

July 1, 2016

NC 73 Corridor Study (Segment 4)

Congestion Management Section

Project: SP-2009-17 (Segment 4 of 4)
Division: 10
County: Cabarrus
Description: NC 73 Corridor Improvements from SR 2424 (Poplar Tent Road) to US 29 (Concord Parkway)




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Michael Reese
1 JUL 2016

 Nothing ComparesSM

NC 73 Corridor Study (Segment 4)		
SP-2009-17	Cabarrus County	July 1, 2016

Per your request, the Congestion Management Section (CMS) of the Transportation Mobility and Safety Division has completed a review of NC 73 across all of Cabarrus County. This is **Segment 4** (from SR 1394 (Poplar Tent Road)/ SR 1600 (Shiloh Church Road) to US 29 (Concord Parkway N)). There is a TIP project, R-5706B, proposed to improve NC 73 across Cabarrus County, and the expected let date for this project is in 2024. There are also multiple proposed site developments along this corridor in the coming years. The purpose of this analysis is to indicate 2016 and 2021 conditions under existing geometry and to improve 2021 traffic operations in this corridor with interim improvements in the absence of any specific new developments or TIP project improvements.

NC 73 is a two-lane undivided roadway throughout the entire study area. The traffic volumes used in the analysis were developed from the available 2011, 2014, 2015, and 2016 counts and an assumed 1.5% annual growth rate for the entire study area through 2021. The 2012 AADT range from 10,000 to 28,000 (near I-85) vehicles per day. We performed the capacity analysis based on the current year (2016) and the design year (2021) AM/PM peak hours using Synchro/SimTraffic, version 9.1. The traffic analysis summary tables and the recommended interim geometry, lanes, and storage are included in the attachments.

Study Area ~ N↑ [NC 73 from SR 1394 (Poplar Tent Road)/SR 1600 (Shiloh Church Road) to US-29 (Concord Pkwy N)]



Fig: NC 73 Corridor Network Study Areas in Cabarrus County (Segment 4)

Analyzed Scenarios for Cabarrus County - Segment 4

We performed capacity analysis for the following scenarios based on the existing (2016) lane geometry:

- Scenario 1 – 2016 Existing Geometry:** Existing (2016) lane geometry and storage with estimated 2016 traffic volumes
- Scenario 2 – 2021 Existing Geometry:** Existing (2016) lane geometry and storage with estimated 2021 traffic volumes
- Scenario 3 – 2021 Interim Improvements:** Includes minor-low cost improvements without significant geometric changes with estimated 2021 traffic volumes

The results of the capacity analysis can be found in the attached summary tables.

Interim Improvements (2021)

Based on our analysis, the following interim intersection improvements should provide minor-low cost improvements without significant geometric changes. Some of these intersections operate with poor Levels-of-Service (LOS), at or over capacity, and with excessive queuing. Analysis measures of effectiveness for each intersection are shown in the attached summary tables, and geometric recommendations are shown in the attached figures.

1. NC 73 and SR 2424 (Poplar Tent Rd)/ SR 1600 (Shiloh Church Rd)

Existing Signal

This intersection operates at a poor LOS, over capacity, and with excessive queuing during both the base year (2016) and the design year (2021). This intersection was also analyzed with segment 3.

EB NC 73

- New Single 300' Right-Turn Lane

NB SR 2424 (Poplar Tent Rd)

- Extend Existing Left-Turn Lane to 450'

2. NC 73 and SR 2941 (Meadow Crossing Dr)/Crusader Way

Existing Stop-Control

- No interim improvements are recommended

3. NC 73 and Village Commons St NW/ Wellington Chase Dr

Existing Signal

- No interim improvements are recommended

4. NC 73 and SR 1442 (Odell School Rd)

Existing Signal

This intersection operates at a poor LOS, over capacity, and with excessive queuing during both the base year (2016) and the design year (2021). Additional infrastructure improvements beyond these recommendations may be necessary to achieve acceptable operations beyond 2021.

EB NC 73

- New Single 100' Right-Turn Lane

NB SR 1442 (Odell School Rd)

- New Single 150' Right-Turn Lane

SB SR 1442 (Odell School Rd)

- Extend Existing Left-Turn Lane to 375'

5. NC 73 and SR 1430 (Kannapolis Pkwy)

Existing Signal

This intersection operates at a poor LOS, over capacity, and with excessive queuing during both the base year (2016) and the design year (2021). Additional infrastructure improvements beyond these recommendations may be necessary to achieve acceptable operations beyond 2021.

EB NC 73

- New 300' Left-Turn Lane (One Existing)
- Extend Existing Left-Turn Lane to 300'
- New 200' Right-Turn Lane (One Existing)

WB NC 73

- New 300' Left-Turn Lane (One Existing)
- Extend Existing Left-Turn Lane to 300'

6. NC 73 and SR 1620 (Roger Dale Carter Blvd)

Existing Stop-Control

This intersection operates at a poor LOS and with excessive queuing during both the base year (2016) and the design year (2021). Additional infrastructure improvements beyond these recommendations may be necessary to achieve acceptable operations beyond 2021.

- No interim improvements are recommended
- Possible future signal, superstreet, or roundabout

7. NC 73 and Stanley Dr

Existing Signal

This intersection operates at a poor LOS during both the base year (2016) and the design year (2021). Additional infrastructure improvements beyond these recommendations may be necessary to achieve acceptable operations beyond 2021.

- No interim improvements are recommended
- Possible future roundabout or superstreet

8. NC 73 and Biscayne Dr

Existing Stop-Control

This intersection is anticipated to operate at poor LOS during the base year (2016) and the design year (2021). Additional infrastructure improvements beyond these recommendations may be necessary to achieve acceptable operations beyond 2021.

- No interim improvements are recommended
- Possible future signal, superstreet, or roundabout

9. NC 73 and SR 1622 (Trinity Church Rd) and 9A. WB U-Turn on NC 73

Existing Signal

These intersections were examined under STIP Project I-3802B.

- No interim improvements are recommended

NC 73 and I-85 Diverging Diamond Interchange

Existing Signal

This interchange was analyzed and improved under STIP Project I-3802B, and was not analyzed for this project.

10. NC 73 and SR 1429 (International Dr NW)

Existing Signal

- No interim improvements are recommended

11. NC 73 and Branson Rd NW/ Westgate Cir NW

Existing Stop-Control

This intersection operates at a poor LOS and over capacity during the base year (2016) and the design year (2021). Additional infrastructure improvements beyond these recommendations may be necessary to achieve acceptable operations beyond 2021.

- No interim improvements are recommended
- Possible future signal or superstreet

12. NC 73 and Hanover Dr NW

Existing Stop Control

- No interim improvements are recommended

13. NC 73 and Chadbourne Ave NW

Existing Stop Control

This intersection operates at a poor LOS during the base year (2016) and the design year (2021). Additional infrastructure improvements beyond these recommendations may be necessary to achieve acceptable operations beyond 2021.

- No interim improvements are recommended

14. NC 73 and SR 1790 (Winecoff School Rd)

Existing Signal

This intersection operates at a poor LOS and with excessive queuing during both the base year (2016) and the design year (2021). Additional infrastructure improvements beyond these recommendations may be necessary to achieve acceptable operations beyond 2021.

EB NC 73

- Extend Existing Left-Turn Lane to 275'

WB NC 73

- New Single 200' Right-Turn Lane

SB SR 1790 (Winecoff School Rd)

- New Single 250' Right-Turn Lane

15. NC 73 and Central Dr NW

Existing Signal

This intersection operates at a poor LOS and with excessive queuing during both the base year (2016) and the design year (2021). Additional infrastructure improvements beyond these recommendations may be necessary to achieve acceptable operations beyond 2021.

EB NC 73

- Extend existing left-turn lane to 250'

16. NC 73 and US-29 (Concord Pkwy N)

Existing Signal

- No interim improvements are recommended



SP-2009-17 (NC 73 Corridor Study, Segment 4)

NCDOT-Congestion Management Section

The intersection results for the existing current year 2016, design year 2021 (No-Build), and design year 2021 (Build) AM/PM peak hours analysis are shown in the following table:

NC 73 (East-West direction) AM/PM Peak Hour Intersection Analysis Comparisons (All Delays in Seconds) (All Queuing in feet*)		NC 73 Corridor Study, Segment 4, Cabarrus County					
		Current Year (2016)		Design Year (2021)		Design Year (2021)	
		Existing Geometry		Existing Geometry		Improved Geometry	
		AM	PM	AM	PM	AM	PM
1. NC 73 and SR 2424/ SR 1600	Overall Intn. LOS/Delay	D/49	E/56	E/59	E/69	C/32	D/38
	Max. Movement Delay	92 (SBT)	120 (SBT)	113 (SBT)	138 (SBT)	64 (SBT)	72 (SBT)
	Max. Intn. Movt. V/C	1.02 (NBL)	1.10 (NBL)	1.08 (NBL)	1.13 (NBL)	0.86 (NBL)	0.88 (NBL)
	Worst Movement LOS	F (Mult)	F (Mult)	F (Mult)	F (Mult)	E (SBT)	E (SBT)
	Synchro/SimTraffic Maximum Queuing *	>1000' (EB)	>1000' (Mult)	>1000' (Mult)	>1000' (Mult)	555' (EB)	605' (EB)
2. NC 73 and SR 2941 (Meadow Crossing Dr)	Overall Intn. LOS/Delay	-	-	-	-	-	-
	Max. Movement Delay	21 (NB)	21 (NB)	25 (NB)	23 (NB)	25 (NB)	25 (NB)
	Max. Intn. Movt. V/C	0.43 (EBTR)	0.50 (EBTR)	0.46 (EBTR)	0.54 (EBTR)	0.46 (EBTR)	0.54 (EBTR)
	Worst Movement LOS	C (Mult)	C (Mult)	C (Mult)	C (Mult)	D (NB)	C (Mult)
	Synchro/SimTraffic Maximum Queuing *	92' (EB)	52' (NB)	77' (NB)	52' (SB)	114' (NB)	74' (SB)
3. NC 73 and Village Commons St NW	Overall Intn. LOS/Delay	A/9	A/9	A/9	A/10	A/9	A/9
	Max. Movement Delay	24 (NBT)	19 (NBT)	26 (NBT)	22 (NBT)	26 (NBT)	27 (NBT)
	Max. Intn. Movt. V/C	0.45 (EB)	0.54 (WB)	0.48 (EB)	0.58 (WB)	0.48 (EB)	0.54 (WB)
	Worst Movement LOS	C (NB)	B (Mult)	C (Mult)	C (NB)	C (Mult)	C (NB)
	Synchro/SimTraffic Maximum Queuing *	194' (EB)	176' (WB)	224' (EB)	201' (WB)	283' (WB)	222' (WB)
4. NC 73 and SR 1422 (Odell School Rd)	Overall Intn. LOS/Delay	E/64	E/63	F/86	F/85	E/57	E/58
	Max. Movement Delay	114 (SBL)	144 (SBL)	133 (SBL)	215 (SBL)	102 (SBT)	121 (SBL)
	Max. Intn. Movt. V/C	1.06 (SBL)	1.17 (SBL)	1.14 (SBT)	1.35 (SBL)	1.07 (SBT)	1.10 (SBL)
	Worst Movement LOS	F (Mult)	F (Mult)	F (Mult)	F (Mult)	F (Mult)	F (Mult)
	Synchro/SimTraffic Maximum Queuing *	>1000' (Mult)	>1000' (NB)	>1000' (Mult)	>1000' (Mult)	>1000' (Mult)	>1000' (NB)

* The highest value of 95th percentile Synchro queues or SimTraffic micro simulation maximum queues used in the above table

- Stop-Controlled intersection

SP-2009-17 (NC 73 Corridor Study, Segment 4)
 NCDOT-Congestion Management Section

NC 73 (East-West direction) AM/PM Peak Hour Intersection Analysis Comparisons (All Delays in Seconds) (All Queuing in feet*)		NC 73 Corridor Study, Segment 4, Cabarrus County					
		Current Year (2016)		Design Year (2021)		Design Year (2021)	
		Existing Geometry		Existing Geometry		Improved Geometry	
		AM	PM	AM	PM	AM	PM
5. NC 73 and SR 1430 (Kannapolis Pkwy)	Overall Intn. LOS/Delay	D/48	E/62	E/58	F/81	D/48	E/67
	Max. Movement Delay	95 (WBL)	130 (WBL)	127 (WBL)	129 (EBL)	95 (NBL)	102 (NBT)
	Max. Intn. Movt. V/C	1.04 (WBL)	1.17 (WBL)	1.12 (WBL)	1.12 (WBL)	1.03 (NBL)	1.11 (NBT)
	Worst Movement LOS	F (WBL)	F (WBL)	F (Mult)	F (Mult)	F (Mult)	F (Mult)
	Synchro/SimTraffic Maximum Queuing *	>1000' (EB)	>1000' (WB)	>1000' (SB)	>1000' (Mult)	>1000' (Mult)	>1000' (Mult)
6. NC 73 and Roger Dale Carter Blvd	Overall Intn. LOS/Delay	-	-	-	-	-	-
	Max. Movement Delay	23 (SB)	31 (SB)	28 (SB)	41 (SB)	28 (SB)	40 (SB)
	Max. Intn. Movt. V/C	0.41 (EBT)	0.57 (WBT)	0.44 (EBT)	0.62 (WBT)	0.44 (EBT)	0.62 (WBT)
	Worst Movement LOS	C (SB)	D (SB)	D (SB)	E (SB)	D (SB)	E (SB)
	Synchro/SimTraffic Maximum Queuing *	39' (SB)	>1000' (WB)	560' (WB)	>1000' (WB)	>1000' (WB)	>1000' (WB)
7. NC 73 and Stanley Dr	Overall Intn. LOS/Delay	A/7	B/13	A/8	B/15	A/8	B/14
	Max. Movement Delay	55 (NB)	59 (SBT,NBT)	55 (NB)	60 (SBT)	55 (NB)	60 (SBT)
	Max. Intn. Movt. V/C	0.47 (WBT)	0.65 (WBT)	0.53 (WBT)	0.70 (WBT)	0.53 (WBT)	0.70 (WBT)
	Worst Movement LOS	E (NB)	E (Mult)	E (NB)	E (Mult)	E (NB)	E (Mult)
	Synchro/SimTraffic Maximum Queuing *	400' (WB)	458' (WB)	495' (WB)	570' (WB)	505' (WB)	515' (WB)
8. NC 73 and Biscayne Dr	Overall Intn. LOS/Delay	-	-	-	-	-	-
	Max. Movement Delay	21 (NB)	49 (NB)	23 (NB)	83 (NB)	23 (NB)	83 (NB)
	Max. Intn. Movt. V/C	0.44 (WBT)	0.59 (NB)	0.48 (WBT)	0.78 (NB)	0.48 (WBT)	0.78 (NB)
	Worst Movement LOS	C (NB)	E (NB)	C (NB)	F (NB)	C (NB)	F (NB)
	Synchro/SimTraffic Maximum Queuing *	53' (WB)	119' (NB)	74' (WB)	158' (NB)	72' (NB)	134' (NB)

* The highest value of 95th percentile Synchro queues or SimTraffic micro simulation maximum queues used in the above table

- Stop-Controlled intersection

SP-2009-17 (NC 73 Corridor Study, Segment 4)
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NC 73 (East-West direction) AM/PM Peak Hour Intersection Analysis Comparisons (All Delays in Seconds) (All Queuing in feet*)		NC 73 Corridor Study, Segment 4, Cabarrus County					
		Current Year (2016)		Design Year (2021)		Design Year (2021)	
		Existing Geometry		Existing Geometry		Improved Geometry	
		AM	PM	AM	PM	AM	PM
9a. NC 73 and U-Turns from SR 1622	Overall Int. LOS/Delay	A/6	A/6	A/6	A/6	A/6	A/6
	Max Movement Delay	25 (WBU)	22 (WBU)	21 (WBU)	22 (WBU)	24 (WBU)	25 (WBU)
	Max Intn. Movement V/C	0.42 (WBT)	0.42 (WBT)	0.45 (WBT)	0.45 (WBT)	0.45 (WBT)	0.45 (WBT)
	Worst Movement LOS	C (WBU)	C (WBU)	C (WBU)	C (WBU)	C (WBU)	C (WBU)
	Synchro/SimTraffic Maximum Queuing*	120' (EB)	97' (EB, WB)	133' (WB)	157' (WB)	153' (EB)	118' (WB)
9. NC 73 and SR 1622 (Trinity Church Rd)	Overall Intn. LOS/Delay	A/9	A/9	A/9	A/9	A/9	A/9
	Max. Movement Delay	22 (SB)	22 (SB)	22 (SB)	23 (SB)	22 (SB)	23 (SB)
	Max. Intn. Movt. V/C	0.53 (SB)	0.55 (SB)	0.55 (SB)	0.59 (SB)	0.55 (SB)	0.59 (SB)
	Worst Movement LOS	C (SB)	C (SB)	C (SB)	C (SB)	C (SB)	C (SB)
	Synchro/SimTraffic Maximum Queuing *	182' (WB)	186' (WB)	195' (SB)	233' (WB)	223' (WB)	151' (SB)
NC 73 and I-85	The I-85 interchange was not analyzed for this project. See I-3803B for analysis.						
10. NC 73 and SR 1429 (International Dr NW)	Overall Intn. LOS/Delay	C/27	C/25	C/29	C/26	C/29	C/26
	Max. Movement Delay	45 (Mult)	42 (SBL)	49 (EBL)	46 (SBL)	49 (EBL)	45 (SBL)
	Max. Intn. Movt. V/C	0.61 (WBT)	0.60 (EBT)	0.64 (WBT)	0.62 (EBT)	0.64 (WBT)	0.64 (NBL)
	Worst Movement LOS	D (Mult)	D (Mult)	D (Mult)	D (Mult)	D (Mult)	D (Mult)
	Synchro/SimTraffic Maximum Queuing *	272' (EB)	295' (EB)	278' (WB)	324' (EB)	278' (WB)	351' (EB)
11. NC 73 and Branson Rd/ Westgate Cir	Overall Intn. LOS/Delay	-	-	-	-	-	-
	Max. Movement Delay	80 (NB)	89 (NB)	151 (NB)	160 (NB)	151 (NB)	160 (NB)
	Max. Intn. Movt. V/C	0.86 (NB)	0.70 (NB)	1.09 (NB)	0.94 (NB)	1.09 (NB)	0.94 (NB)
	Worst Movement LOS	F (NB)	F (NB)	F (NB)	F (Mult)	F (NB)	F (Mult)
	Synchro/SimTraffic Maximum Queuing *	161' (NB)	94' (NB)	235' (NB)	134' (NB)	235' (NB)	178' (NB)

* The highest value of 95th percentile Synchro queues or SimTraffic micro simulation maximum queues used in the above table

- Stop-Controlled intersection

SP-2009-17 (NC 73 Corridor Study, Segment 4)
 NCDOT-Congestion Management Section

NC 73 (East-West direction) AM/PM Peak Hour Intersection Analysis Comparisons (All Delays in Seconds) (All Queuing in feet*)		NC 73 Corridor Study, Segment 4, Cabarrus County					
		Current Year (2016)		Design Year (2021)		Design Year (2021)	
		Existing Geometry		Existing Geometry		Improved Geometry	
		AM	PM	AM	PM	AM	PM
12. NC 73 and Hanover Drive NW	Overall Intn. LOS/Delay	-	-	-	-	-	-
	Max. Movement Delay	28 (NB)	29 (NB)	35 (NB)	34 (NB)	35 (NB)	34 (NB)
	Max. Intn. Movt. V/C	0.32 (EB)	0.47 (EB)	0.39 (NB)	0.51 (EB)	0.39 (NB)	0.51 (EB)
	Worst Movement LOS	D (NB)	D (NB)	D (NB)	D (NB)	D (NB)	D (NB)
	Synchro/SimTraffic Maximum Queuing *	136' (NB)	72' (WB)	81' (WB)	116' (WB)	91' (NB)	189' (WB)
13. NC 73 and Chadbourne Ave NW	Overall Intn. LOS/Delay	-	-	-	-	-	-
	Max. Movement Delay	29 (NB)	42 (NB)	36 (NB)	56 (NB)	36 (NB)	56 (NB)
	Max. Intn. Movt. V/C	0.44 (WBT)	0.51 (EB)	0.47 (WB)	0.55 (EB)	0.45 (NB)	0.55 (EB)
	Worst Movement LOS	D (NB)	E (NB)	E (NB)	F (NB)	E (NB)	F (NB)
	Synchro/SimTraffic Maximum Queuing *	109' (NB)	53' (WB)	90' (NB)	74' (NB)	87' (NB)	111' (NB)
14. NC 73 and SR 1790 (Winecoff School Road)	Overall Intn. LOS/Delay	C/28	D/55	C/31	E/71	B/20	C/27
	Max. Movement Delay	41 (SB)	97 (Mult)	46 (SB)	122 (EBL)	31 (SBR)	50 (SBL)
	Max. Intn. Movt. V/C	0.81 (WB)	1.04 (EBL)	0.85 (WBT)	1.12 (EBL)	0.72 (WBT)	0.82 (WBT)
	Worst Movement LOS	D (SB)	F (Mult)	D (Mult)	F (Mult)	C (Mult)	D (SB)
	Synchro/SimTraffic Maximum Queuing *	538' (WB)	>1000' (Mult)	605' (WB)	>1000' (Mult)	359' (WB)	560' (WB)
15. NC 73 and Central Drive NW	Overall Intn. LOS/Delay	C/27	C/30	C/28	C/33	C/28	C/33
	Max. Movement Delay	55 (SBT)	62 (SBT)	54 (SB)	65 (SBT)	54 (SB)	65 (SBT)
	Max. Intn. Movt. V/C	0.69 (SBT)	0.76 (SBT)	0.71 (SBT)	0.79 (Mult)	0.71 (SBT)	0.79 (SBT,NBL)
	Worst Movement LOS	D (SB)	E (SB)	D (SB)	E (SB)	D (SB)	E (SB)
	Synchro/SimTraffic Maximum Queuing *	291' (EB)	757' (EB)	339' (EB)	>1000' (WB)	328' (WB)	607' (EB)

* The highest value of 95th percentile Synchro queues or SimTraffic micro simulation maximum queues used in the above table

- Stop-Controlled intersection

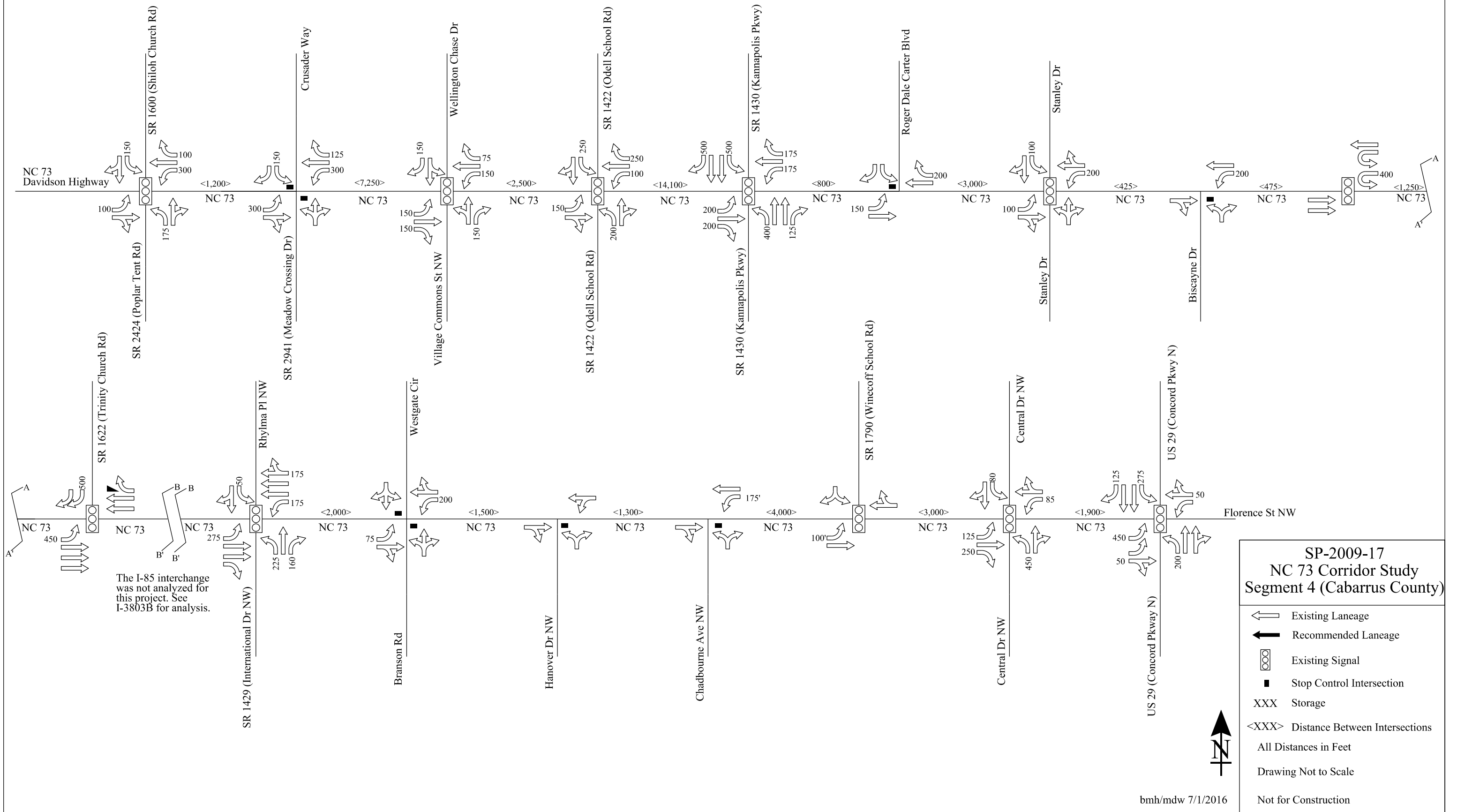
SP-2009-17 (NC 73 Corridor Study, Segment 4)
 NCDOT-Congestion Management Section

NC 73 (East-West direction) AM/PM Peak Hour Intersection Analysis Comparisons (All Delays in Seconds) (All Queuing in feet*)		NC 73 Corridor Study, Segment 4, Cabarrus County					
		Current Year (2016)		Design Year (2021)		Design Year (2021)	
		Existing Geometry		Existing Geometry		Improved Geometry	
		AM	PM	AM	PM	AM	PM
16. NC 73 and US 29 (Concord Pkwy N)	Overall Intn. LOS/Delay	C/34	D/37	C/33	D/39	C/33	D/38
	Max. Movement Delay	40 (EBL)	54 (WBT)	40 (NBT)	60 (WBT)	40 (NBT)	61 (WBT)
	Max. Intn. Movt. V/C	0.76 (NBT)	0.87 (SBT)	0.77 (NBT)	0.91 (SBT)	0.77 (NBT)	0.90 (SBT)
	Worst Movement LOS	D (Mult)	D (Mult)	D (Mult)	E (WBT)	D (Mult)	E (WBT)
	Synchro/SimTraffic Maximum Queuing *	349' (NB)	498' (SB)	367' (NB)	615' (SB)	390' (NB)	679' (SB)

* The highest value of 95th percentile Synchro queues or SimTraffic micro simulation maximum queues used in the above table

- Stop-Controlled intersection

NC 73 Corridor Segment 4 (Cabarrus County) 2016 Existing Geometry



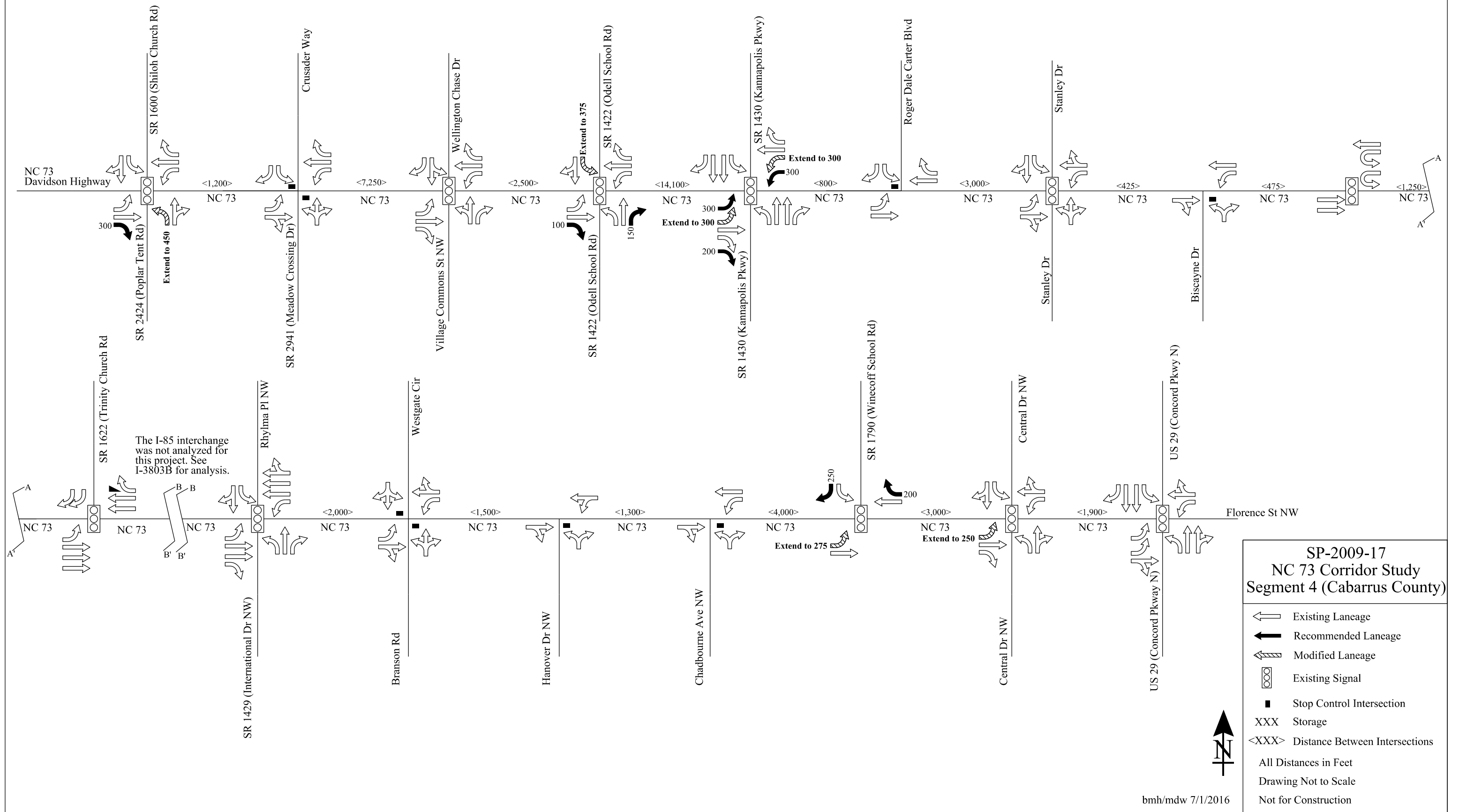
The I-85 interchange was not analyzed for this project. See I-3803B for analysis.

SP-2009-17 NC 73 Corridor Study Segment 4 (Cabarrus County)

- ← Existing Laneage
- ← Recommended Laneage
- ⊞ Existing Signal
- Stop Control Intersection
- XXX Storage
- <XXX> Distance Between Intersections



NC 73 Corridor Segment 4 (Cabarrus County) 2021 - Recommended Interim Improvements



SP-2009-17
NC 73 Corridor Study
Segment 4 (Cabarrus County)

- Existing Laneage
- Recommended Laneage
- Modified Laneage
- Existing Signal
- Stop Control Intersection
- Storage
- Distance Between Intersections

All Distances in Feet
Drawing Not to Scale
Not for Construction