



# HENLOPEN

## TRANSPORTATION IMPROVEMENT DISTRICT

EXISTING CONDITIONS

TRAFFIC ANALYSIS

February 2017



## EXECUTIVE SUMMARY

The purpose of this traffic study was to evaluate existing traffic and other network conditions for the Henlopen Transportation Improvement District (TID) study area. The Henlopen TID seeks to comprehensively coordinate land use and transportation within the study area which will allow the Delaware Department of Transportation (DelDOT) and Sussex County to proactively approach and plan for future development in partnership.

Efficient traffic movement throughout the study area continues to be a challenge for both residents and visitors to the Henlopen study area. As the area continues to grow it is expected that traffic congestion will increase both in the summer peak season and throughout the remaining months of each year.

### Several key findings were identified from the report:

- AM Peak Hour – 39% of intersections have at least one approach Level of Service D or greater.
- AM Peak Hour (without SR 1) – 26% of intersections have at least one approach Level of Service D or greater.
- PM Peak Hour – 49% of intersections have at least one approach Level of Service D or greater.
- PM Peak Hour (without SR 1) – 36% of intersections have at least one approach Level of Service D or greater.
- Saturday Peak Hour – 54% of intersections have at least one approach Level of Service D or greater.
- Saturday Peak Hour (without SR 1) – 40% of intersections have at least one approach Level of Service D or greater.

For the major corridors within the study area, the percentage of intersections with at least one movement at Level of Service D or greater is significantly higher.

- SR 1 – AM Peak Hour – 85%
- SR 1 – PM Peak Hour – 85%
- SR 1 – Saturday Peak Hour – 92%
- SR 24 – AM Peak Hour – 86%
- SR 24 – PM Peak Hour – 71%
- SR 24 – Saturday Peak Hour – 71%

DelDOT has made and continues to make significant investments along the SR 1 corridor and other corridors within the study area. Population and employment projections indicate, however, that the study area will continue to grow as eastern Sussex County attracts more tourism related trips in addition to the growing establishment of a year round community of permanent residents.

These trends present both a challenge and an opportunity for Sussex County and DelDOT. It is anticipated that, similar to current trends, future residential growth will continue to move to undeveloped properties outside of the SR 1 corridor. Although this Study did not look at the impact of projected future growth (to be addressed in the next phase of the Land Use and Transportation Study),

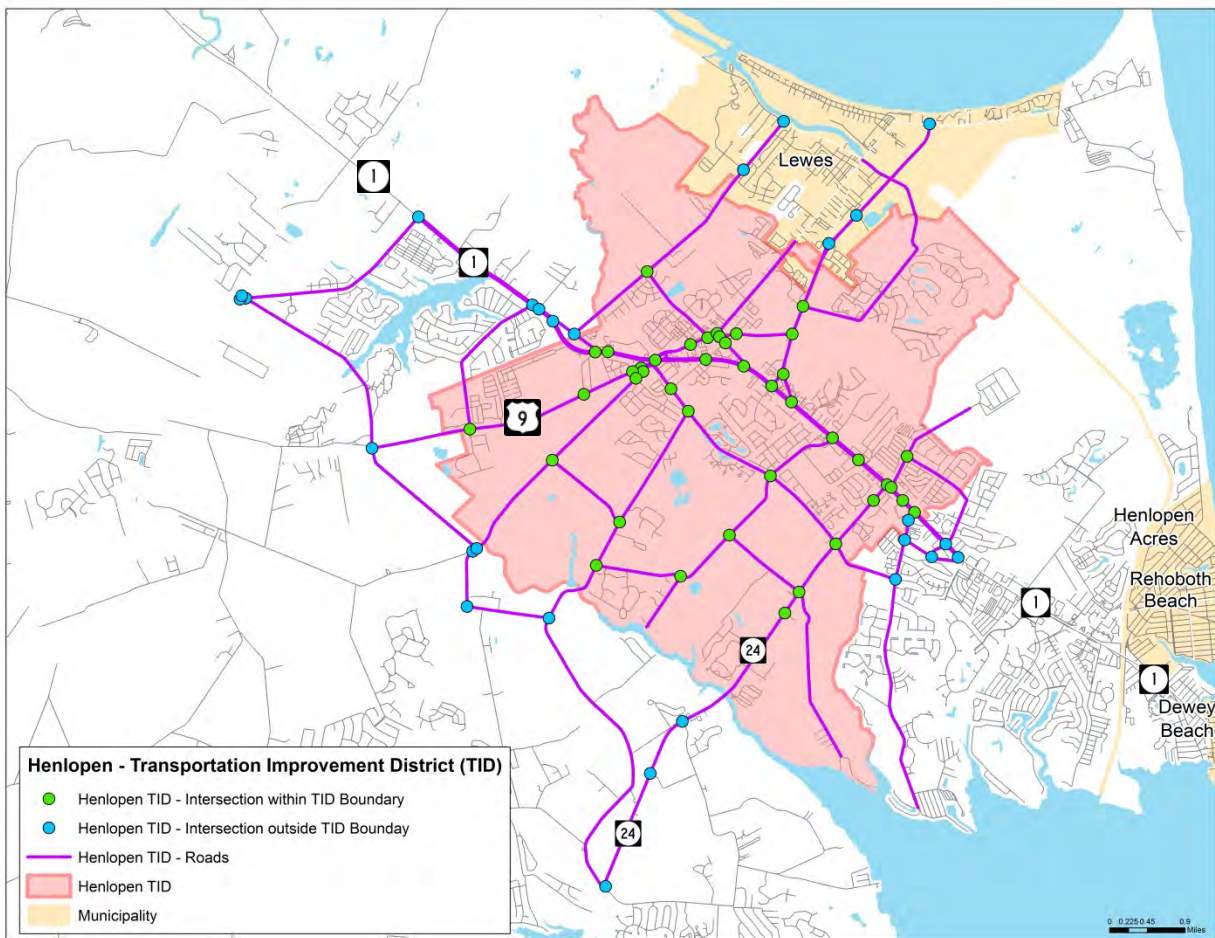
it is reasonable to conclude that many of the intersections and roadways that will serve this growth are not adequate to handle future traffic demands.

The establishment of the Henlopen TID will provide the County and DeIDOT with a mechanism for the orderly funding and prioritization of new transportation infrastructure projects to meet predicted future growth. In addition, the Department is confident that the development community will also respond positively to the establishment of the Henlopen TID which will provide the private sector with a measure of predictability in regard to its investments. A systematic and holistic approach for mitigating traffic challenges both now and in the future is needed to ensure that the Study area can continue as an economically attractive location for both its citizens and visitors. DeIDOT believes that the adoption of the Henlopen Transportation Improvement District (TID) is that mechanism for achieving these goals.

## TID DESCRIPTION

The Henlopen TID is located in Sussex County (see Figures 1), with project limits generally extending from Love Creek in the west, Rehoboth Bay in the south, Arnell Creek and Wolfe Glade in the east, and the City of Lewes municipal boundary in the north. Included within the boundaries of the TID are 69 intersections, 103 road segments, with a total area of 17.12 miles (participant boundary).

Figure 1 – Location Map



## EXISTING TRAFFIC

Traffic count data for the Henlopen TID existing conditions analysis originated from a variety of sources including previously published Traffic Impact Studies (TIS), Traffic Operations Analyses (TOA) and new counts collected as part of the Henlopen TID analysis. The following is a list of existing and newly acquired traffic counts that were utilized in this report:

### Existing TIS or TOA

- Belle Terre TIS (weekday only)
- JMT Village Center TOA
- Love Creek Campground
- Love Creek Elementary School TIS
- Osprey Point TOA
- Overbrook Town Center TIS
- Reserves at Nassau II TIS

### New Counts

- US Route 9 (Lewes-Georgetown Highway) @ Nassau Commons Boulevard
- US Route 9 (Lewes-Georgetown Highway) @ Church St (aka Belltown Rd)
- US Route 9 (Dartmouth Dr) @ Kings Highway
- US Route 9 (Kings Highway) @ Clay Rd
- US Route 9 (Freeman Highway) @ Kings Highway
- US Route 9 (Freeman Highway) @ Monroe Ave
- US Route 9 (Freeman Highway) @ Cape Henlopen Dr
- DE Route 1 @ Old Mill Rd
- DE Route 1 @ US Route 9 / Savannah Rd
- DE Route 1 @ Shady Rd/Marsh Rd
- DE Route 1 @ Wescoats Rd
- DE Route 1 @ US Route 9 / Dartmouth Dr
- DE Route 1 @ Kings Highway
- DE Route 1 @ Midway Galleria
- DE Route 1 @ Wolfe Neck Rd
- DE Route 1 @ Rehoboth Mall
- DE Route 1 @ Old Landing Rd
- DE Route 1 @ Munchy Branch Rd / Miller Rd
- DE Route 1 @ Airport Rd
- DE Route 23 (Beaver Dam Rd) @ Kendale Rd
- DE Route 23 (Beaver Dam Rd) @ Fisher Rd
- DE Route 23 (Beaver Dam Rd) @ Dairy Farm Rd
- DE Route 23 (Beaver Dam Rd) @ Jimtown Rd
- DE Route 23 (Beaver Dam Rd) @ Church St (aka Belltown Rd) / Saltmarsh Blvd
- DE Route 23 (Beaver Dam Rd) @ DE Route 1D (aka Church St) /Plantation Rd

- DE Route 24 @ Robinsville Rd/Angola Rd
- DE Route 24 @ Jolyn Way
- DE Route 24 @ Camp Arrowhead Rd
- New Rd @ Nassau Rd
- New Rd @ Old Orchard Rd
- New Rd @ Park Dr
- New Rd @ Pilottown Rd
- Wolfe Neck Rd @ Munchy Branch Rd
- Airport Rd @ Miller Rd
- Old Landing Rd @ Rehoboth Mall Entrance
- Old Landing Rd @ Airport Rd
- Robinsonville Rd @ Kendale Rd
- Robinsonville Rd @ Cedar Grove Rd
- Robinsonville Rd @ Jimtown Rd
- Robinsonville Rd @ Plantation Rd
- Plantation Rd @ Shady Rd / Saltmarsh Blvd

## **METHODOLOGY**

### **Traffic Count Adjustment**

Given the various sources of data described above, one of the challenges for the Department was to develop a consistent set of existing condition data. Four types of adjustments were identified and applied to all of the count data utilized within this report:

- 1) Seasonal Adjustment Factors - DeIDOT Electronic Operations Management Application (EOPS) was employed to develop factors that took into account localized time of year traffic data within the study area for the purpose of helping to normalize the traffic counts which were, in some cases, collected in different seasons and in different years.
- 2) One-time Summary Adjustments – Single adjustments made to account for specific developments in the study area that have occurred since any of newest counts were collected.
- 3) Growth Factors – EOPS data was again employed to provide localized data.
- 4) Intersection Count Balancing – Only applied after adjustments 1-3 were completed.

## **LEVEL OF SERVICE (LOS) ANALYSIS**

Following the traffic count adjustment procedures previously described the study area intersection were analyzed for capacity and delay through the use of Synchro/SimTraffic software which implements the 2010 Highway Capacity Manual (Transportation Research Board, 2010). A supplemental review was also performed using the official Highway Capacity Software (HCS) for the purpose of identifying any discrepancies between Synchro and HCS outputs. Tables 2 and 3 provide a description of level-of-service (LOS) for both signalized and unsignalized intersections.

**Table 1 – Level of Service Criteria for Signalized Intersections**

<b>Level of Service</b>	<b>Average Control Delay (seconds/vehicle)</b>
A	≤10
B	>10-20
C	>20-35
D	>35-55
E	>55-80
F	>80

Source: Highway Capacity Manual 2010. Transportation Research Board  
Transportation Research Board

A qualitative description of the Level of Service criteria for signalized intersections as found in Table 2 is shown below.

**Table 2 - Level of Service – Qualitative Description**

**Level of Service A** - The volume-to-capacity ratio is low and progression is extremely favorable or the cycle length is very short.

**Level of Service B** - The volume-to-capacity ratio typically is low and progression is highly favorable or the cycle length is short. More vehicles stop than at LOS A.

**Level of Service C** - Progression is favorable and cycle lengths are moderate. Occasionally some vehicles will be unable to clear the intersection on the first signal cycle.

**Level of Service D** - Progression is ineffective or the cycle length is long. Many vehicles stop and there is noticeable difficulty with vehicles being unable to clear the intersection on the first signal cycle.

**Level of Service E** - The volume-to-capacity ratio is high, progression is unfavorable and the cycle length is long. Vehicles are frequently unable to clear the intersection on the first signal cycle.

**Level of Service F** - The volume-to-capacity ratio is very high, progression is very poor and the cycle length is long. Most vehicles are unable to clear the intersection on the first signal cycle.

Many complex factors serve as inputs and variables that result in a measure of control delay for each vehicle at a signalized intersection. Those factors include signal phasing, coordination, signal cycle length, and traffic volumes.

<b>Level of Service</b>	<b>Average Control Delay (seconds/vehicle)</b>
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F <sup>1</sup>	>50

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.  
1. If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned an individual lane group for all unsignalized intersections, or minor street approach at two-way stop-controlled intersections. Overall intersection LOS is determined solely by control delay.

All-way stop, two-way stop, and roundabout control constitute the three intersection types defined as unsignalized intersections. All-way stop and roundabout LOS is the weighted average control delay of the overall intersection or by individual approach. Two-way stop control LOS is the average control delay for each minor street movement (or shared movement) as well as major street left-turns. This methodology recognizes that major street vehicles are assumed to experience zero delay which could mask deficiencies of minor movements if a weighted average was employed for of all movements.

### **LEVEL OF SERVICE (LOS)**

Traffic analysis was conducted utilizing Synchro/HCM2010 for sixty nine intersections within the study area. The intersections evaluated in this TID analysis are as follows:

**Table 4 – Henlopen TID Intersections**

			Inside/Outside
No.	Street 1	Street 2	Participant Boundary
1	US Route 9 (Lewes-Georgetown Highway)	Sweetbriar Rd / Dairy Farm Rd	Out
2	US Route 9 (Lewes-Georgetown Highway)	Minos Conaway Rd / Lakeview Blvd	In
3	US Route 9 (Lewes-Georgetown Highway)	Nassau Commons Boulevard	In
4	US Route 9 (Lewes-Georgetown Highway)	Church St (aka Belltown Rd)	In
5	US Route 9 (Lewes-Georgetown Highway)	DE Route 1D (aka Church St)	In
6	US Route 9 (Dartmouth Dr)	Kings Highway	In
7	US Route 9 (Kings Highway)	Clay Rd	Out
8	US Route 9 (Kings Highway)	Gills Neck Rd	Out
9	US Route 9 (Freeman Highway)	Kings Highway	Out
10	US Route 9 (Freeman Highway)	Monroe Ave	Out
11	US Route 9 (Freeman Highway)	Cape Henlopen Dr	Out
12	US Route 9B (Savannah Rd)	Villages at Five Points entrance	In
13	US Route 9B (Savannah Rd)	Old Orchard Rd	In
14	US Route 9B (Savannah Rd)	Wescoats Rd	In
15	DE Route 1	Cave Neck Rd	Out
16	DE Route 1	Minos Conaway Rd	Out
17	DE Route 1	Old Mill Rd	Out
18	DE Route 1	Nassau Rd (North)	Out
19	DE Route 1	Nassau Rd (South)	In
20	DE Route 1	Tulip Drive / Slipper Shell Way	In
21	DE Route 1	US Route 9 / Savannah Rd	In
22	DE Route 1	Shady Rd/Marsh Rd	In
23	DE Route 1	Wescoats Rd	In
24	DE Route 1	US Route 9 / Dartmouth Dr	In
25	DE Route 1	Kings Highway	In
26	DE Route 1	Postal Lane	In
27	DE Route 1	Midway Galleria	In
28	DE Route 1	Delaware Route 24	In
29	DE Route 1	Wolfe Neck Rd	In
30	DE Route 1	Rehoboth Mall	In



**Table 4 – Henlopen TID Intersections (cont.)**

			Inside/Outside
No.	Street 1	Street 2	Participant Boundary
31	DE Route 1	Old Landing Rd	In
32	DE Route 1	Munchy Branch Rd / Miller Rd	Out
33	DE Route 1	Airport Rd	Out
34	DE Route 23 (Beaver Dam Rd)	Kendale Rd	Out
35	DE Route 23 (Beaver Dam Rd)	Fisher Rd	Out
36	DE Route 23 (Beaver Dam Rd)	Dairy Farm Rd	Out
37	DE Route 23 (Beaver Dam Rd)	Jimtown Rd	In
38	DE Route 23 (Beaver Dam Rd)	Church St (aka Belltown Rd) / Saltmarsh Blvd	In
39	DE Route 23 (Beaver Dam Rd)	DE Route 1D (aka Church St) / Plantation Rd	In
40	DE Route 24	Robinsville Rd/Angola Rd	Out
41	DE Route 24	Jolyn Way	Out
42	DE Route 24	Camp Arrowhead Rd	Out
43	DE Route 24	Beacon Middle School / Love Ck Elem School	In
44	DE Route 24	Mulberry Knoll Rd	In
45	DE Route 24	Plantation Rd / Warrington Road	In
46	DE Route 24	Rehoboth Mall Service Rd / Hudson Way	In
47	New Rd	Nassau Rd	Out
48	New Rd	Old Orchard Rd	In
49	New Rd	Park Dr	Out
50	New Rd	Pilottown Rd	Out
51	Wescoats Rd	Clay Rd	In
52	Wescoats Rd	Marsh Rd	In
53	Clay Rd	Marsh Rd	In
54	Wolfe Neck Rd	Munchy Branch Rd	In
55	Airport Rd	Miller Rd	Out
56	Old Landing Rd	Rehoboth Mall Entrance	Out
57	Old Landing Rd	Airport Rd	Out
58	Old Landing Rd	Warrington Rd / Strawberry Way	Out
59	Robinsonville Rd	Kendale Rd	Out
60	Robinsonville Rd	Cedar Grove Rd	In
61	Robinsonville Rd	Jimtown Rd	In
62	Robinsonville Rd	Plantation Rd	In
63	Plantation Rd	Shady Rd / Saltmarsh Blvd	In
64	Plantation Rd	Cedar Grove Rd / Postal Lane	In
65	Cedar Grove Rd	Mulberry Knoll Rd	In
66	Cedar Grove Rd	Ward Rd	In
67	Cave Neck Rd	Sweetbriar Rd	Out
68	Cave Neck Rd	Hudson Rd	Out
69	Hudson Rd	Sweetbriar Rd	Out

# LEVEL OF SERVICE (LOS) – RESULTS

The following table summarizes the AM, PM, and Saturday Peak Hour LOS results for intersections within the study area.

**Table 5 – Level of Service Results**

Henlopen TID			HCM 2010 LOS		
Intersection Data - Existing Conditions					
No. Street 1	Street 2	Inside/Outside Participant Boundary	AM	PM	Summer SAT
1	US Route 9 (Lewes-Georgetown Highw	Sweetbriar Rd/Dairy Farm Rd	C	C	C
2	US Route 9 (Lewes-Georgetown Highw	Minos Conaway Rd/Lakeview Blvd	NB-C; SB-C	NB-C; SB-D	NB-C; SB-E
3	US Route 9 (Lewes-Georgetown Highw	Nassau Commons Boulevard	SB-C	SB-D	SB-F
4	US Route 9 (Lewes-Georgetown Highw	Church St	NB-C	NB-D	NB-F
5	US Route 9 (Lewes-Georgetown Highw	DE Route 1D (aka Belltown Rd)	F	D	F
6	US Route 9 (Dartmouth Dr)	Kings Highway	EB-F	EB-C	EB-F
7	US Route 9 (Kings Highway)	Clay Rd	EB-F	EB-F	EB-F
8	US Route 9 (Kings Highway)	Gills Neck Rd	C	C	D
9	US Route 9 (Freeman Highway)	Kings Highway	NBL Lane LOS-B <sup>1</sup>	NBL Lane LOS-B <sup>1</sup>	NBL Lane LOS-C <sup>1</sup>
10	US Route 9 (Freeman Highway)	Monroe Ave	SE-A; NW-B	SE-B; NW-B	SE-C; NW-C
11	US Route 9 (Freeman Highway)	Cape Henlopen Dr	NB-A	NB-B	NB-E
12	US Route 9B (Savannah Rd)	Villages at Five Points entrance	B	C	C
13	US Route 9B (Savannah Rd)	Old Orchard Rd	NB-D; SE-F	NB-E; SE-F	NB-F; SE-F
14	US Route 9B (Savannah Rd)	Wescoats Rd	B	B	B
15	DE Route 1	Cave Neck Rd	NB: NE-C; SB: NE-F <sup>2</sup>	NB: NE-E; SB: NE-C,SW-F <sup>2</sup>	NB: NE-D; SB: NE-F <sup>2</sup>
16	DE Route 1	Minos Conaway Rd	NB: NE-C; SB: NE-E, SW-F <sup>2</sup>	NB: NE-D; SB: NE-D, SW-F <sup>2</sup>	NB: NE-D; SB: NE-F, SW-F <sup>2</sup>
17	DE Route 1	Old Mill Rd	NB: NE-C,SW-B; SB: SW-C <sup>2</sup>	NB: NE-D,SW-E; SB: SW-C <sup>2</sup>	NB: NE-F,SW-F; SB: SW-D <sup>2</sup>
18	DE Route 1	Nassau Rd (North)	NB: NE-F, SW-A; SB: SW-D <sup>2</sup>	NB: NE-F, SW-E; SB: SW-C <sup>2</sup>	NB: NE-F, SW-A; SB: SW-F <sup>2</sup>
19	DE Route 1	Nassau Rd (South)	NB: N-D,S-D; SB: N-E,S-E <sup>2</sup>	NB: N-F,S-F; SB: N-E,S-E <sup>2</sup>	NB: N-F,S-F; SB: N-F,S-F <sup>2</sup>
20	DE Route 1	Tulip Drive/Slipper Shell Way	NB: N-C,S-C; SB: N-C,S-C <sup>2,3</sup>	NB: N-E,S-E; SB: N-C,S-C <sup>2,3</sup>	NB: N-F,S-F; SB: N-D,S-F <sup>2,3</sup>
21	DE Route 1	US Route 9/Savannah Rd	D	D	F
22	DE Route 1	Shady Rd/Marsh Rd	NB: NE-F, SW-B; SB: NE-D, SW-	NB: NE-F, SW-D; SB: NE-C, SW-	NB: NE-F, SW-D; SB: NE-F
23	DE Route 1	Wescoats Rd	C	C	B
24	DE Route 1	US Route 9/Dartmouth Dr	D	D	E
25	DE Route 1	Kings Highway	SB-C	SB-C	SB-D
26	DE Route 1	Postal Lane	C	C	D
27	DE Route 1	Tanger Outlets/Midway Galleria	A	D	C
28	DE Route 1	Delaware Route 24	C	C	D
29	DE Route 1	Wolfe Neck Rd	SB-D	SB-F	SB-F
30	DE Route 1	Rehoboth Mall	A (HCM 2000) <sup>4</sup>	A (HCM 2000) <sup>4</sup>	A (HCM 2000) <sup>4</sup>
31	DE Route 1	Old Landing Rd	C	C	C
32	DE Route 1	Munchy Branch Rd/Miller Rd	B	C	B
33	DE Route 1	Airport Rd	No HCM LOS given <sup>5</sup>	No HCM LOS given <sup>5</sup>	No HCM LOS given <sup>5</sup>
34	DE Route 23 (Beaver Dam Rd)	Kendale Rd	WB-C	WB-E	WB-C
35	DE Route 23 (Beaver Dam Rd)	Fisher Rd	EB-C	EB-C	EB-C
36	DE Route 23 (Beaver Dam Rd)	Dairy Farm Rd	SE-B	SE-C	SE-C
37	DE Route 23 (Beaver Dam Rd)	Jimtown Rd	NW-B	NW-C	NW-B
38	DE Route 23 (Beaver Dam Rd)	Church St/Salt Marsh Blvd	NB-C; SB-B	NB-C; SB-B	NB-E; SB-C
39	DE Route 23 (Beaver Dam Rd)	DE Route 1D (aka Belltown Rd)/Plantation	No HCM LOS given <sup>6</sup>	No HCM LOS given <sup>6</sup>	No HCM LOS given <sup>6</sup>
40	DE Route 24	Robinsonville Rd/Angola Rd	D	D	F
41	DE Route 24	Jolyns Way	WB-C	WB-C	WB-C
42	DE Route 24	Camp Arrowhead Rd	E	C	C
43	DE Route 24	Beacon Middle School/Love Creek Elem S	A	B	A
44	DE Route 24	Mulberry Knoll Rd	SE-C; NW-D	SE-D; NW-D	SE-F; NW-F
45	DE Route 24	Plantation Rd/Warrington Road	D	E	E
46	DE Route 24	Rehoboth Mall Service Rd/Hudson Way	A	B	A






**Table 5 – Level of Service Results (cont.)**

Henlopen TID				HCM 2010 LOS		
Intersection Data - Existing Conditions						
			Inside/Outside Participant			
No.	Street 1	Street 2	Boundary	AM	PM	Summer SAT
47	New Rd	Nassau Rd	Out	SW-B	SW-B	SW-B
48	New Rd	Old Orchard Rd	In	NW-B	NW-B	NW-B
49	New Rd	Park Dr	Out	SE-A	SE-A	SE-B
50	New Rd	Pilottown Rd	Out	NE-A	NE-A	NE-B
51	Wescoats Rd	Clay Rd	In	WB-B	WB-B	WB-B
52	Wescoats Rd	Marsh Rd	In	NE-C; SW-C	NE-C; SW-D	NE-C; SW-C
53	Clay Rd	Marsh Rd	In	NE-A	NE-A	NE-A
54	Wolfe Neck Rd	Munchy Branch Rd	In	WB-A	WB-A	WB-A
55	Airport Rd	Miller Rd	Out	NB-B; SB-B	NB-B; SB-B	NB-C; SB-B
56	Old Landing Rd	Rehoboth Mall Entrance	Out	SE-B; NW-A	SE-F; NW-B	SE-F; NW-C
57	Old Landing Rd	Airport Rd	Out	WB-B	WB-D	WB-F
58	Old Landing Rd	Warrington Rd/Strawberry Way	Out	E-C; W-A; N-B; S-A	E-C; W-A; N-B; S-C	E-F; W-B; N-C; S-D
59	Robinsonville Rd	Kendale Rd	Out	EB-B	EB-B	EB-C
60	Robinsonville Rd	Cedar Grove Rd	In	WB-B	WB-B	WB-B
61	Robinsonville Rd	Jimtown Rd	In	EB-A	EB-A	EB-A
62	Robinsonville Rd	Plantation Rd	In	NB-C	NB-C	NB-C
63	Plantation Rd	Shady Rd/Saltmarsh Blvd	In	C	F	C
64	Plantation Rd	Cedar Grove Rd/Postal Lane	In	B	B	C
65	Cedar Grove Rd	Mulberry Knoll Rd	In	NW-B	NW-B	NW-B
66	Cedar Grove Rd	Ward Rd	In	NB-B	NB-A	NB-A
67	Cave Neck Rd	Sweetbriar Rd	Out	SE-C; NW-C	SE-B; NW-B	SE-B; NW-B
68	Cave Neck Rd	Hudson Rd	Out	NB-C; SB-C	NB-B; SB-B	NB-B; SB-B
69	Hudson Rd	Sweetbriar Rd	Out	WB-A	WB-A	WB-A
				1) Intersection modeled as standalone Synchro model to get LOS		
				2) Synchro did not produce a HCM2010 LOS with the model having SR 1 as a single link. Using standalone models with separate links for each direction of SR 1 at the median crossover, Synchro did produce HCM2010 for each side of the crossover.		
				3) This intersection was modeled as a TWSC intersection since it has a flashing signal.		
				4) HCM2010 does not support this intersection configuration; LOS is derived from the default HCM2000.		
				5) Neither HCM 2000 nor HCM 2010 supports this lane configuration; no LOS given.		
				6) HCM2000 does not produce a report for this configuration; HCM2010 produces a report but no LOS.		

**SUB-AREA ANALYSIS**

Study area maps were created for twelve study sub-areas. The following map identifies the intersections that were analyzed in the traffic model and whether those intersections experienced traffic congestion as described in Table 6 below.

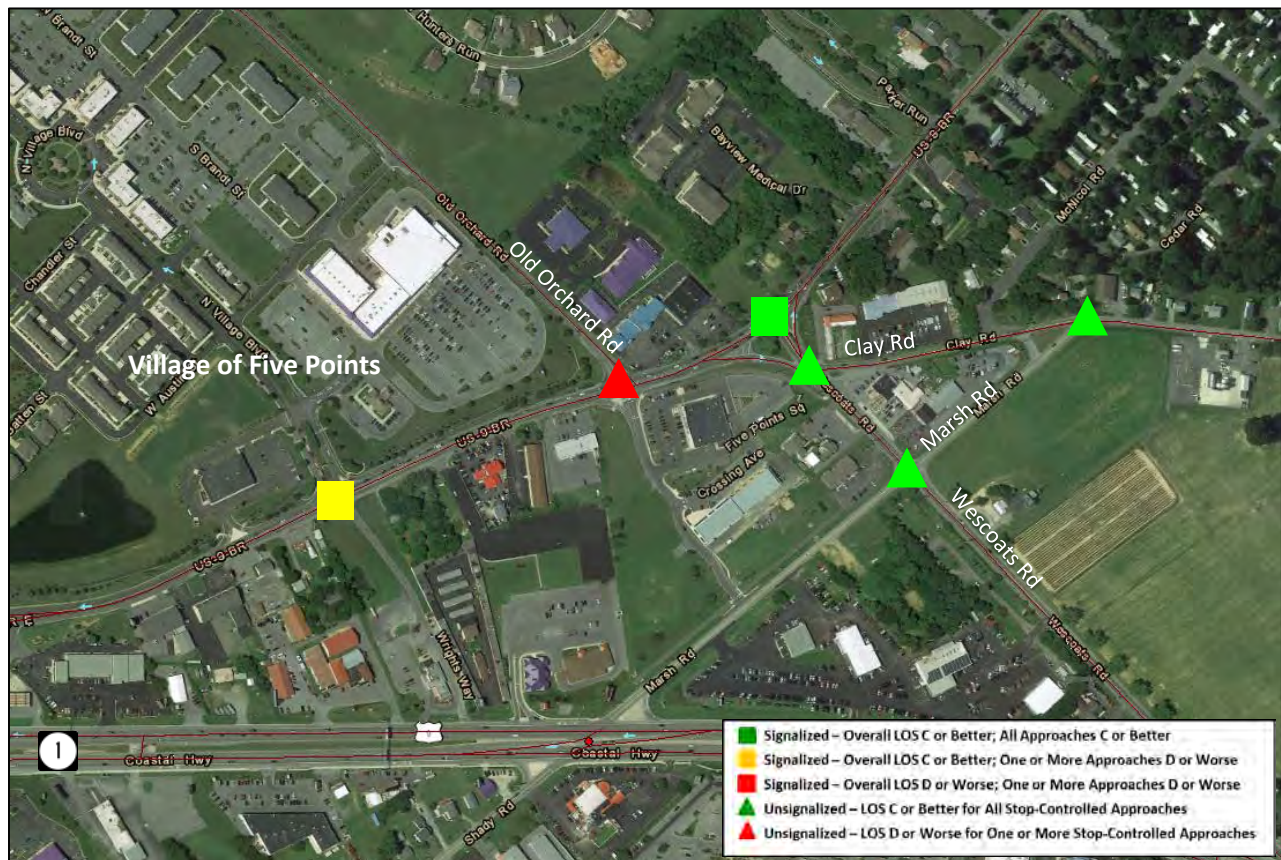
**Table 6 – Map - Level of Service Description**

	<b>Signalized – Overall LOS C or Better; All Approaches C or Better</b>
	<b>Signalized – Overall LOS C or Better; One or More Approaches D or Worse</b>
	<b>Signalized – Overall LOS D or Worse; One or More Approaches D or Worse</b>
	<b>Unsignalized – LOS C or Better for All Stop-Controlled Approaches</b>
	<b>Unsignalized – LOS D or Worse for One or More Stop-Controlled Approaches</b>

The sub-areas are as follows:

1. Eastern Area - Lewes / US 9B - Savannah Rd East of Five Points
2. Eastern Area – Rehoboth
3. Northwest Interior Area
4. Plantations Rd
5. SR 24 & SE Area Rehoboth
6. SR 1 Five Points and South
7. SR 23 Beaver Dam Rd / Western Interior Area
8. US 9 - West of Five Points
9. Northeast Interior Area- Lewes / New Rd & SR 1 North of Five Points
10. Southeast Area - Rehoboth Non-Corridor
11. US 9 Kings & Freeman Highways
12. Western Interior Area / Non-Corridor

**Corridor - Eastern Area Lewes & US 9B Savannah Rd East of Five Points**  
**AM Peak Hour**



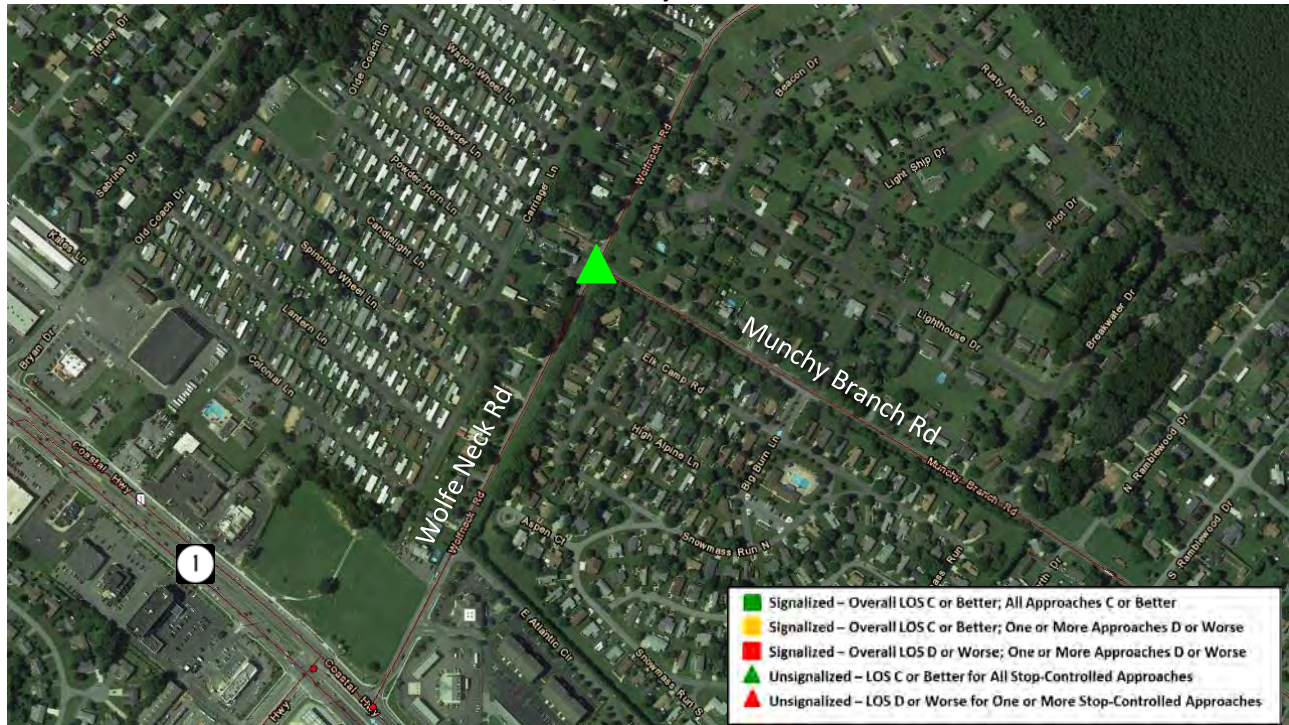
**Corridor - Eastern Area Lewes & US 9B Savannah Rd East of Five Points**  
**PM Peak Hour**



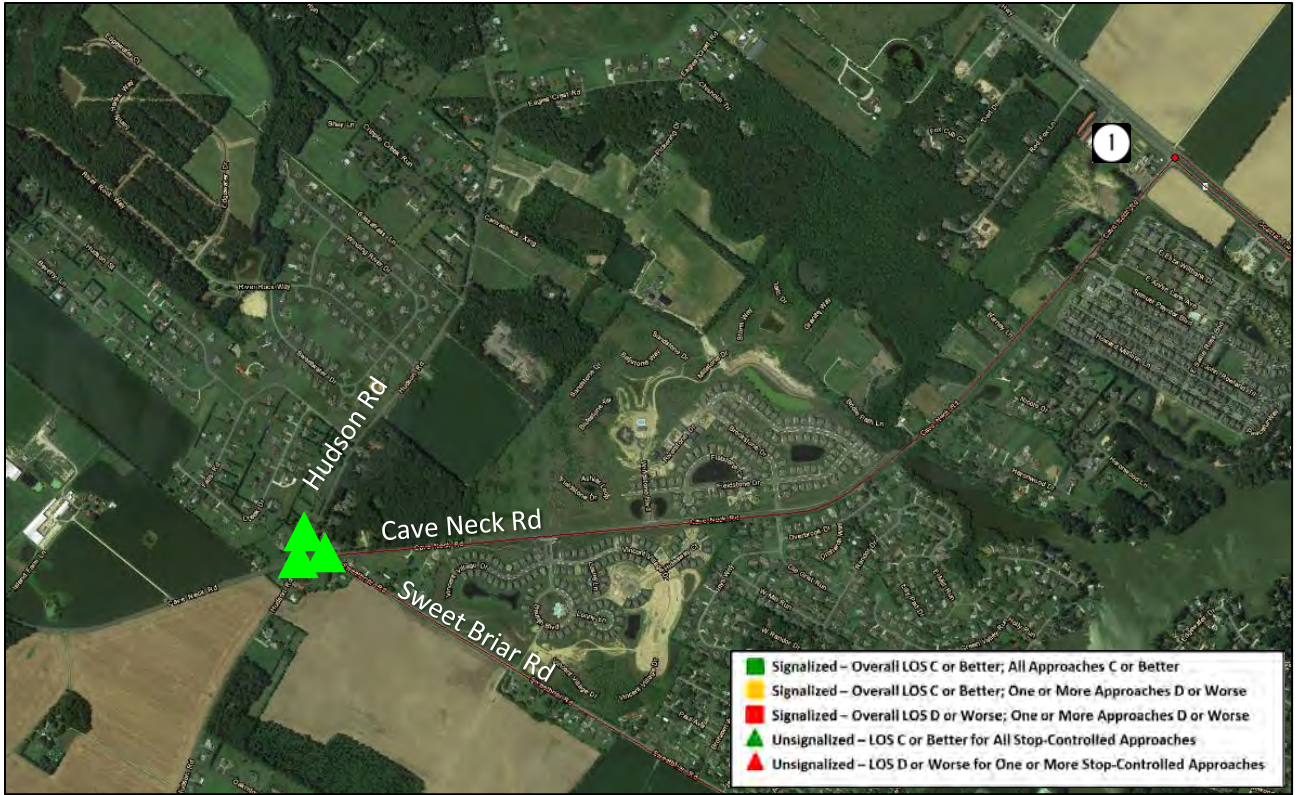
**Corridor - Eastern Area Lewes & US 9B Savannah Rd East of Five Points  
Saturday Peak Hour**



**Corridor - Eastern Area - Rehoboth  
AM/PM/Saturday Peak Hour**



**Corridor – Northwest Interior Area  
AM/PM/Saturday Peak Hour**



**Corridor – Plantation Rd  
AM Peak Hour**



### Corridor – Plantation Rd PM Peak Hour

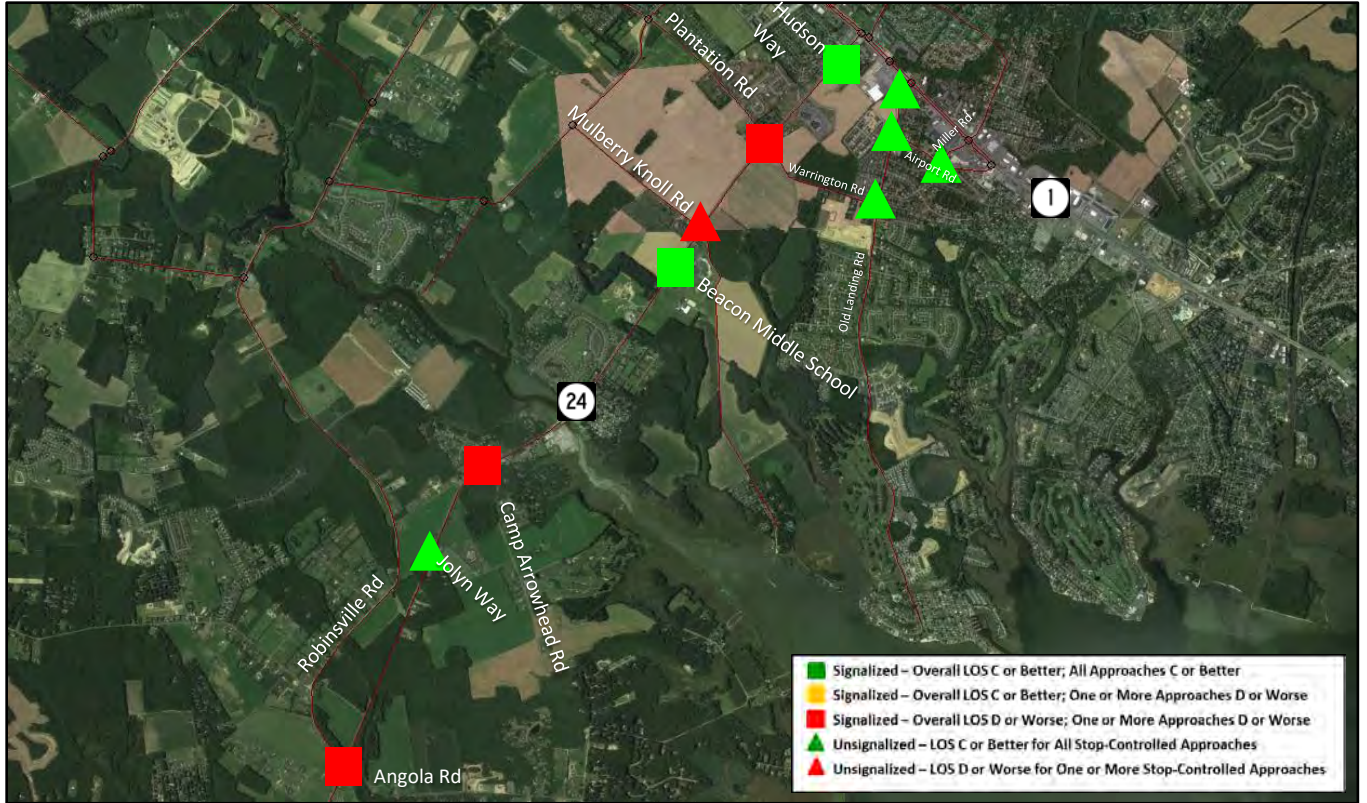




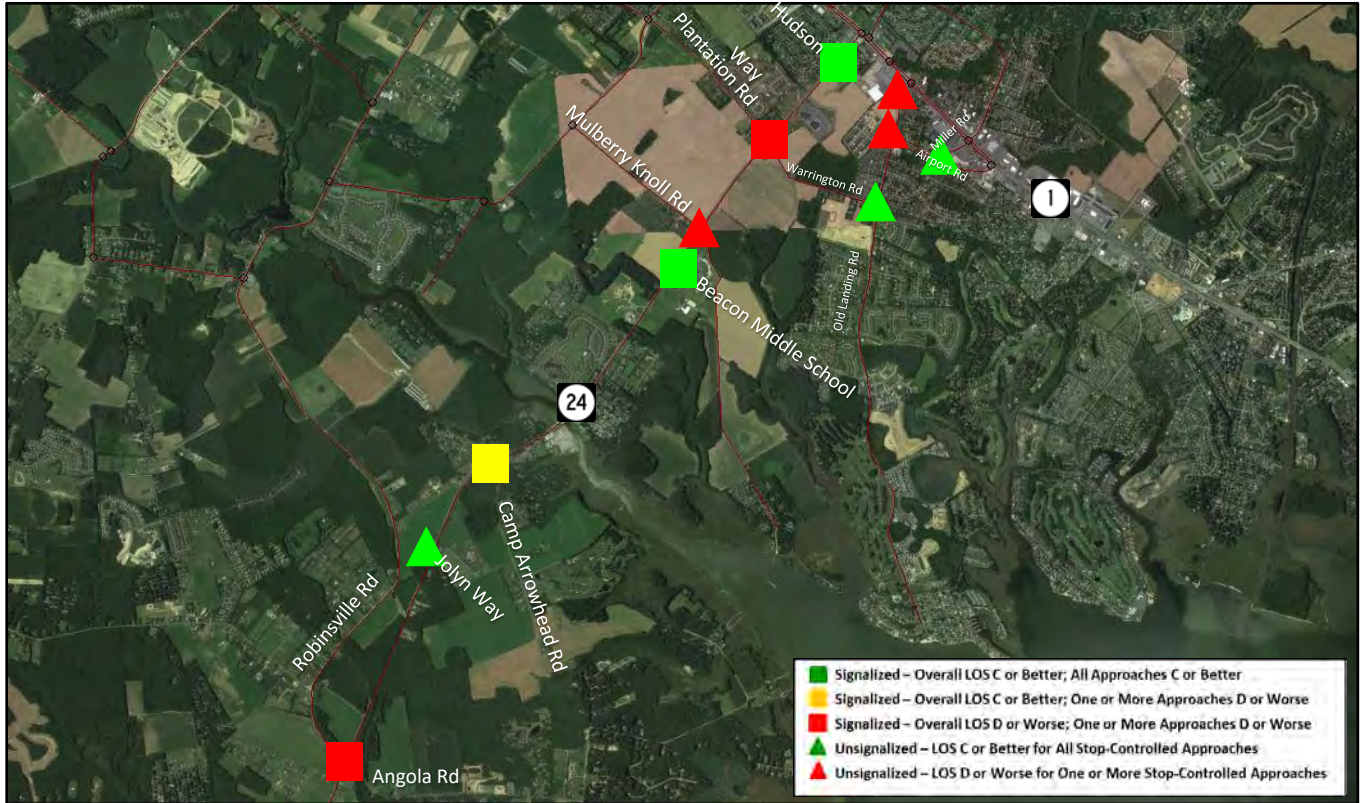
**Corridor – Plantation Rd**  
**Saturday Peak Hour**



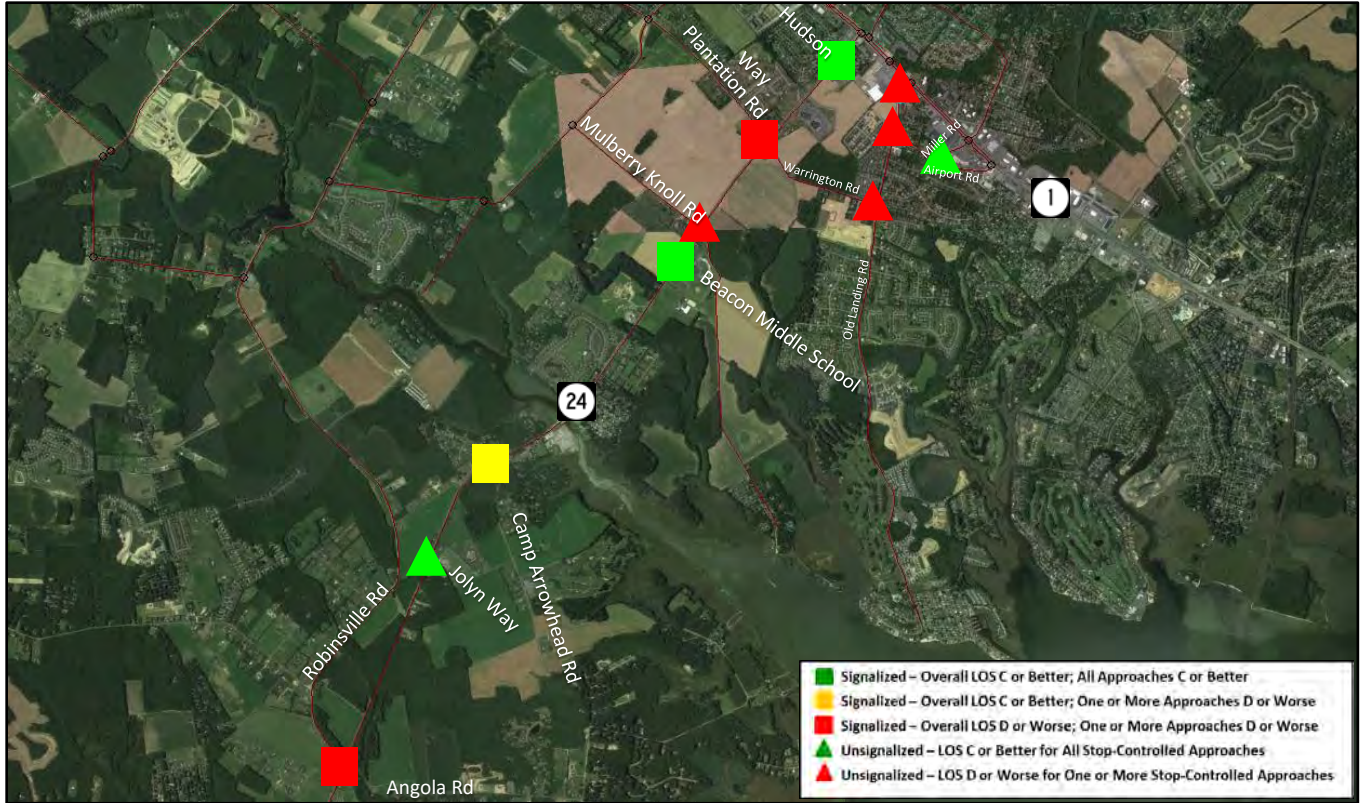
**Corridor – SR 24 & SE Area Rehoboth**  
**AM Peak Hour**



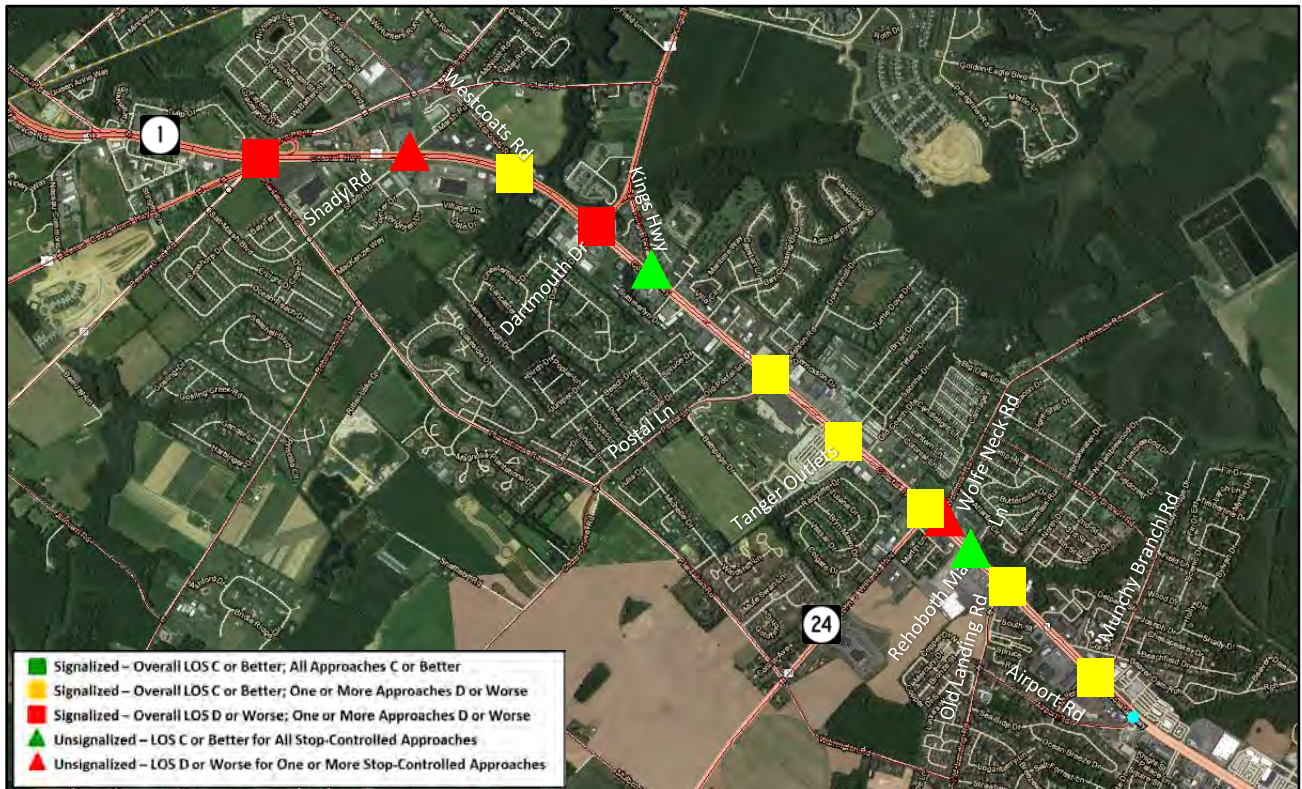
**Corridor – SR 24 & SE Area Rehoboth**  
**PM Peak Hour**



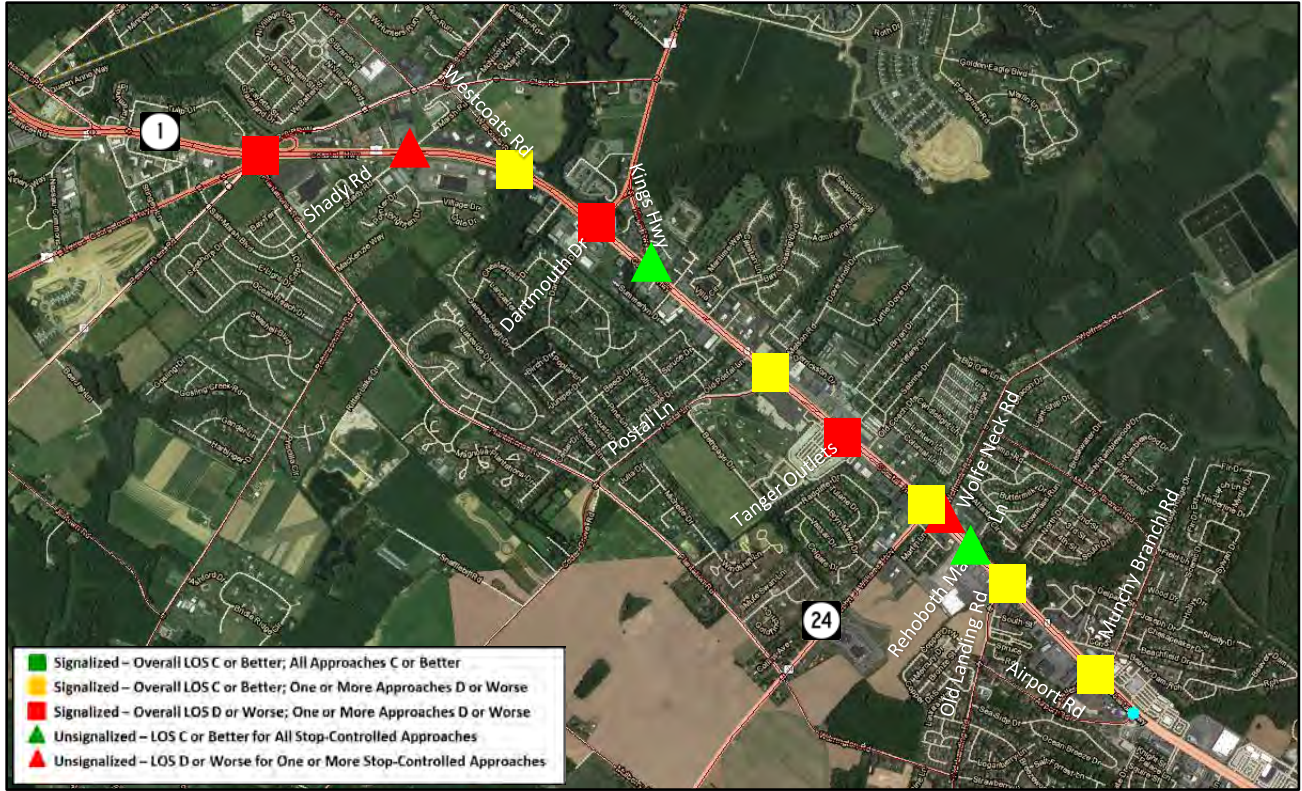
**Corridor – SR 24 & SE Area Rehoboth  
Saturday Peak Hour**



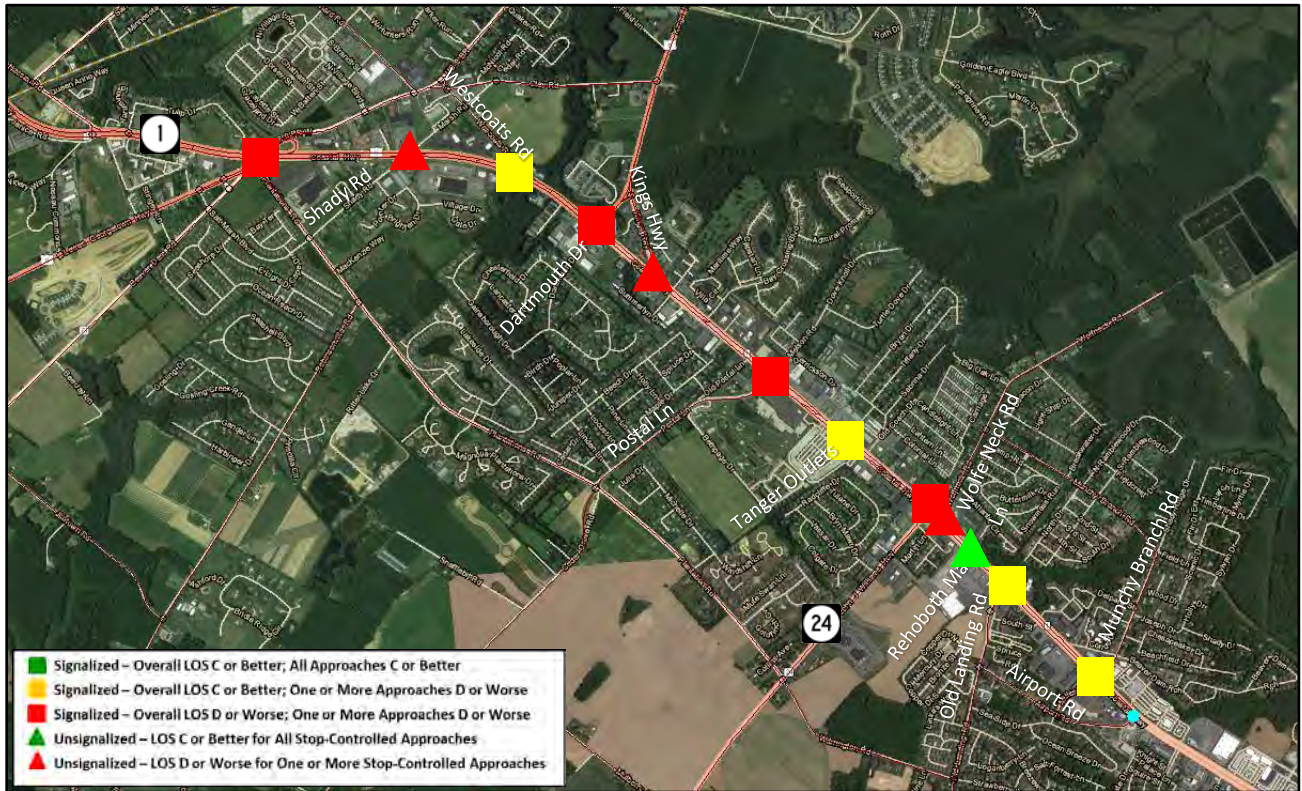
**Corridor – SR 1 Five Points and South  
AM Peak Hour**



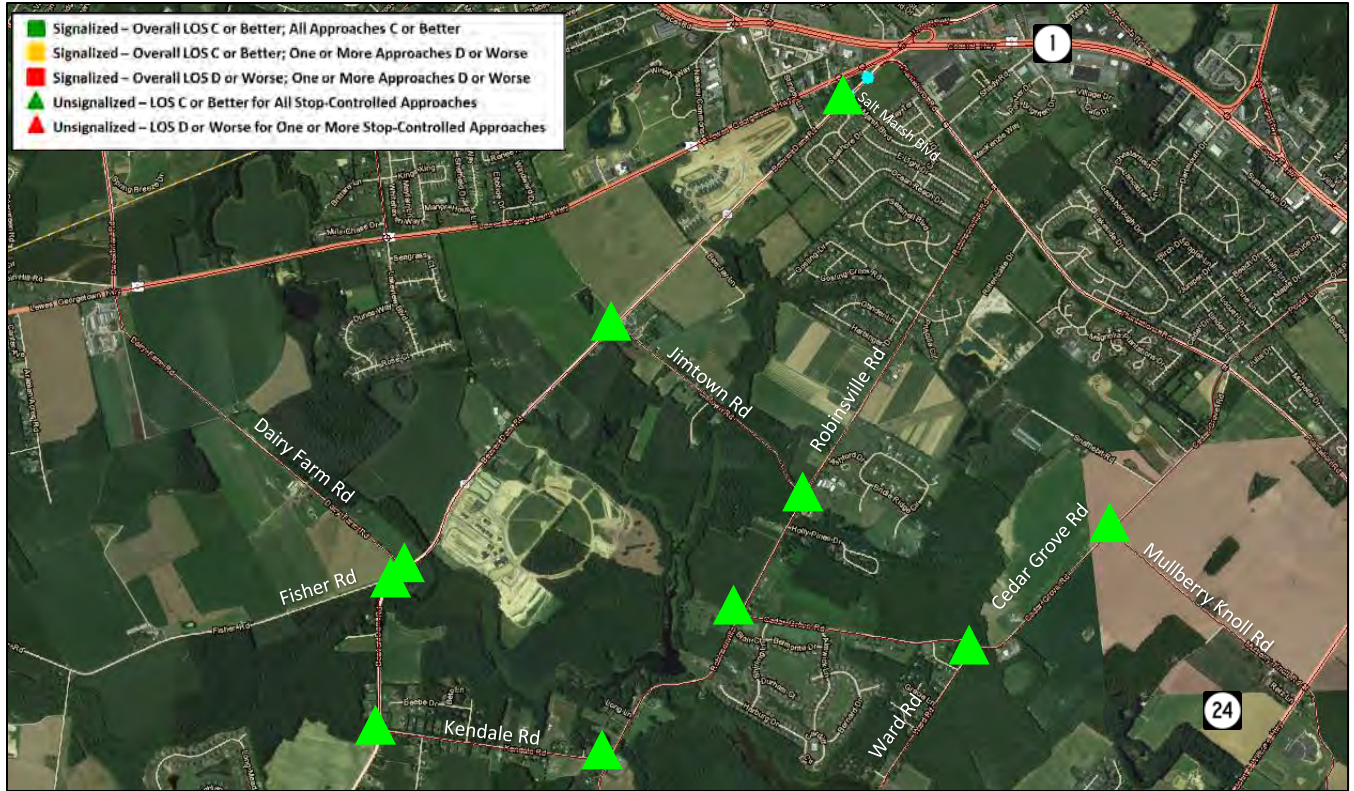
**Corridor – SR 1 Five Points and South  
PM Peak Hour**



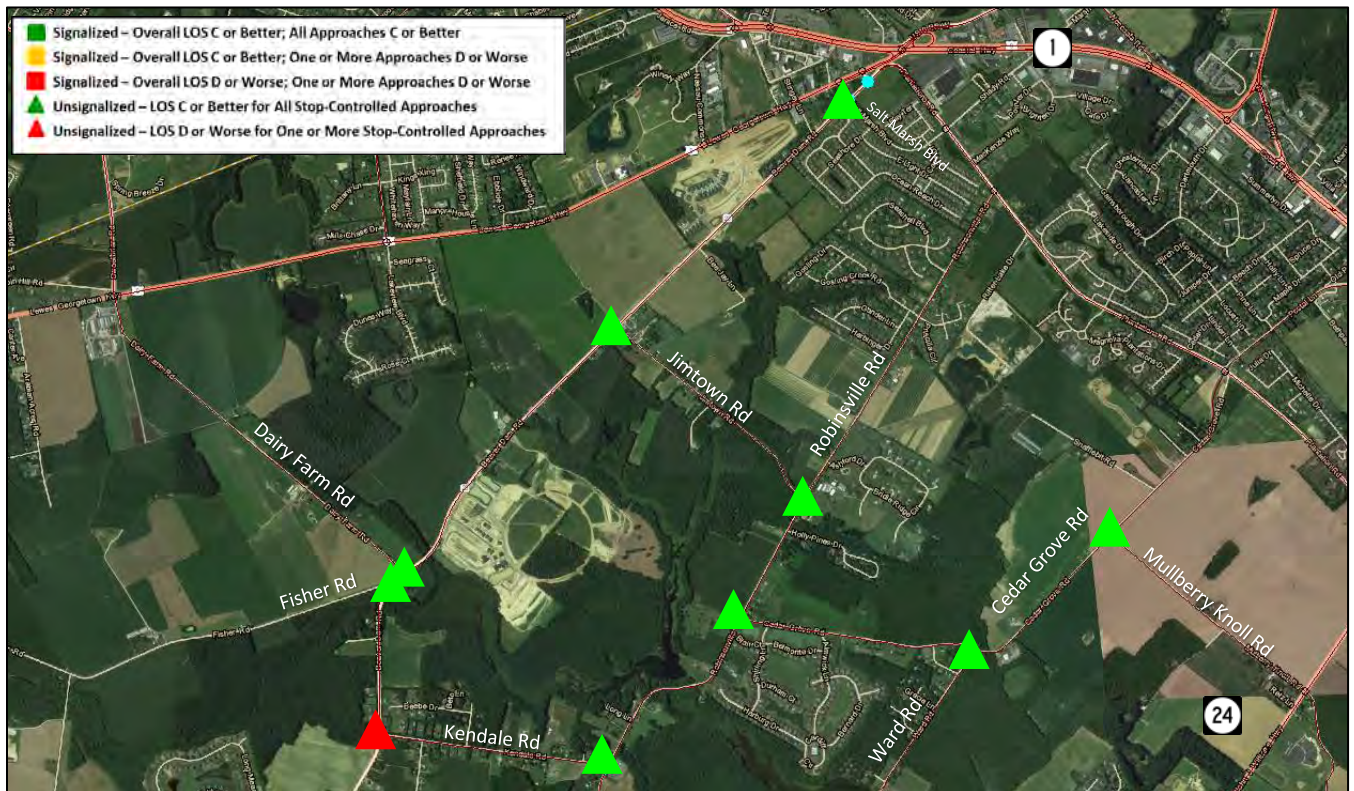
**Corridor – SR 1 Five Points and South  
Saturday Peak Hour**



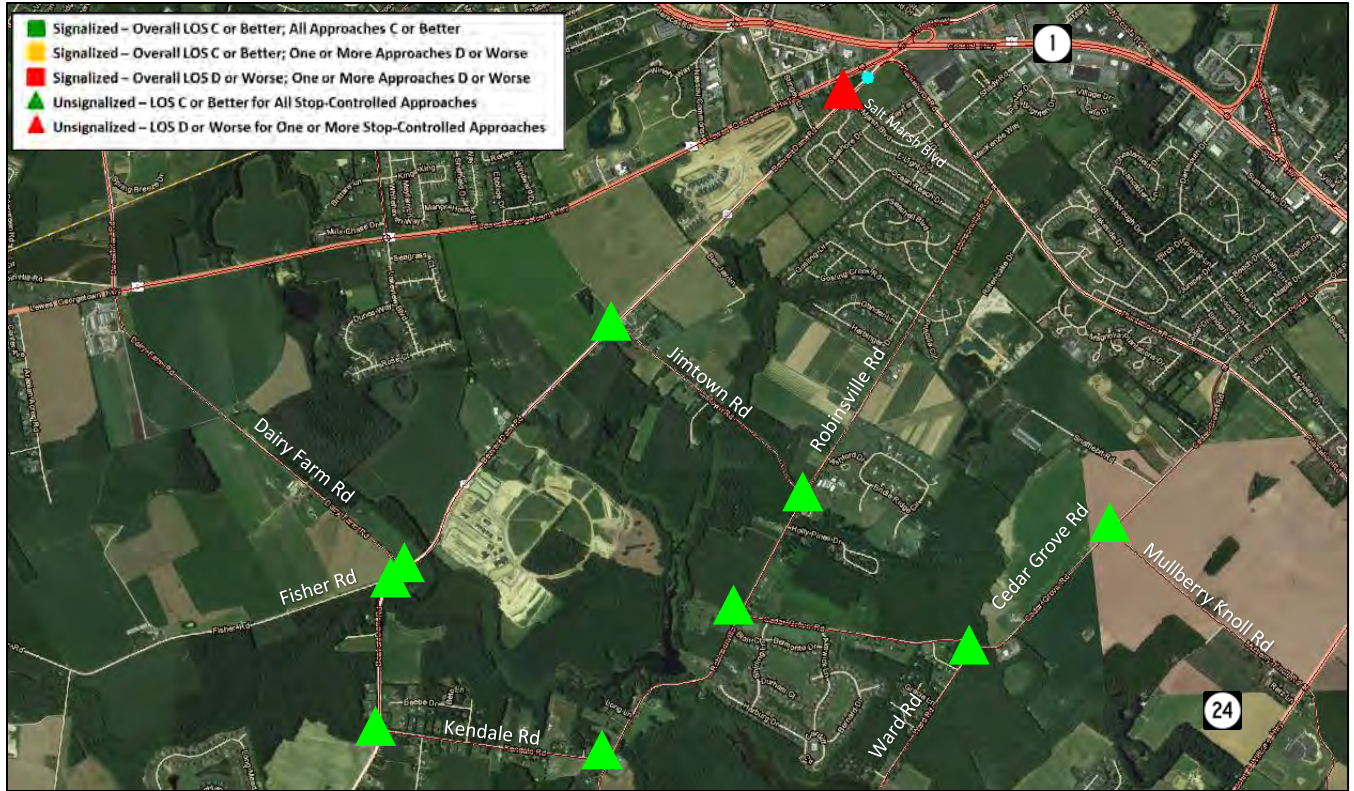
**Corridor – SR 23/Beaver Dam Rd – Western Interior Area**  
**AM Peak Hour**



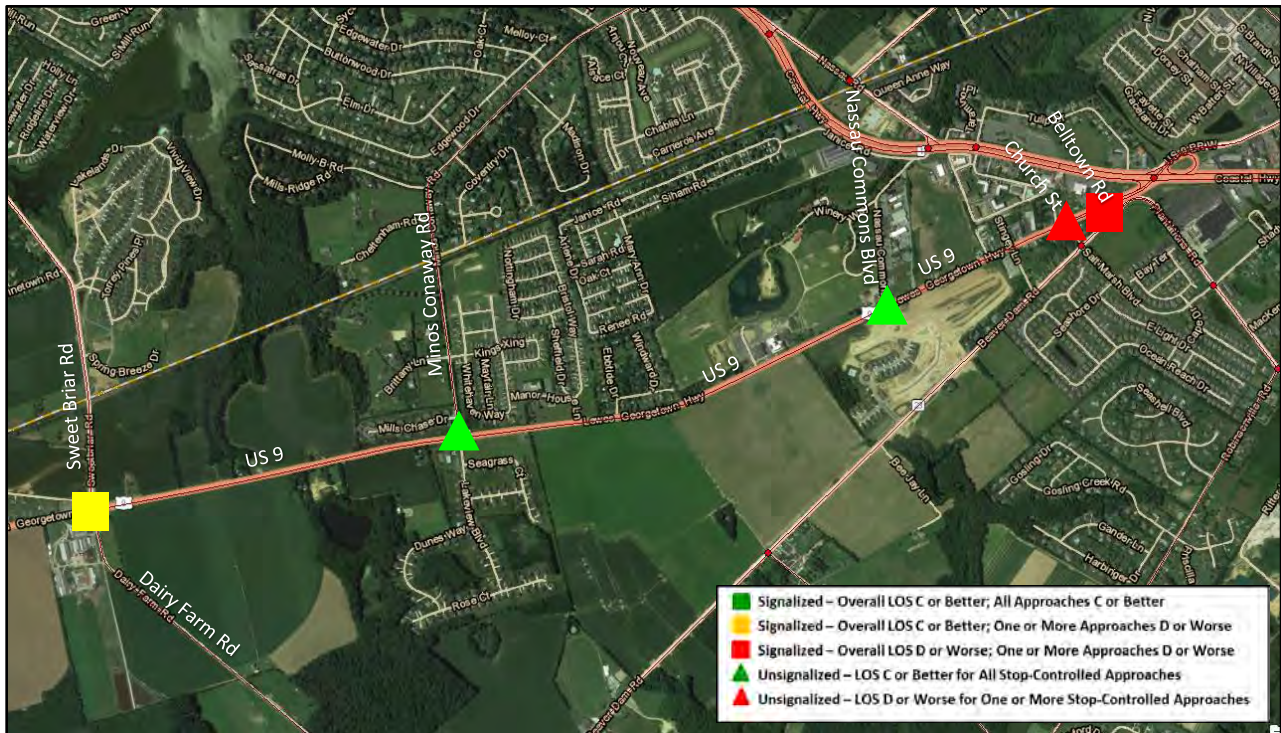
**Corridor – SR 23/Beaver Dam Rd – Western Interior Area**  
**PM Peak Hour**



**Corridor – SR 23/Beaver Dam Rd – Western Interior Area  
Saturday Peak Hour**



**Corridor - US 9 West of Five Points  
AM Peak Hour**



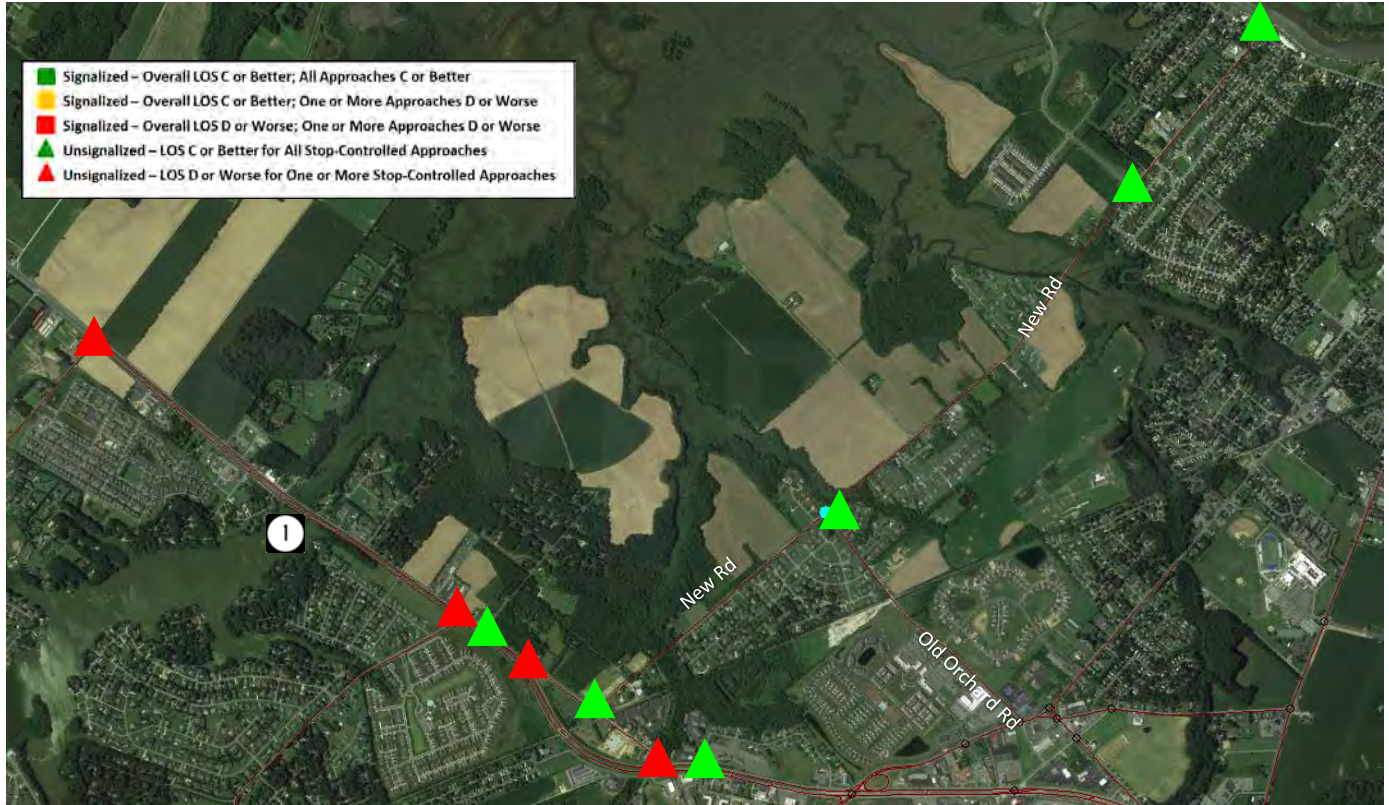
**Corridor - US 9 West of Five Points  
PM Peak Hour**



**Corridor - US 9 West of Five Points  
Saturday Peak Hour**



**Corridor – Northeast Interior Area / Lewes / New Rd & SR 1 North of Five Points**  
**AM Peak Hour**

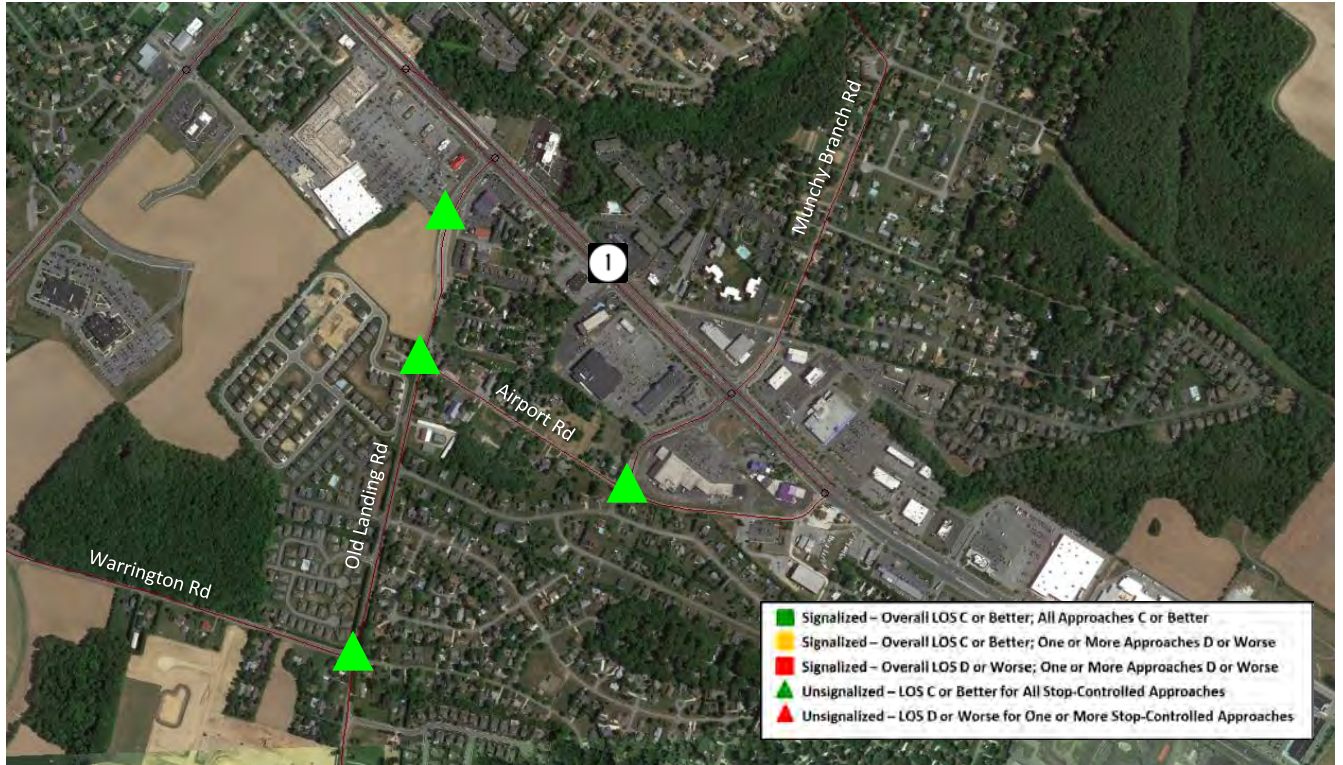


**Corridor – Northeast Interior Area / Lewes / New Rd & SR 1 North of Five Points**  
**PM & Saturday Peak Hour**

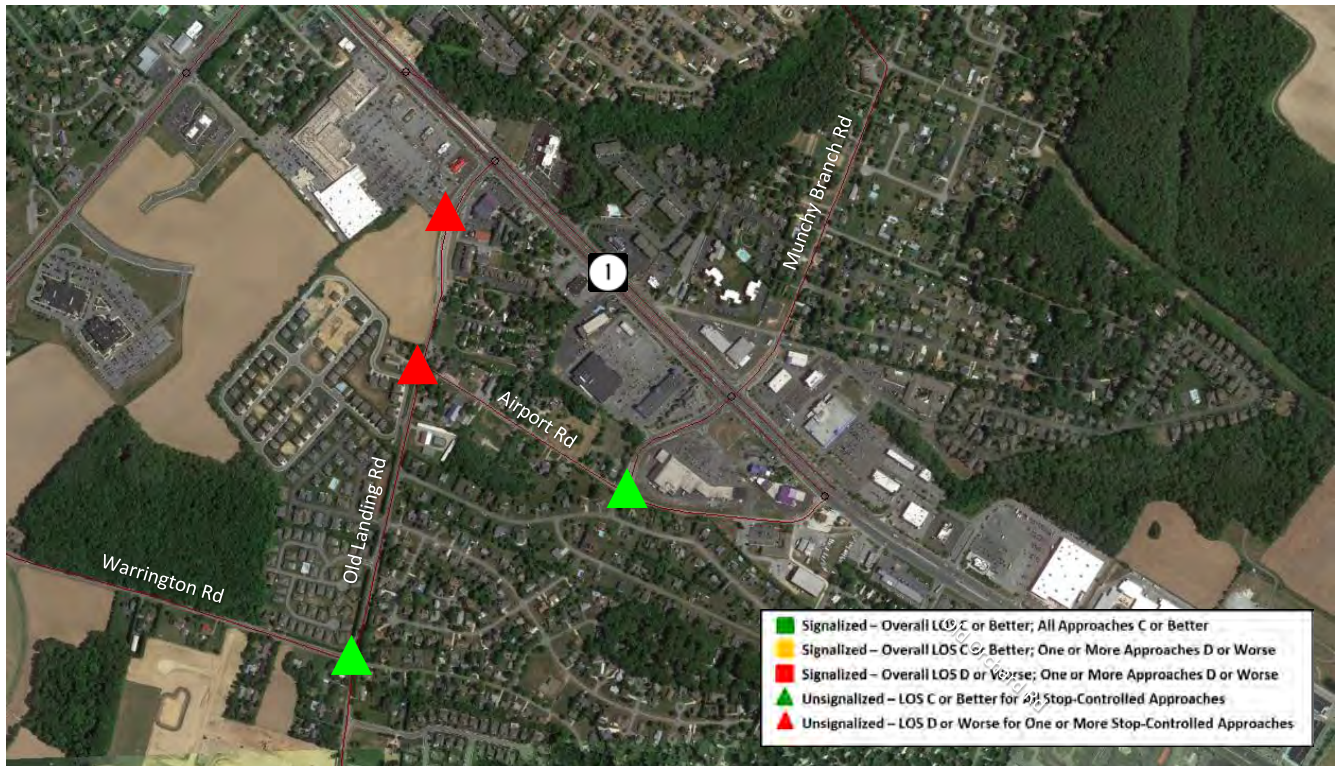




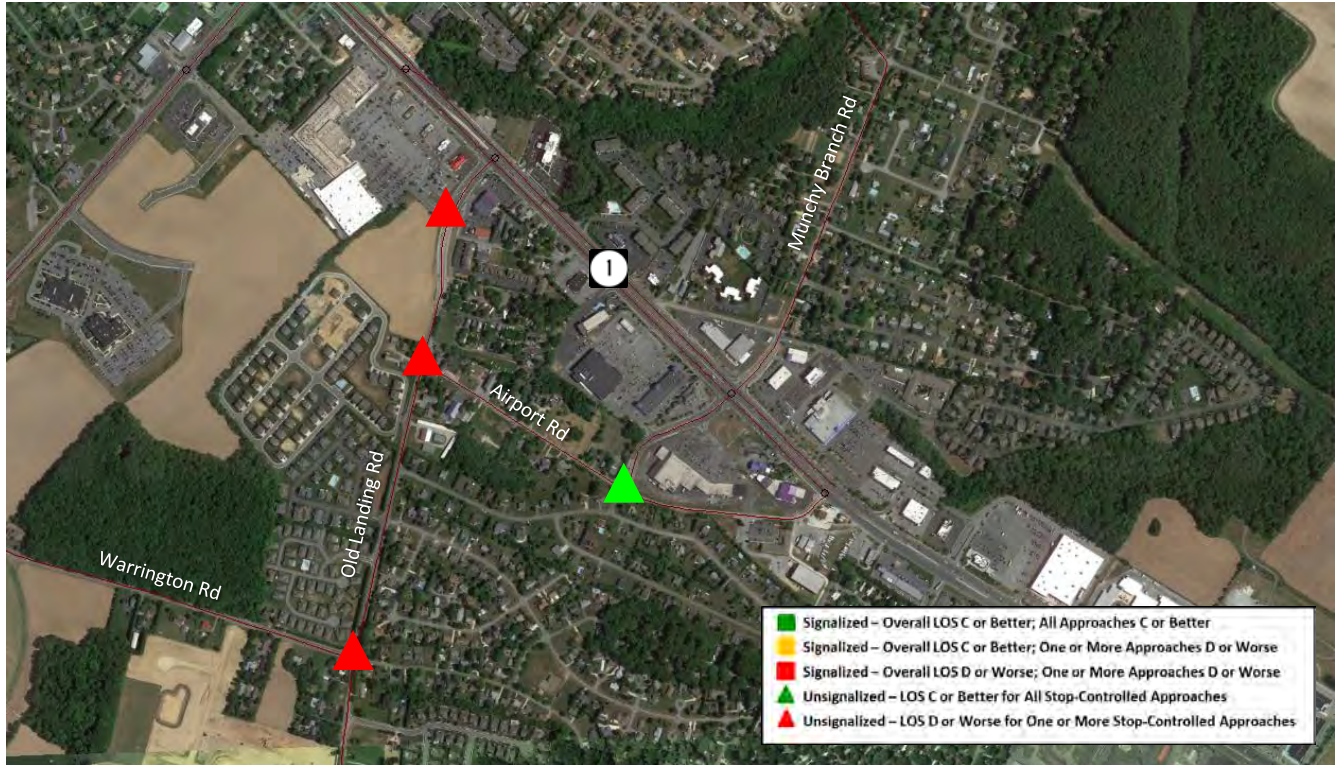
**Corridor – SE Area Rehoboth  
AM Peak Hour**



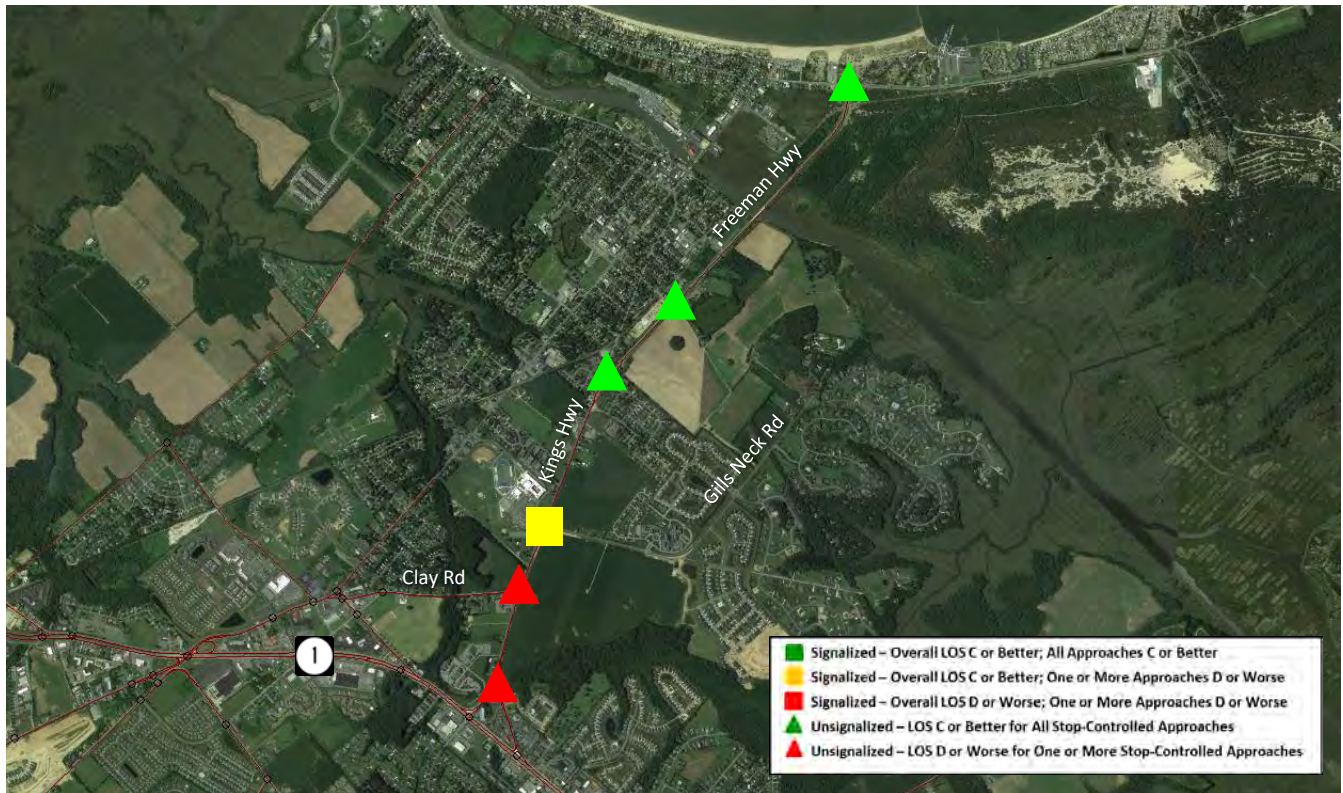
**Corridor – SE Area Rehoboth  
PM Peak Hour**



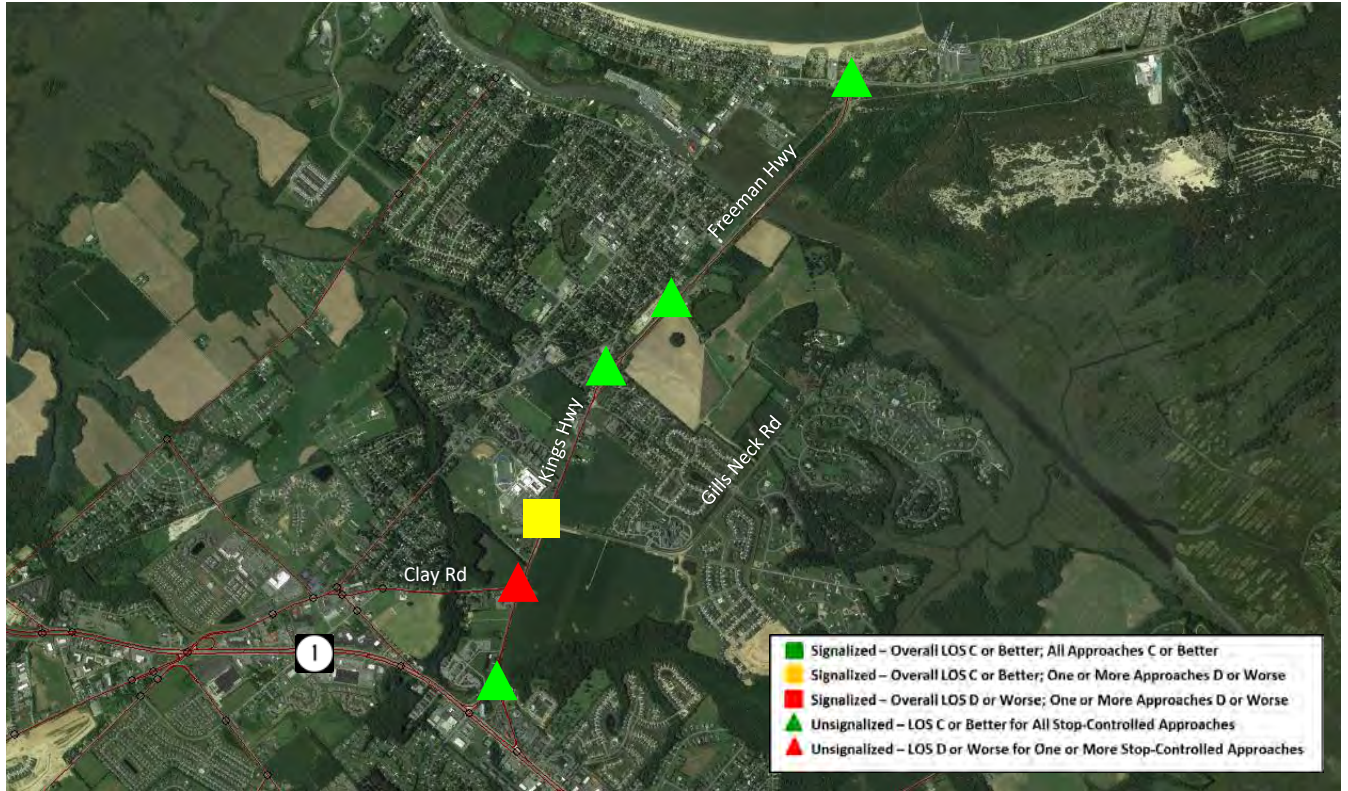
**Corridor – SE Area Rehoboth  
Saturday Peak Hour**



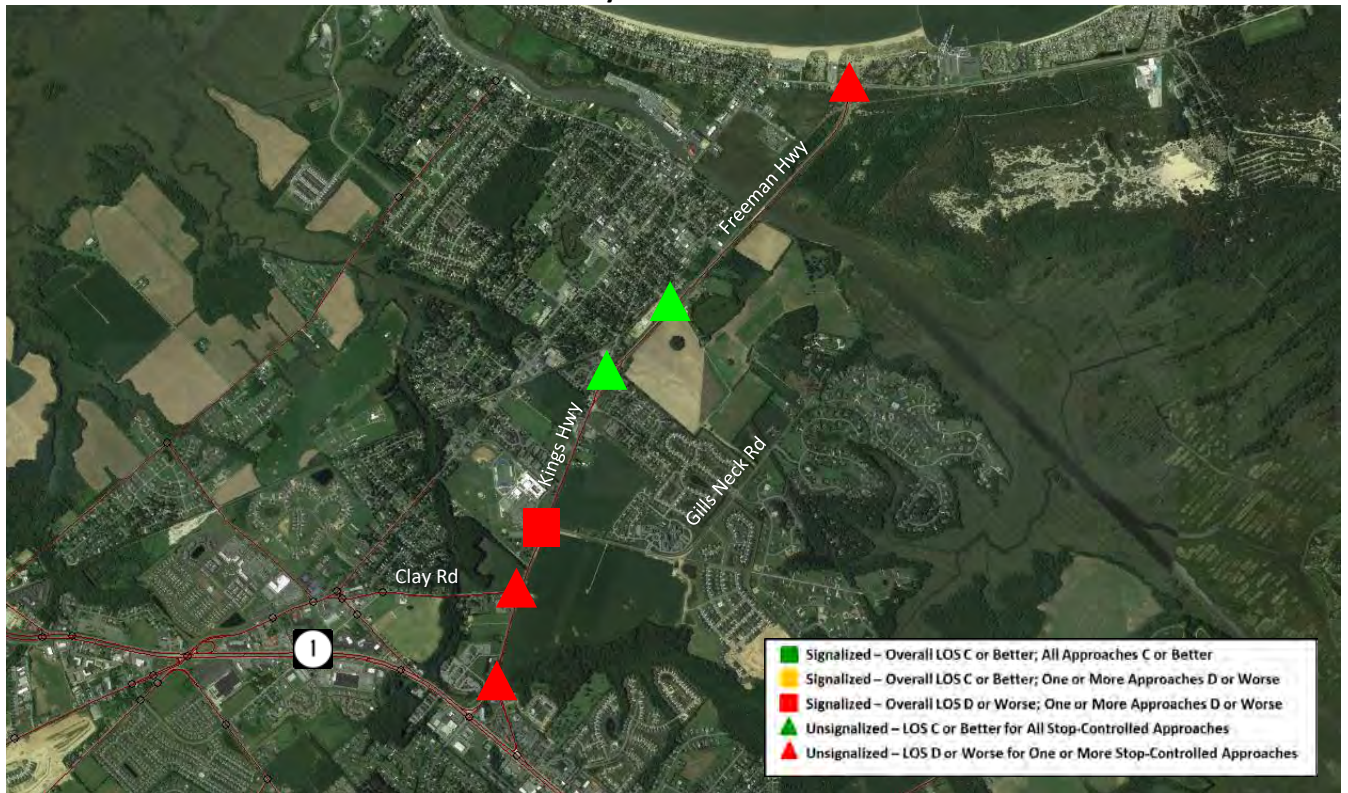
**Corridor – US 9 Kings & Freeman Highways  
AM Peak Hour**



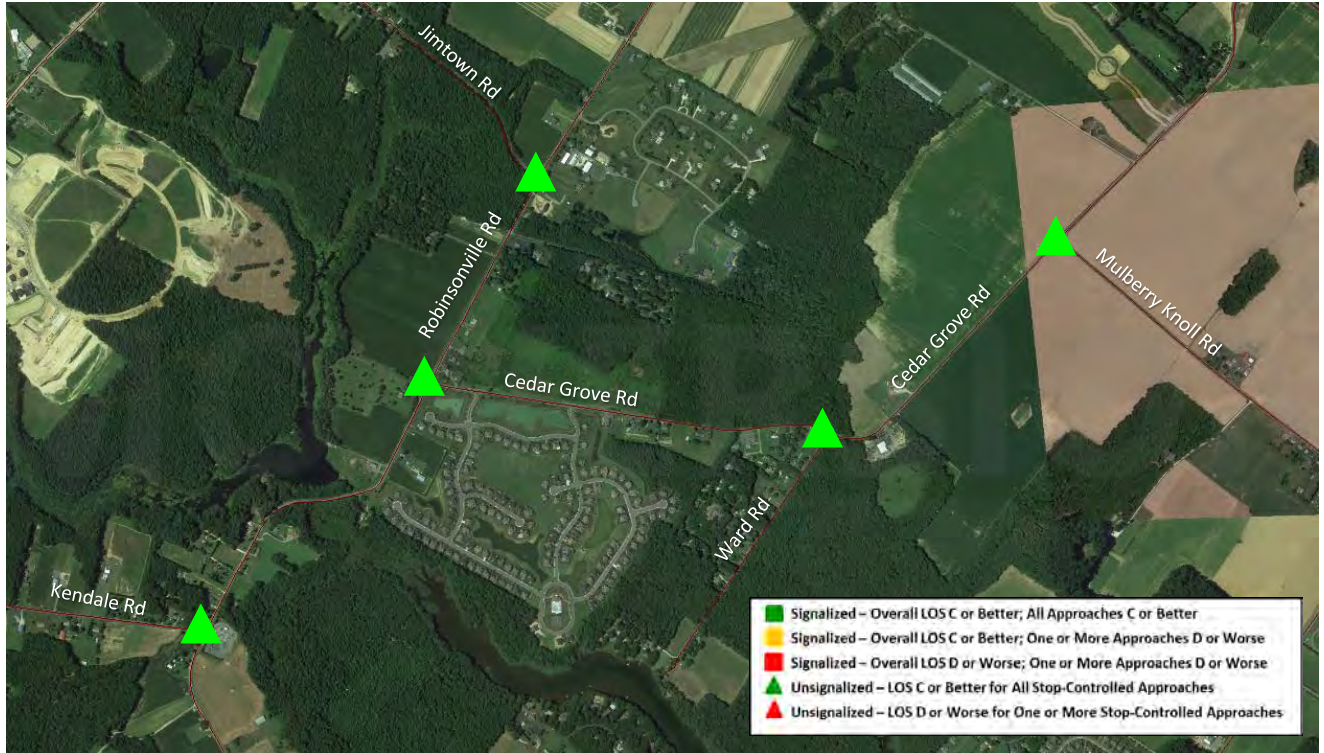
**Corridor – US 9 Kings & Freeman Highways  
PM Peak Hour**



**Corridor – US 9 Kings & Freeman Highways  
Saturday Peak Hour**



**Corridor – Western Interior Area  
AM/PM/Saturday Peak Hour**



## Roadway Deficiency Analysis

There are 65.79 miles of road included in the Henlopen TID. Of these, 37.39 miles of road are within the Participant Boundary. The other 28.40 miles extend beyond the Participant Boundary and define the Facilities Boundary. They are included in the TID because some traffic from developments within the Participant Boundary travels outside that boundary. This overview will describe the current conditions of the lane and shoulder widths, level of biking stress, sidewalk development, and public transit facilities.

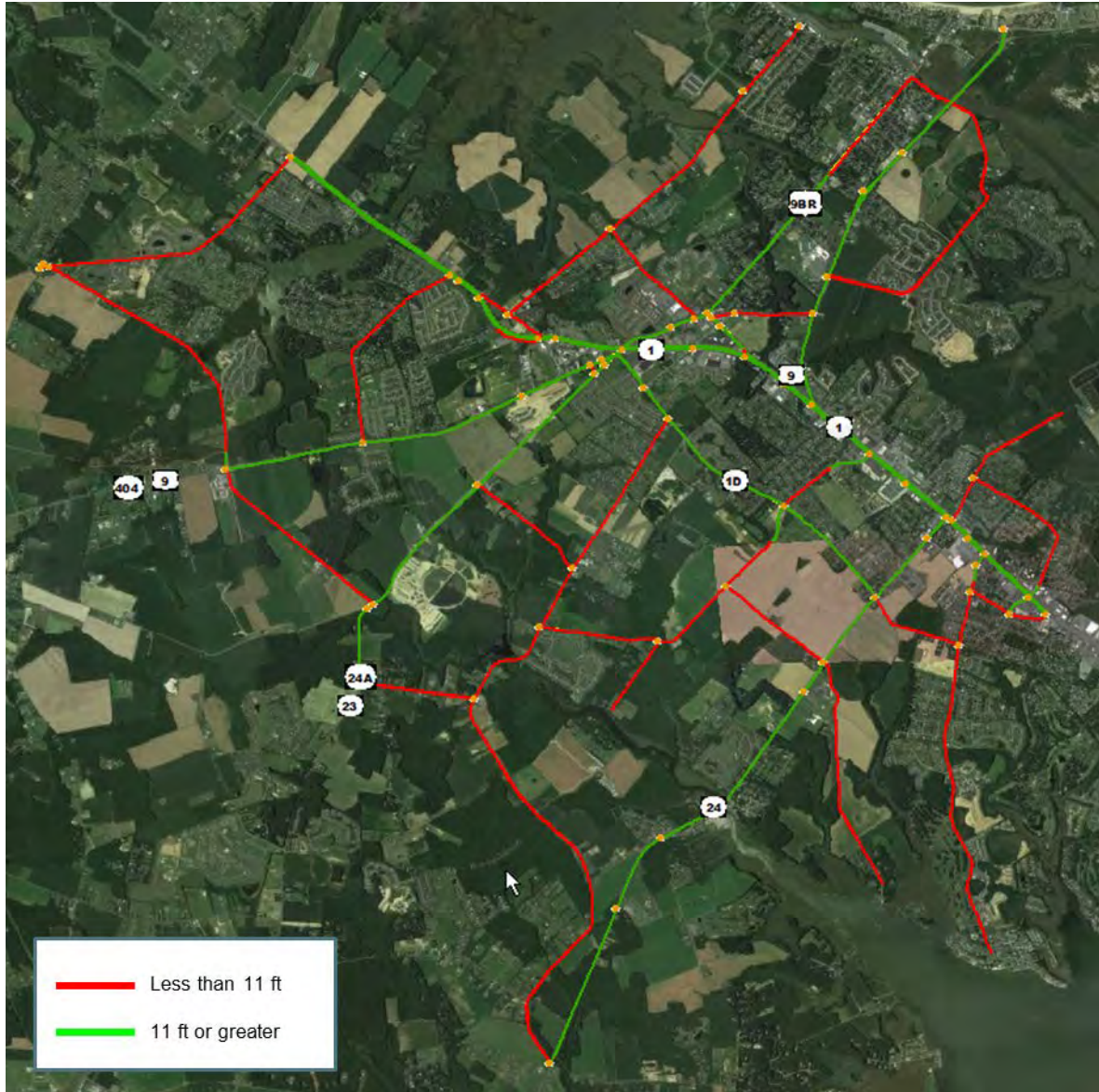
## TID Roads and Participant Boundary



### Lane Widths

Of the approximately 66 miles of road within the study area, roadways identified as collectors or arterials appear to have sufficient lane widths (11 ft or greater). There are, however, several local roads that contain lanes less than 11 ft as shown in the map below.

## Lane Width Sufficiency



### Shoulder Sufficiency

The following map depicts study area road shoulder sufficiency as per the following criteria:

- Sufficient - Less than 5ft for Local roads
- Sufficient - Less than 8ft for Collector and Arterial roads

A “mixed” category was also added to the map to indicate roadway segments that contain a mixture of both sufficient and insufficient shoulders.

## Shoulder Sufficiency



## Bikeability

Biking level of stress (BLS) was analyzed on the roads, taking into account the number of lanes, size of the shoulder, traffic volume, and the speed limit. BLS shows how comfortable a biker would be traveling on a road. A BLS of Level 1 would be very comfortable for a biker, and they may feel comfortable enough to include their children. Level 2 would be used by about 60% of bikers, and parents would probably not allow their children to ride. Level 3 and 4 are used by experienced bikers who are comfortable with traffic conflicts. The Biking Level of Stress image below shows these level 1 and 2 areas, and as can be seen, the majority of the TID contains roads that are best reserved for experienced bikers. It's important to recognize that the majority of bike lane placement is on roads considered level 3 or 4. In fact, from 65.89 miles of roads (added distance comes from BLS assessing middle of intersections and some turning lanes), only 11.68 miles of roadway are considered to be level 1 or 2 with 8.35 miles being considered level 1.

## Biking Level of Stress



### Sidewalks

There are 20.64 miles of sidewalk constructed along the designated roads for the Henlopen TID, and an additional 1.95 miles of marked crosswalk and median. Like shoulder development, this is total development, and not the amount of roadway which has sidewalk development next to it. When looking at length of roadway that has sidewalk development, 9.23 miles of all the TID's 61.96 miles of roadway have sidewalk connecting both sides of each road segment. Another 9.41 miles of road has sidewalk development on at least one side running the entire length of the segment, but not both sides. This leaves 42.95 miles of roadway that has only some or no development on it. The Sidewalk Development



image below shows actual sidewalk placement, while the Sidewalk Connectivity image shows which segments have sidewalks running their entire length.

### Sidewalk Development



## Sidewalk Connectivity

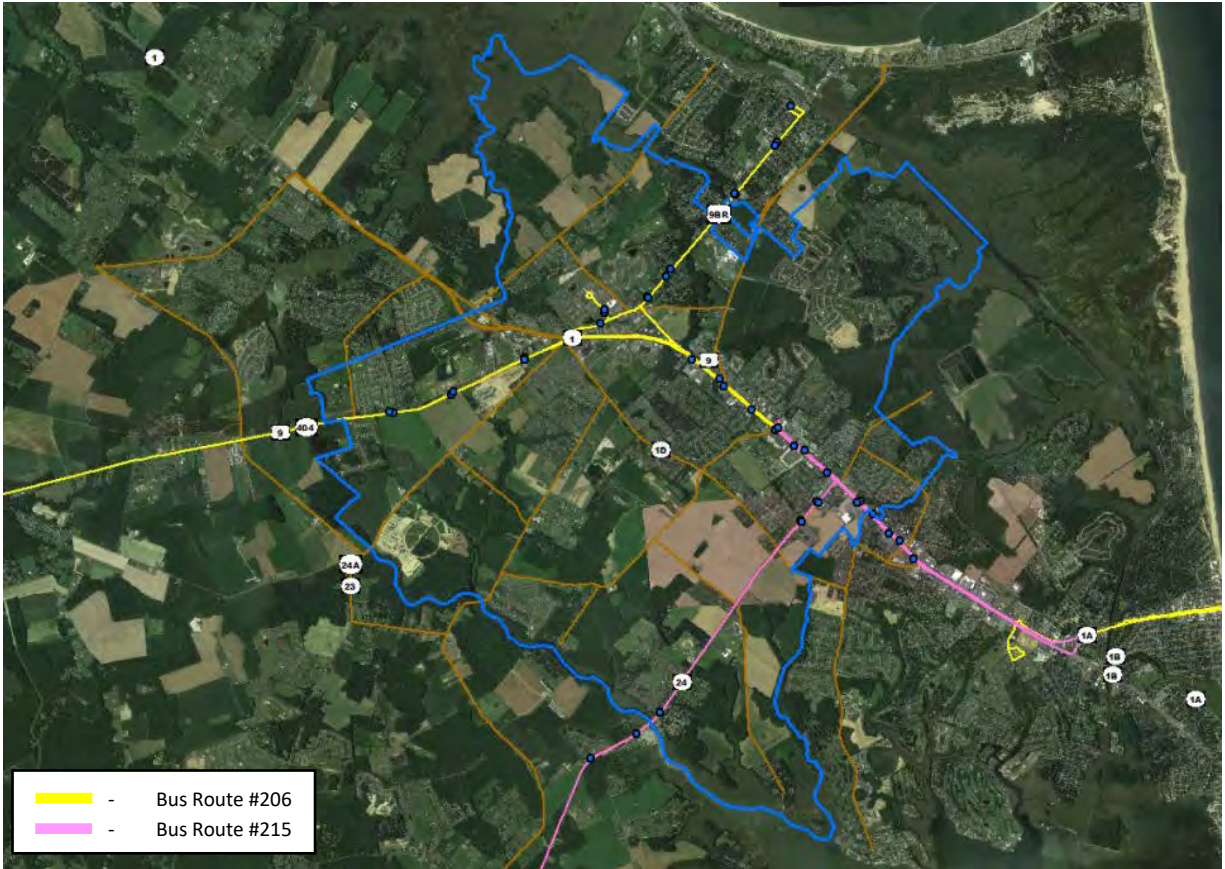


As both images show, sidewalk development has mostly been contained to Rt. 1, south of Five Points, the City of Lewes, intersection improvements, and new developments. In fact, virtually all sidewalk development outside of Rt. 1 and Lewes is sporadic and does not connect to anything else.

### Public Transit Facilities

Within the TID, there are two bus routes that service Rt. 1, US Rt. 9, Rt. 24., and the City of Lewes. These lines are 215 and 206, and they total 40 bus stops between them. As can also be seen from the Public Transit Facilities image below, there are no existing park and ride lots within the TID boundary, however, DelDOT is currently constructing the Lewes Park and Ride.

## Public Transit Facilities



## Conclusions

The traffic network encompassed by the Henlopen TID faces several challenges as land use continues to develop in the future coupled with DeIDOT' s fiscal and geometric constraints for adding additional capacity along SR 1.

As shown in this report, however, the majority of level of services issues (LOS E or F) are mostly confined to the side street approaches either entering SR 1 and/or entering other major corridors within the study area. Many intersections outside of the SR 1 corridor, but adjacent to potential future development tax parcels, are either operating with minimum delay which could provide future opportunities for the Department to develop TID projects in anticipation of future development in those areas.

## Next Steps

This report provides an overall view of existing operating conditions with the Henlopen TID with the following suggested next steps as they relate to the Department and the County's respective responsibilities:

1. DeIDOT and Sussex County agree on an initial set of service standards, including Levels of Service, that can be used to identify facilities as adequate or inadequate and determine where improvements need to be made.
2. Sussex County provides DeIDOT with parcel based land use data inventory, including estimated future households and/or employment square footage, within the study area.
3. Sussex County provides DeIDOT with any anticipated comprehensive plan update policies or initiatives relating to access management or zoning revisions within the study area.
4. DeIDOT technical team coordinates with DeIDOT Transportation Solutions to develop inventory list of existing capital projects, concept plans, or studies for intersection and/or intersection approaches.
5. DeIDOT technical team coordinates with DeIDOT Transportation Management Center (TMC) to review data within this report and identify any existing or planned signal operations plans for corridors within the study area.