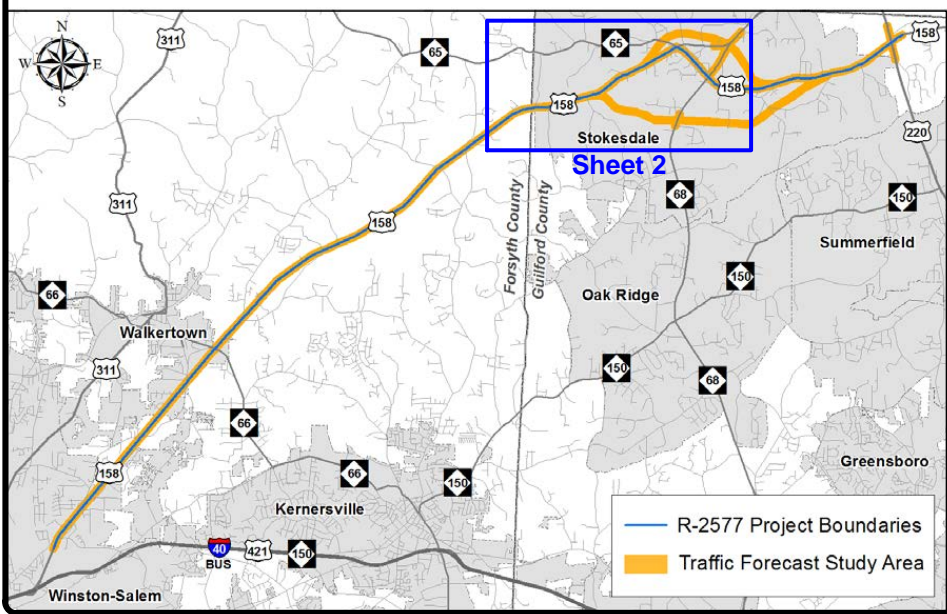
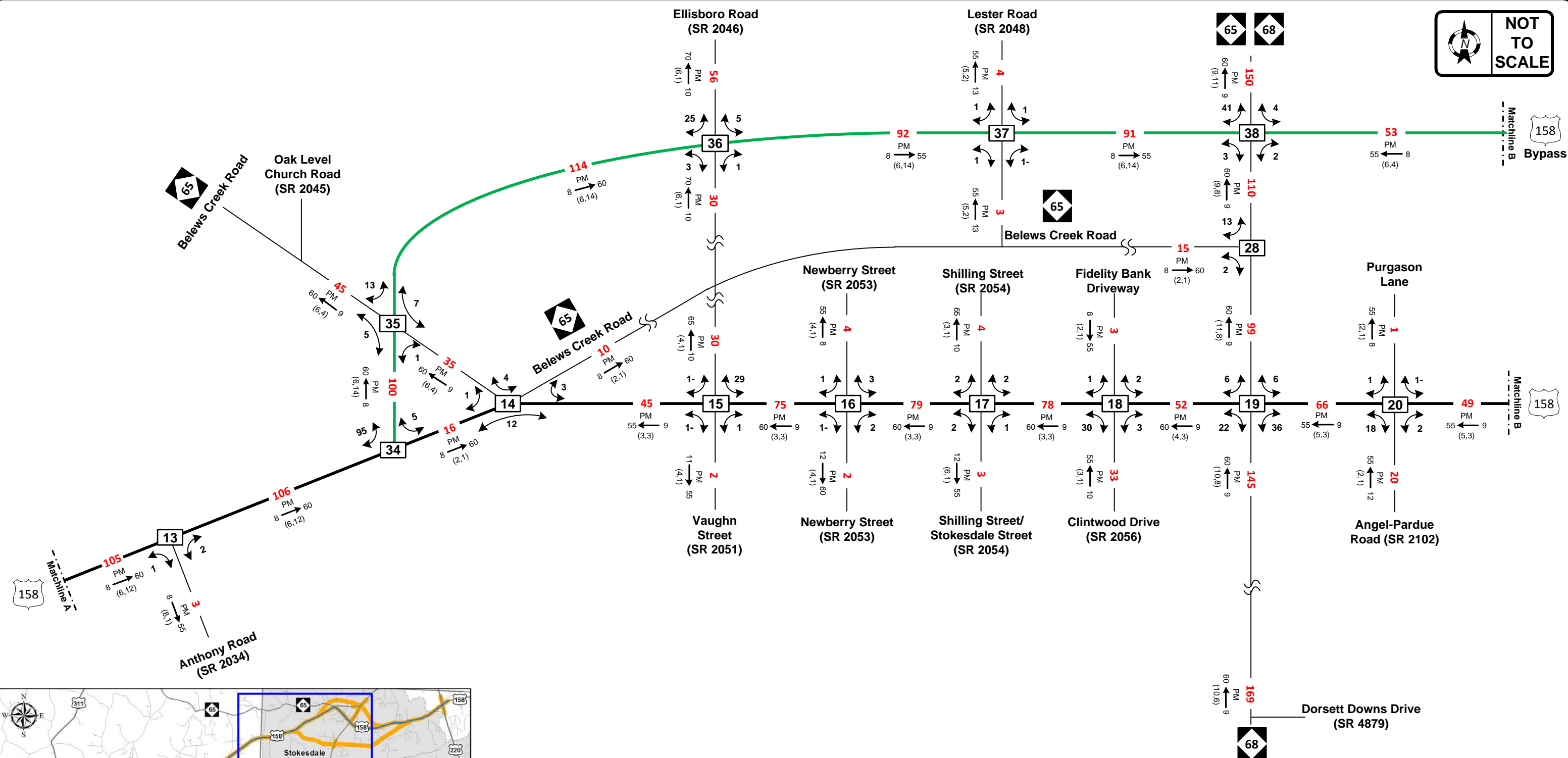
STIP: R-2577	WBS: 37405.1.1
COUNTY: Forsyth/Guilford	DIVISION: 7/9
PREPARED BY: HNTB North Carolina, PC	
PROJECT: US 158 (Reidsville Road) Widening	
LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)	
DATE: July 2017	



NOT TO SCALE



<h1>2017</h1> <p>ANNUAL AVERAGE DAILY TRAFFIC</p>	BASE YEAR BUILD ALTERNATIVE 3	
	Sheet 1 of 3	
LEGEND		
X = Study Area Intersection ID	$K \frac{PM}{(d, t)} \rightarrow D$	STIP: R-2577 WBS: 37405.1.1
### No. of Vehicles Per Day (VPD) in 100s	K Design Hour Factor (%) PM PM Peak Period D Peak Hour Directional Split (%)	COUNTY: Forsyth/Guilford DIVISION: 7/9
1- Less than 50 VPD	\rightarrow Indicates Direction of D (d,t) Duals, TT-STs (%)	PREPARED BY: HNTB North Carolina, PC
----- Proposed Roadway		PROJECT: US 158 (Reidsville Road) Widening
		LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)
		DATE: July 2017



2017 ANNUAL AVERAGE DAILY TRAFFIC

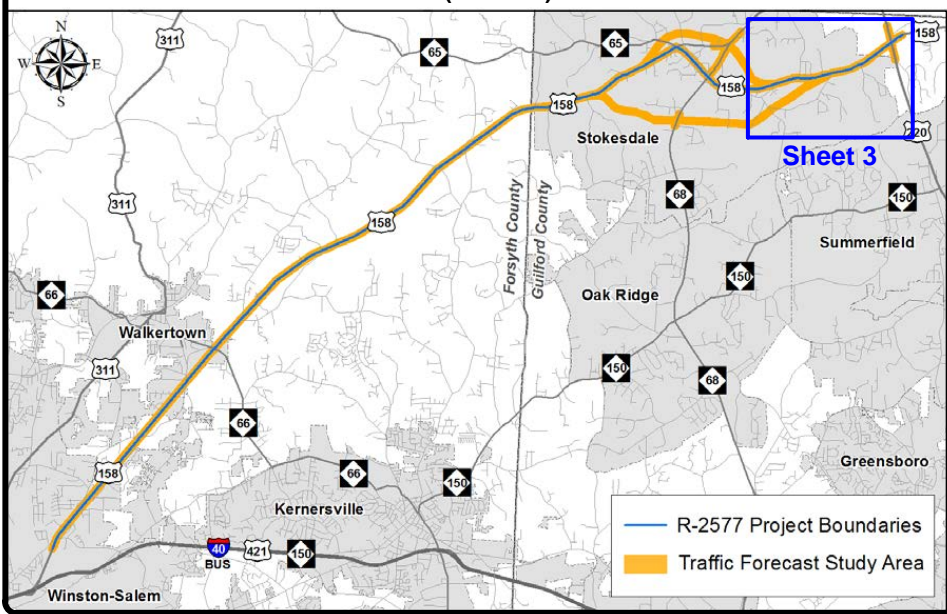
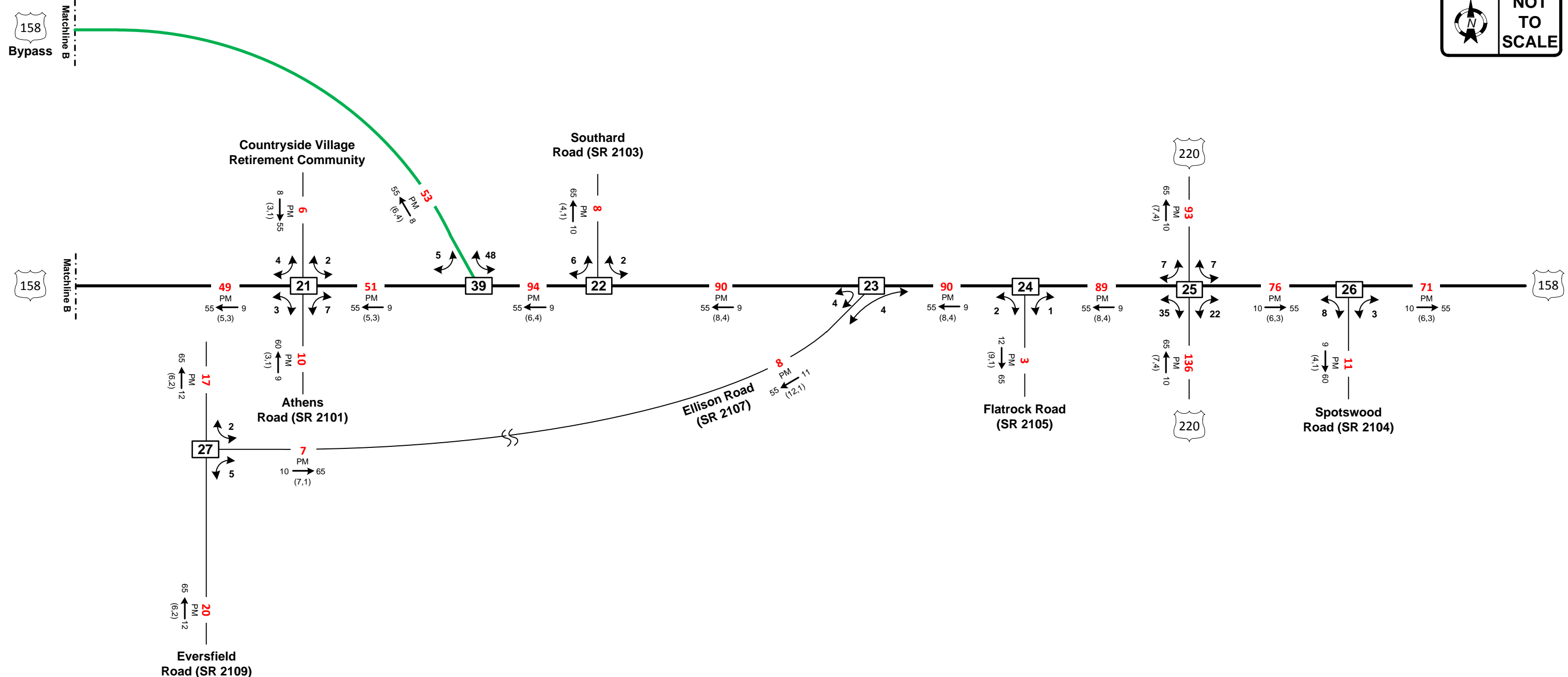
BASE YEAR BUILD ALTERNATIVE 3

Sheet 2 of 3

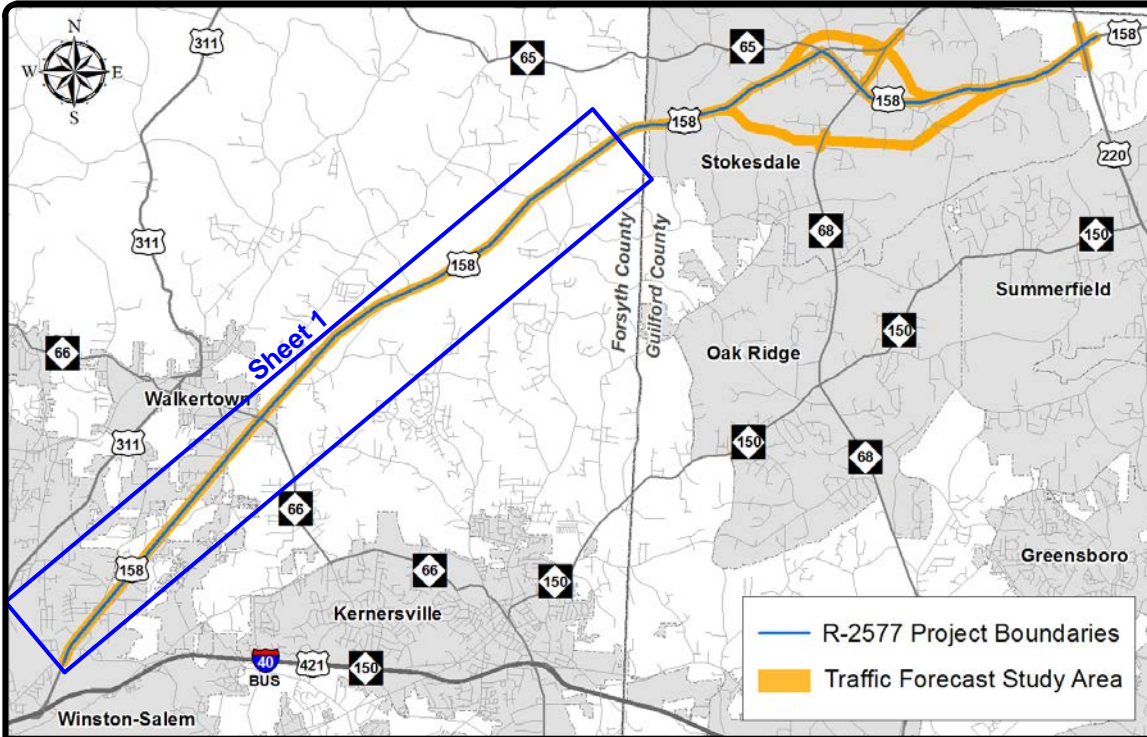
LEGEND

X	= Study Area Intersection ID	$K \frac{PM}{(d, t)} \rightarrow D$	
###	No. of Vehicles Per Day (VPD) in 100s	K	Design Hour Factor (%)
1-	Less than 50 VPD	PM	PM Peak Period
→		D	Peak Hour Directional Split (%)
-----	Proposed Roadway	(d,t)	Indicates Direction of D Duals, TT-STs (%)

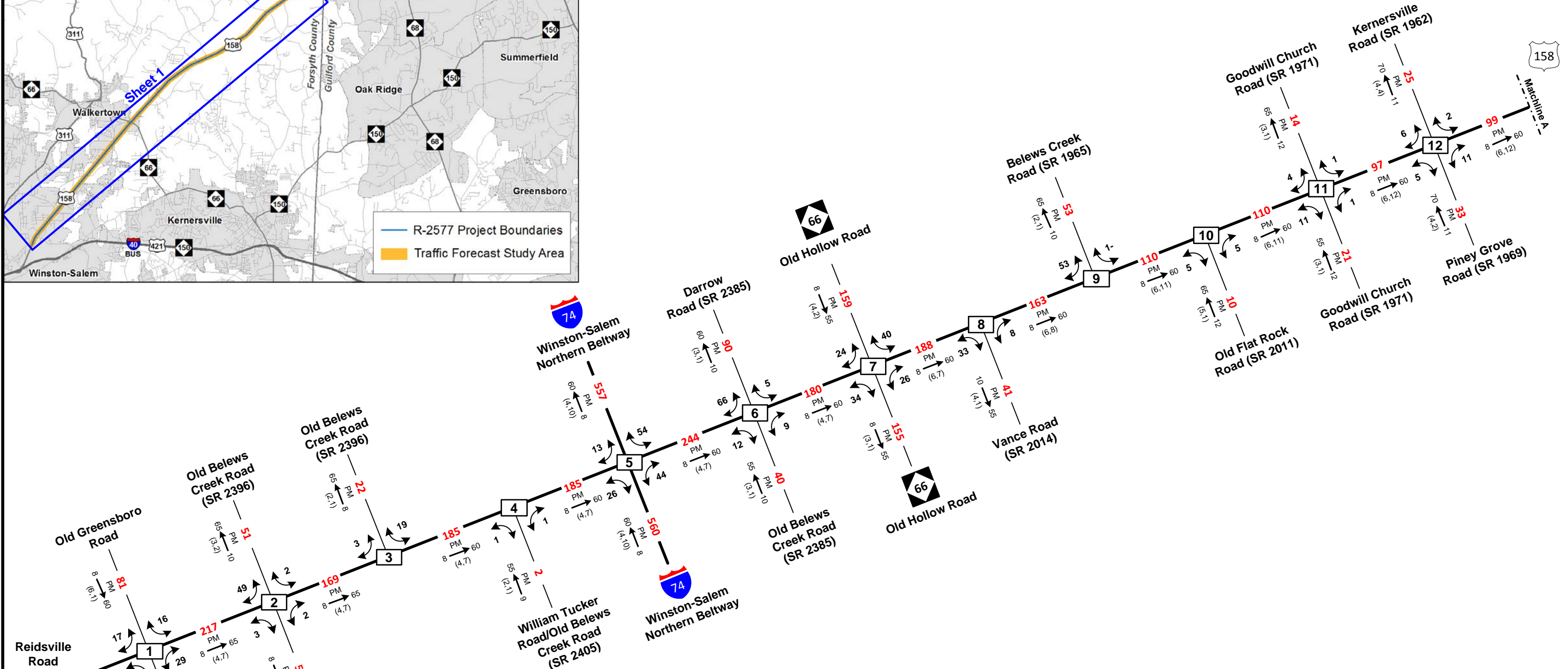
STIP: R-2577	WBS: 37405.1.1
COUNTY: Forsyth/Guilford	DIVISION: 7/9
PREPARED BY: HNTB North Carolina, PC	
PROJECT: US 158 (Reidsville Road) Widening	
LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)	
DATE: July 2017	



2017 ANNUAL AVERAGE DAILY TRAFFIC		BASE YEAR BUILD ALTERNATIVE 3	
		Sheet 3 of 3	
<p>LEGEND</p> <p>X = Study Area Intersection ID</p> <p>### No. of Vehicles Per Day (VPD) in 100s</p> <p>1- Less than 50 VPD</p> <p>----- Proposed Roadway</p> <p>$K \frac{PM}{(d,t)} \rightarrow D$</p> <p>K Design Hour Factor (%)</p> <p>PM PM Peak Period</p> <p>D Peak Hour Directional Split (%)</p> <p>\rightarrow Indicates Direction of D</p> <p>(d,t) Duals, TT-STs (%)</p>		STIP: R-2577	WBS: 37405.1.1
		COUNTY: Forsyth/Guilford	DIVISION: 7/9
		PREPARED BY: HNTB North Carolina, PC	
		PROJECT: US 158 (Reidsville Road) Widening	
		LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)	
		DATE: July 2017	



NOT TO SCALE

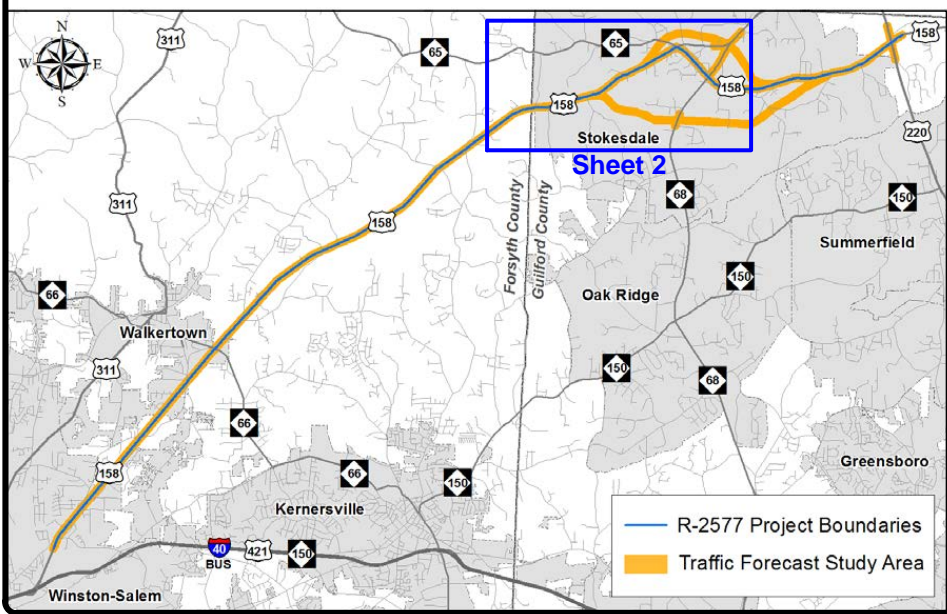
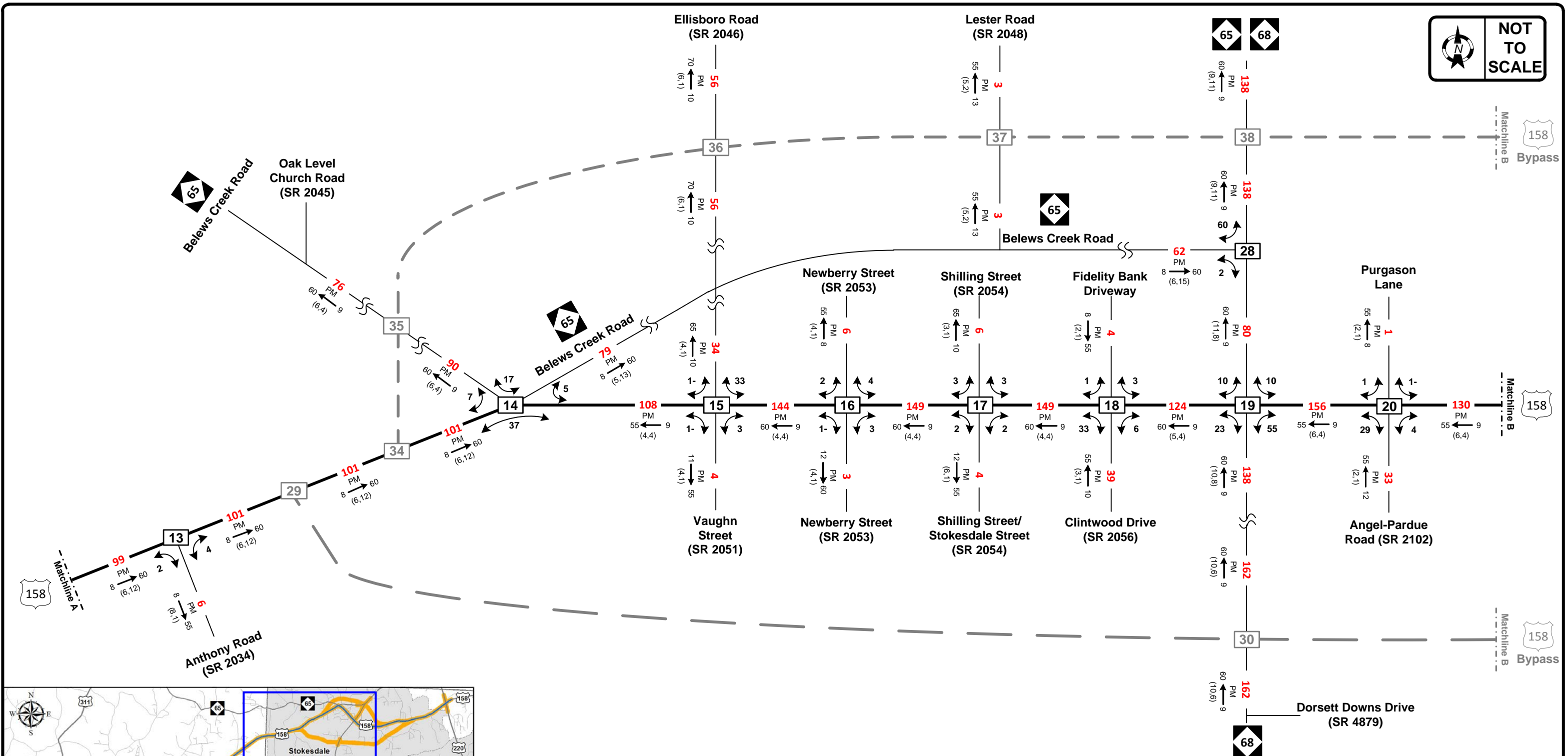


2040 ANNUAL AVERAGE DAILY TRAFFIC

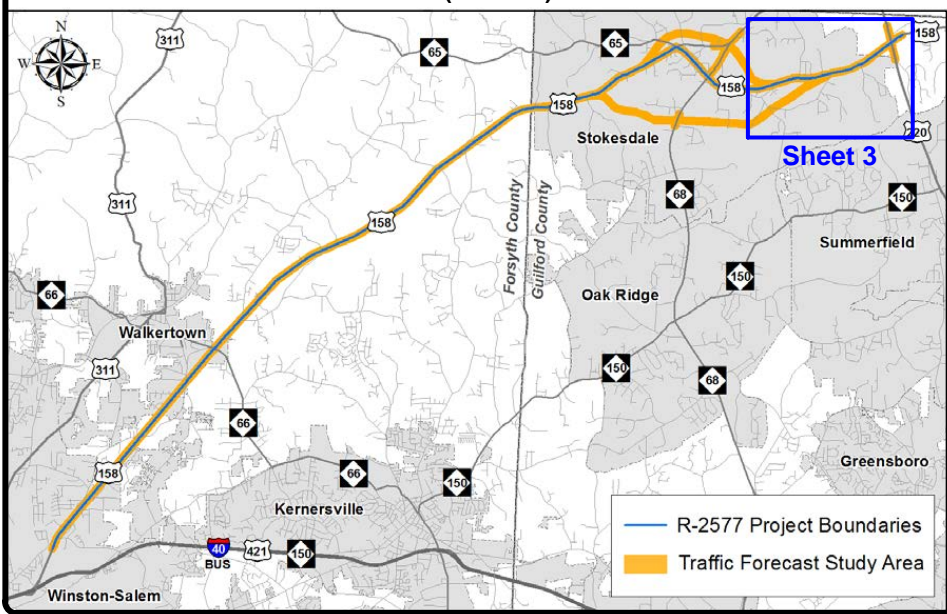
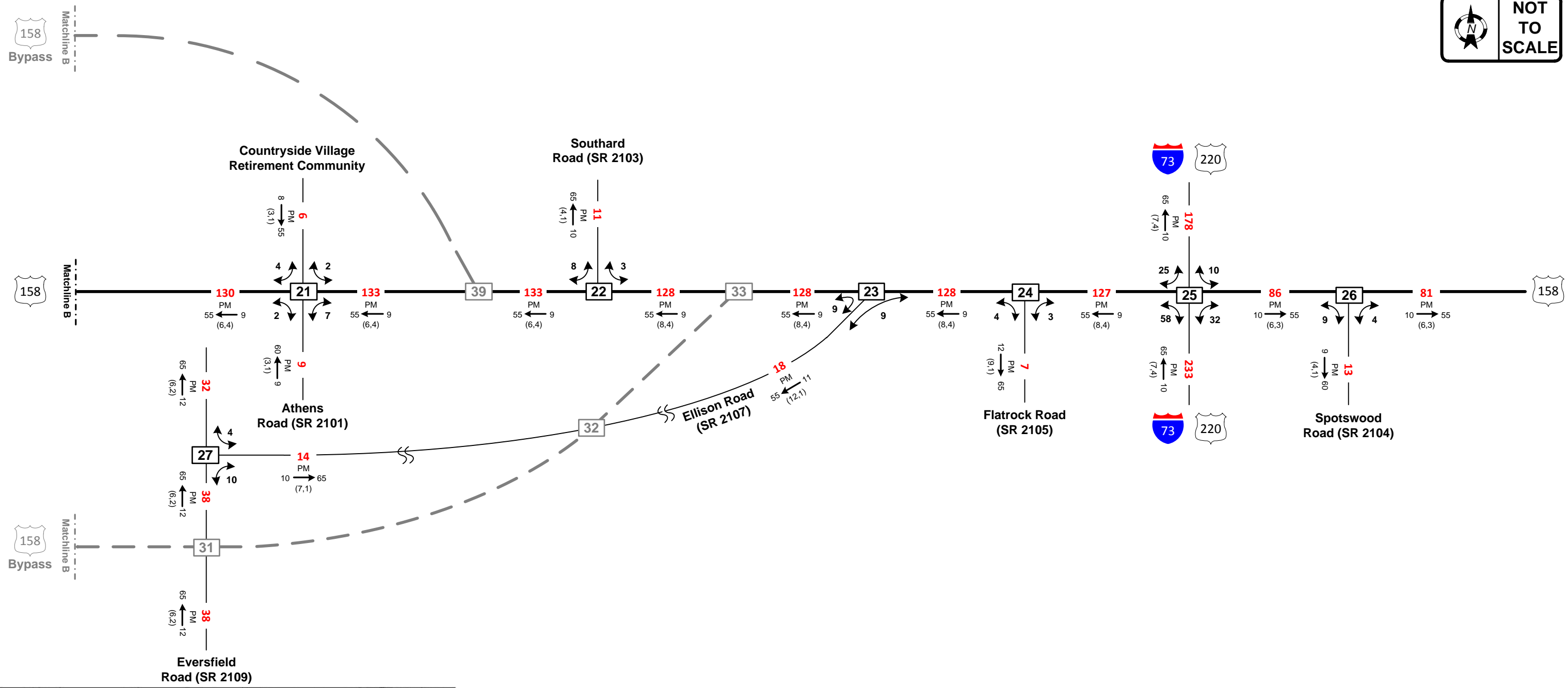
FUTURE YEAR NO-BUILD

Sheet 1 of 3

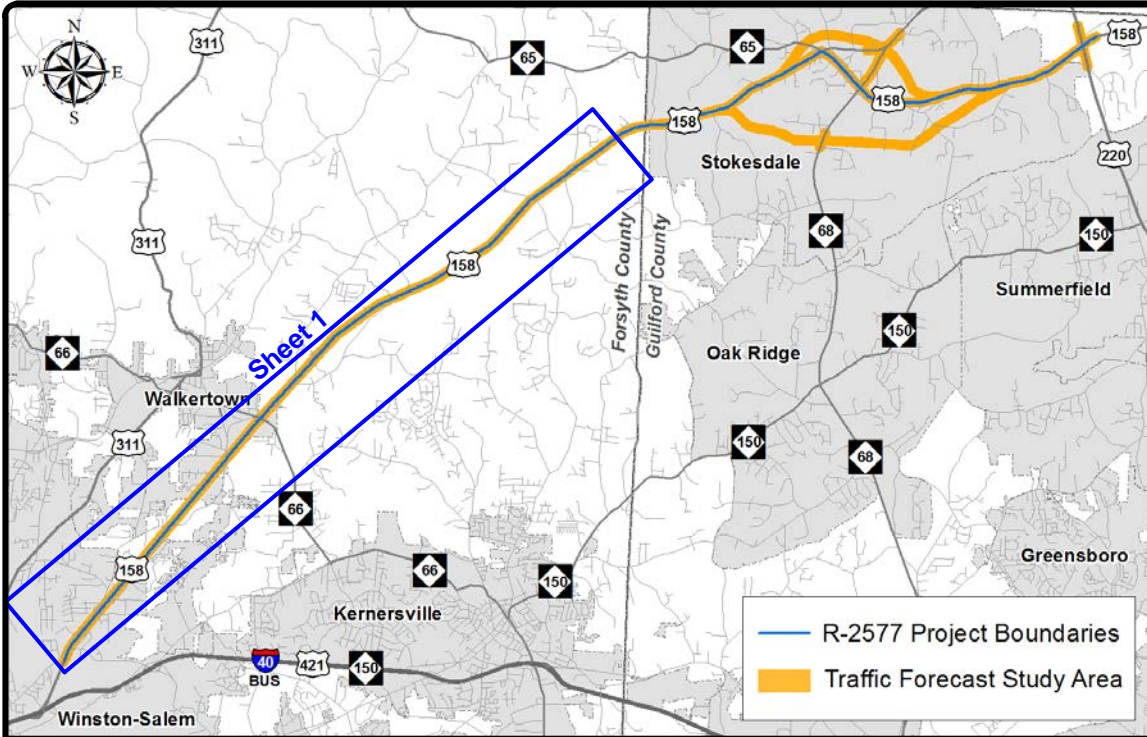
LEGEND		STIP: R-2577	WBS: 37405.1.1
[X] = Study Area Intersection ID ### No. of Vehicles Per Day (VPD) in 100s 1- Less than 50 VPD ----- Proposed Roadway	K Design Hour Factor (%) PM PM Peak Period D Peak Hour Directional Split (%) → Indicates Direction of D (d,t) Duals, TT-STs (%)	COUNTY: Forsyth/Guilford DIVISION: 7/9 PREPARED BY: HNTB North Carolina, PC PROJECT: US 158 (Reidsville Road) Widening LOCATION: North of US 421/I-40 Business to US 220 (Future I-73) DATE: July 2017	



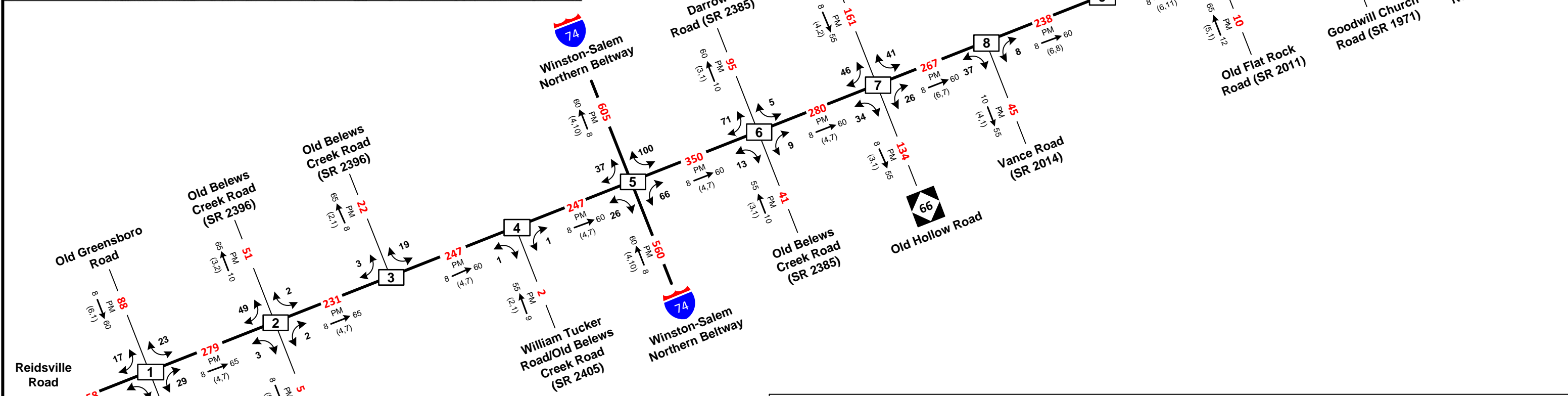
2040 ANNUAL AVERAGE DAILY TRAFFIC		FUTURE YEAR NO-BUILD	
LEGEND		Sheet 2 of 3	
X = Study Area Intersection ID	$K \frac{PM}{(d,t)} \rightarrow D$	STIP: R-2577	WBS: 37405.1.1
### No. of Vehicles Per Day (VPD) in 100s	K Design Hour Factor (%)	COUNTY: Forsyth/Guilford	DIVISION: 7/9
1- Less than 50 VPD	PM PM Peak Period	PREPARED BY: HNTB North Carolina, PC	
----- Proposed Roadway	D Peak Hour Directional Split (%)	PROJECT: US 158 (Reidsville Road) Widening	
	→ Indicates Direction of D	LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)	
	(d,t) Duals, TT-STs (%)	DATE: July 2017	



2040 ANNUAL AVERAGE DAILY TRAFFIC		FUTURE YEAR NO-BUILD	
LEGEND		Sheet 3 of 3	
<ul style="list-style-type: none"> X = Study Area Intersection ID ### No. of Vehicles Per Day (VPD) in 100s 1- Less than 50 VPD ----- Proposed Roadway 	<ul style="list-style-type: none"> $K \xrightarrow{\text{PM}} D$ $\frac{K}{(d,t)}$ K Design Hour Factor (%) PM PM Peak Period D Peak Hour Directional Split (%) → Indicates Direction of D (d,t) Duals, TT-STs (%) 	<p>STIP: R-2577</p> <p>WBS: 37405.1.1</p> <p>COUNTY: Forsyth/Guilford</p> <p>DIVISION: 7/9</p> <p>PREPARED BY: HNTB North Carolina, PC</p> <p>PROJECT: US 158 (Reidsville Road) Widening</p> <p>LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)</p> <p>DATE: July 2017</p>	



NOT TO SCALE



2040 ANNUAL AVERAGE DAILY TRAFFIC

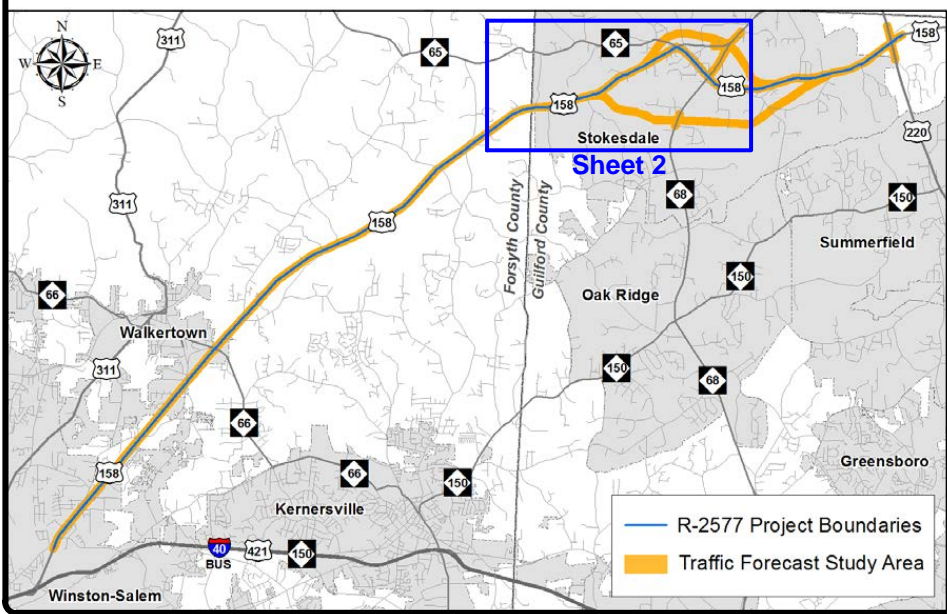
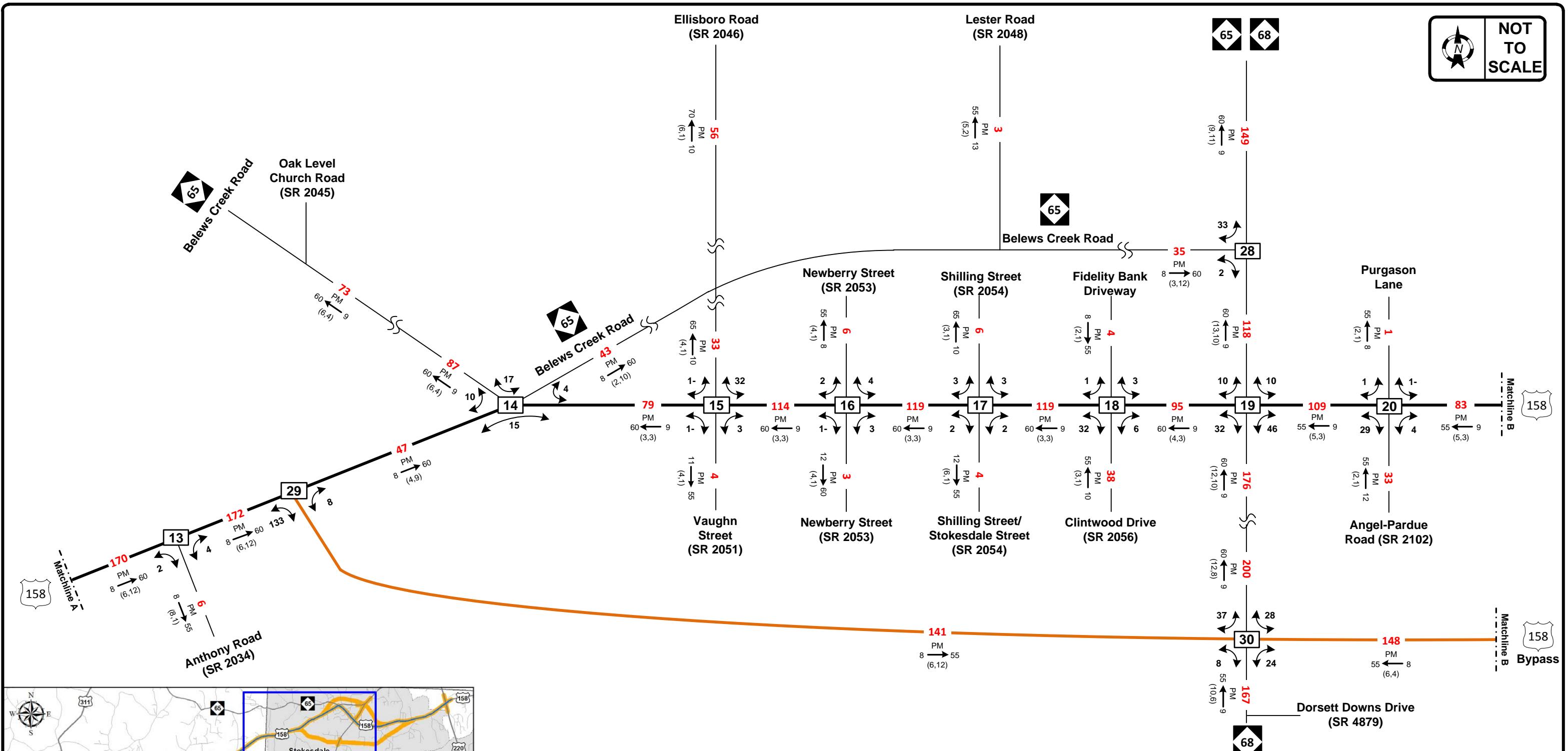
FUTURE YEAR BUILD ALTERNATIVE 2

Sheet 1 of 3

LEGEND

X	= Study Area Intersection ID	$K \frac{PM}{(d,t)} \rightarrow D$
###	No. of Vehicles Per Day (VPD) in 100s	K Design Hour Factor (%)
1-	Less than 50 VPD	PM PM Peak Period
-----	Proposed Roadway	D Peak Hour Directional Split (%)
		→ Indicates Direction of D
		(d,t) Duals, TT-STs (%)

STIP: R-2577	WBS: 37405.1.1
COUNTY: Forsyth/Guilford	DIVISION: 7/9
PREPARED BY: HNTB North Carolina, PC	
PROJECT: US 158 (Reidsville Road) Widening	
LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)	
DATE: July 2017	



2040 ANNUAL AVERAGE DAILY TRAFFIC

FUTURE YEAR BUILD ALTERNATIVE 2

Sheet 2 of 3

LEGEND		STIP: R-2577	WBS: 37405.1.1
X	= Study Area Intersection ID	COUNTY: Forsyth/Guilford	DIVISION: 7/9
###	No. of Vehicles Per Day (VPD) in 100s	PREPARED BY: HNTB North Carolina, PC	PROJECT: US 158 (Reidsville Road) Widening
1-	Less than 50 VPD	LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)	DATE: July 2017
-----	Proposed Roadway		

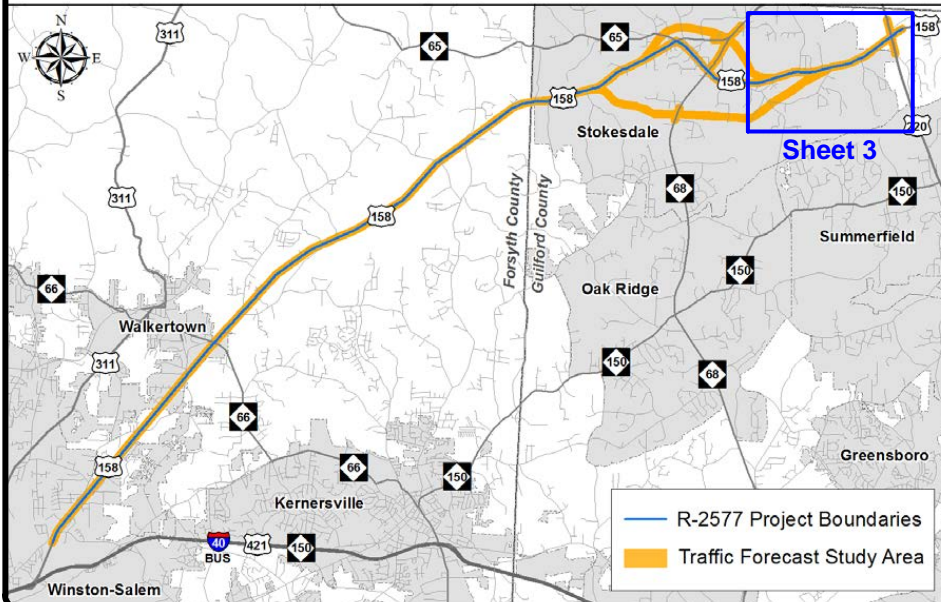
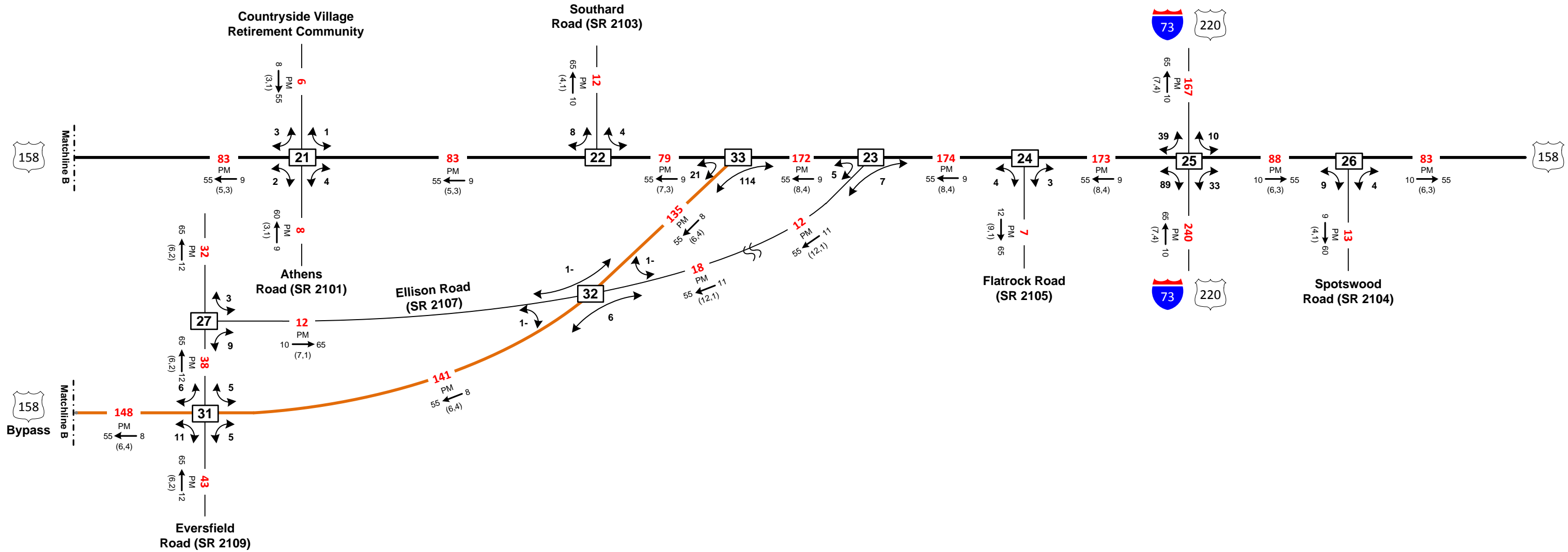
K Design Hour Factor (%)

PM PM Peak Period

D Peak Hour Directional Split (%)

→ Indicates Direction of D

(d,t) Duals, TT-STs (%)



2040 ANNUAL AVERAGE DAILY TRAFFIC

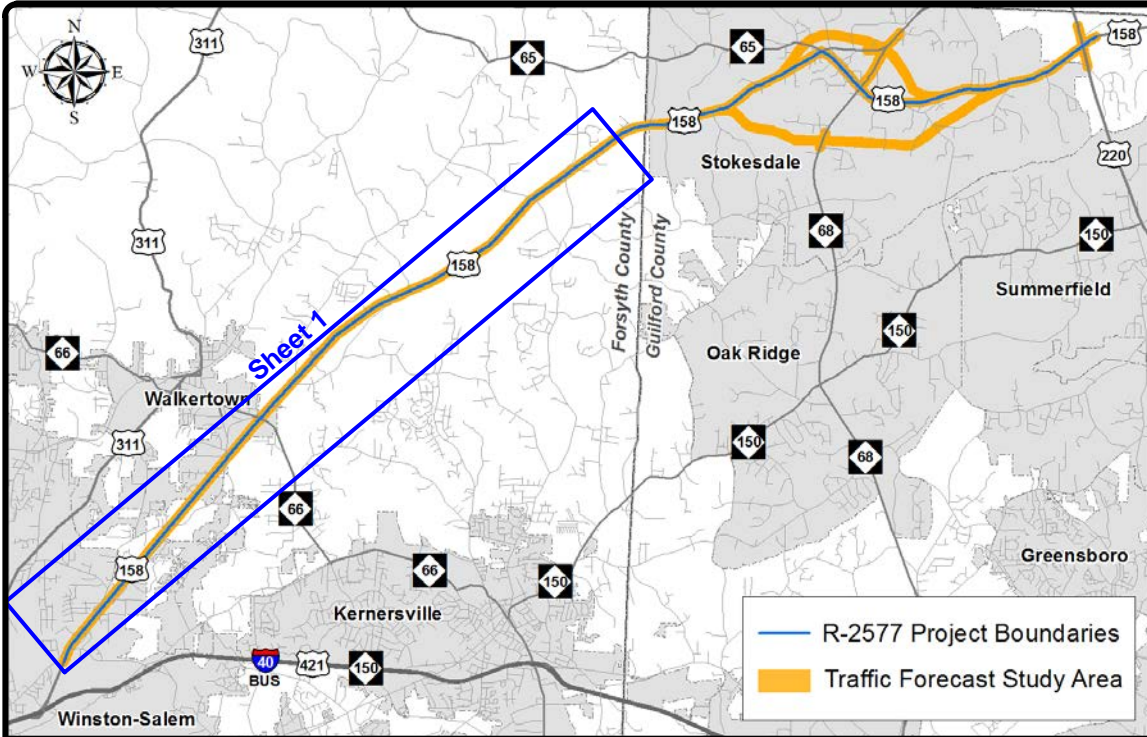
FUTURE YEAR BUILD ALTERNATIVE 2

Sheet 3 of 3

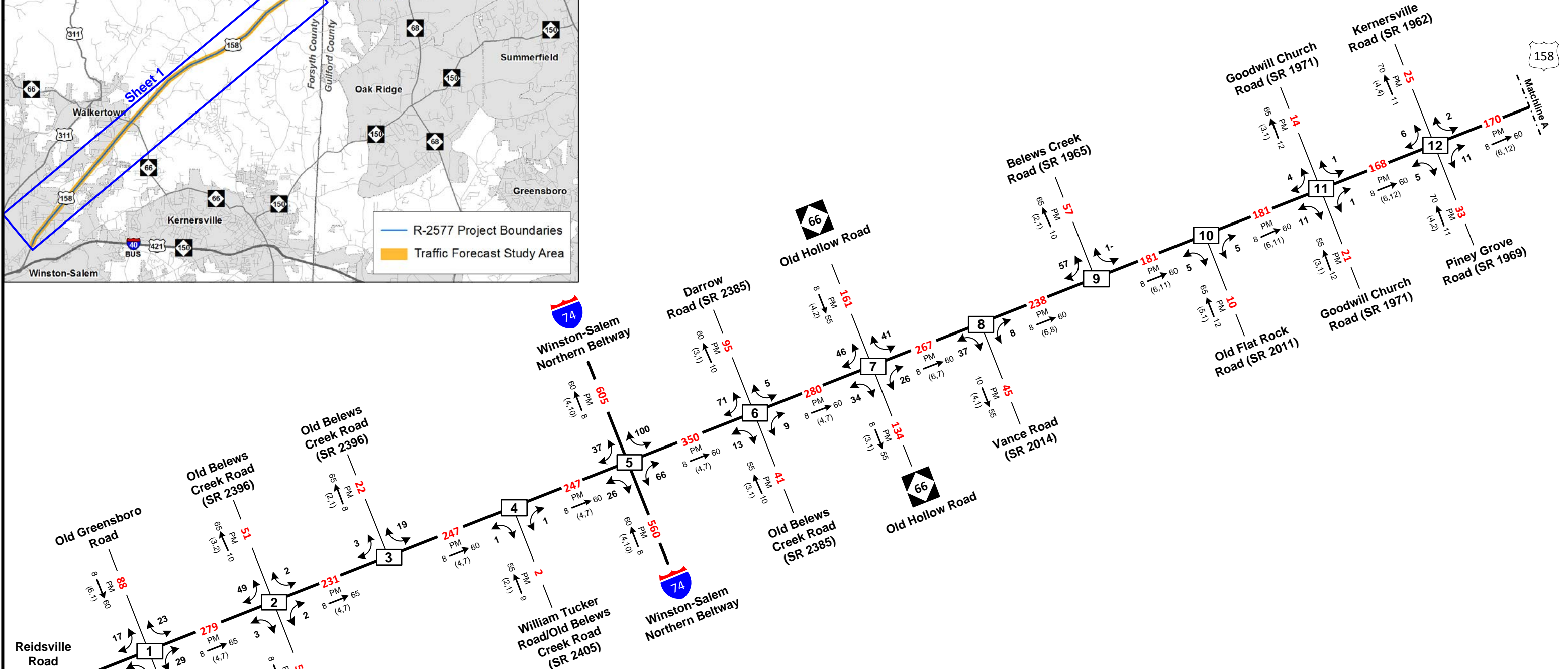
LEGEND

X = Study Area Intersection ID	$K \frac{PM}{(d,t)} \rightarrow D$
### No. of Vehicles Per Day (VPD) in 100s	K Design Hour Factor (%)
1- Less than 50 VPD	PM PM Peak Period
----- Proposed Roadway	D Peak Hour Directional Split (%)
	→ Indicates Direction of D
	(d,t) Duals, TT-STs (%)

STIP: R-2577	WBS: 37405.1.1
COUNTY: Forsyth/Guilford	DIVISION: 7/9
PREPARED BY: HNTB North Carolina, PC	
PROJECT: US 158 (Reidsville Road) Widening	
LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)	
DATE: July 2017	



NOT TO SCALE



2040 ANNUAL AVERAGE DAILY TRAFFIC

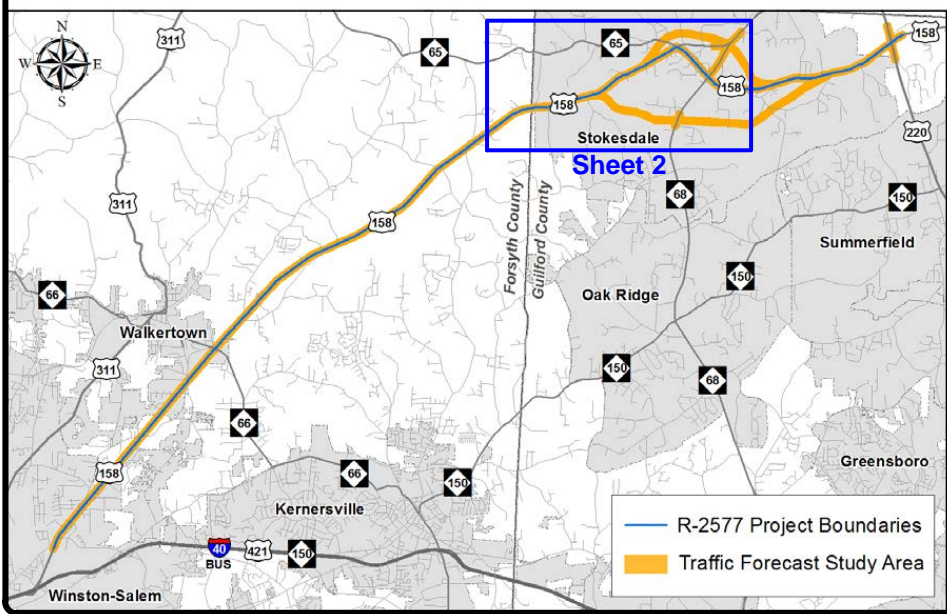
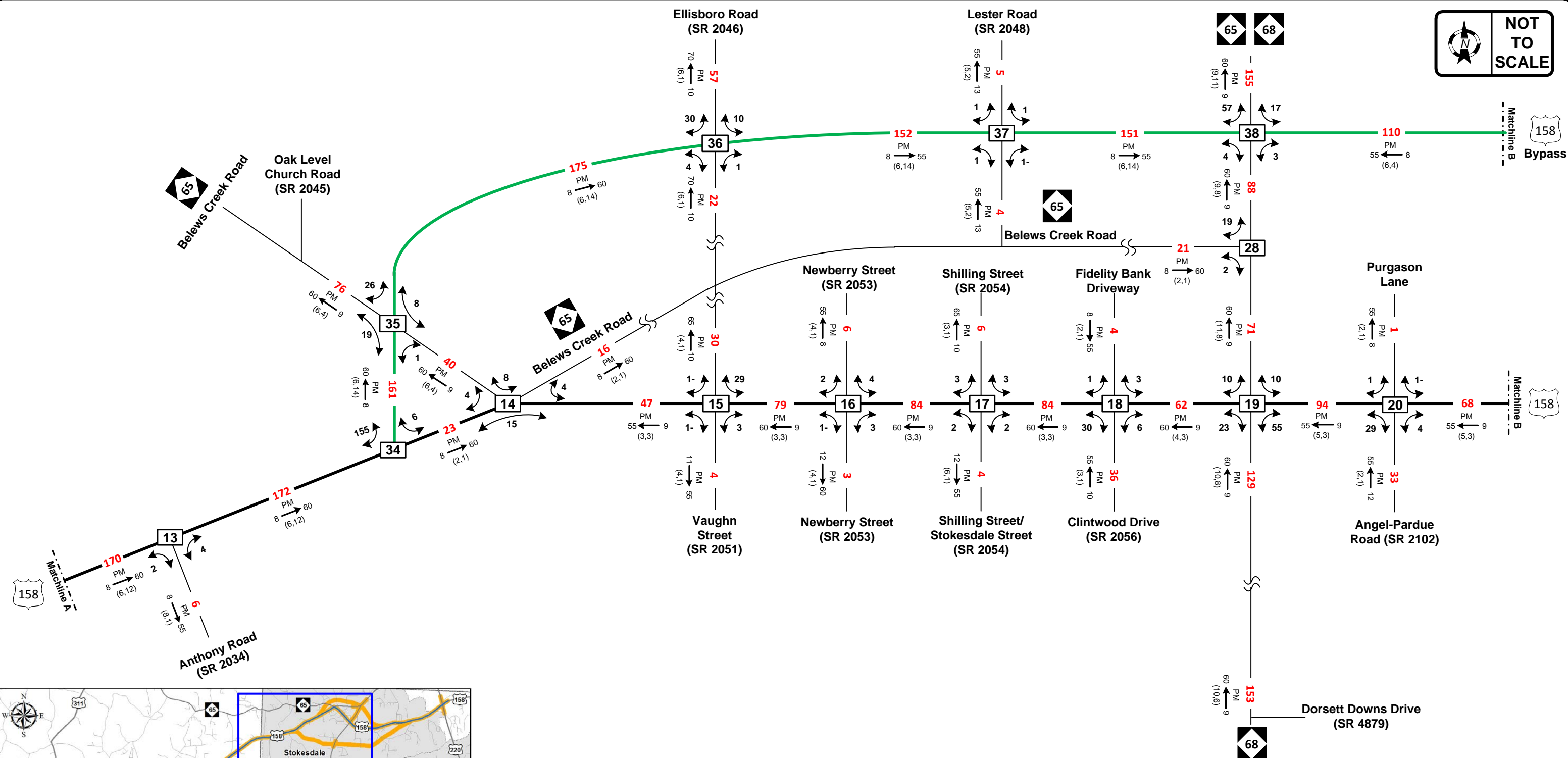
FUTURE YEAR BUILD ALTERNATIVE 3

Sheet 1 of 3

LEGEND

X	= Study Area Intersection ID	$K \frac{PM}{(d,t)} \rightarrow D$
###	No. of Vehicles Per Day (VPD) in 100s	K Design Hour Factor (%)
1-	Less than 50 VPD	PM PM Peak Period
-----	Proposed Roadway	D Peak Hour Directional Split (%)
		→ Indicates Direction of D
		(d,t) Duals, TT-STs (%)

STIP: R-2577	WBS: 37405.1.1
COUNTY: Forsyth/Guilford	DIVISION: 7/9
PREPARED BY: HNTB North Carolina, PC	
PROJECT: US 158 (Reidsville Road) Widening	
LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)	
DATE: July 2017	

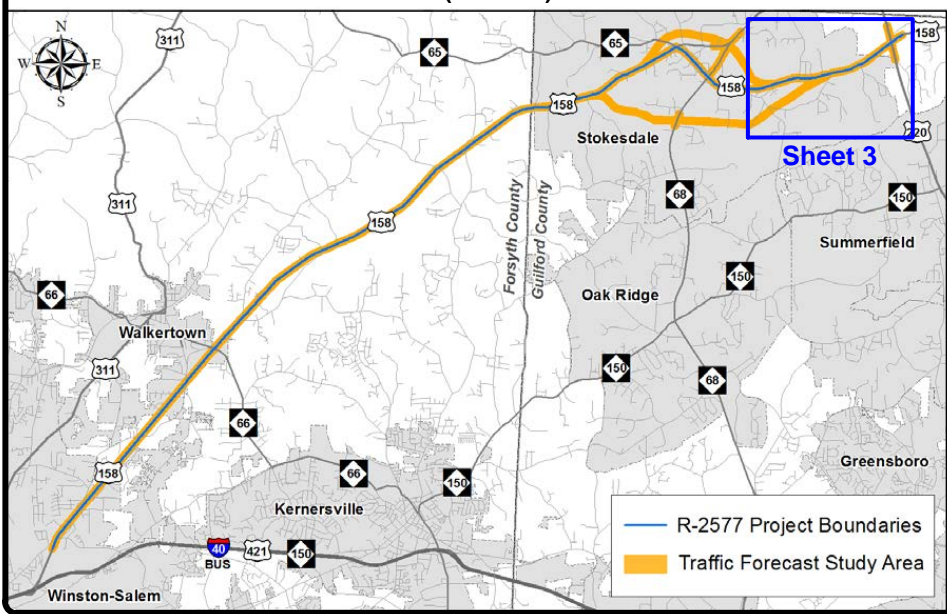
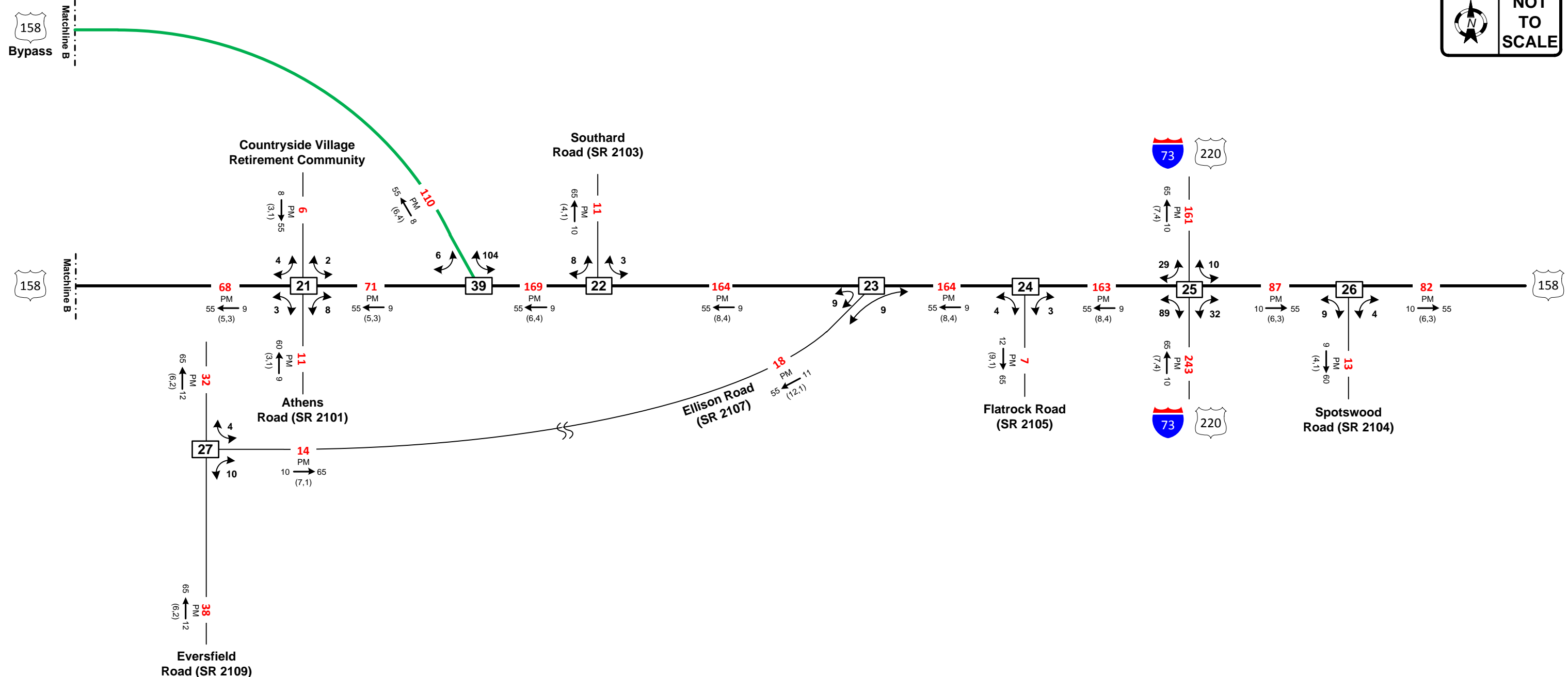


2040 ANNUAL AVERAGE DAILY TRAFFIC

FUTURE YEAR BUILD ALTERNATIVE 3

Sheet 2 of 3

LEGEND		STIP: R-2577	WBS: 37405.1.1
X	= Study Area Intersection ID	COUNTY: Forsyth/Guilford	DIVISION: 7/9
###	No. of Vehicles Per Day (VPD) in 100s	PREPARED BY: HNTB North Carolina, PC	PROJECT: US 158 (Reidsville Road) Widening
1-	Less than 50 VPD	LOCATION: North of US 421/I-40 Business to US 220 (Future I-73)	DATE: July 2017
-----	Proposed Roadway		



2040 ANNUAL AVERAGE DAILY TRAFFIC

LEGEND

<p>X = Study Area Intersection ID</p> <p>### No. of Vehicles Per Day (VPD) in 100s</p> <p>1- Less than 50 VPD</p> <p>----- Proposed Roadway</p>	<p style="text-align: center;">K $\xrightarrow{\text{PM}}$ D</p> <p style="text-align: center;">(d, t)</p> <p>K Design Hour Factor (%)</p> <p>PM PM Peak Period</p> <p>D Peak Hour Directional Split (%)</p> <p>\rightarrow Indicates Direction of D</p> <p>(d,t) Duals, TT-STs (%)</p>
---	--