MILFORD

Proposed

TRANSPORTATION IMPROVEMENT DISTRICT

EXISTING CONDITIONS
TRAFFIC ANALYSIS

September 2018

EXECUTIVE SUMMARY

Like many other areas within the State of Delaware, the City of Milford is experiencing increasing growth in both residential and commercial sectors which places additional demands on transportation infrastructure. To better coordinate governmental responses to these demands a collaborative partnership between the City, Sussex County and the Delaware Department of Transportation (DelDOT) has been proposed that would allow for transportation funding and project development to be carried out in efficient and proactive manner through the implementation of a Transportation Improvement District (TID).

The purpose of this traffic study is to evaluate existing traffic and other transportation network conditions for a proposed Southeast Milford TID. This study also serves the purpose of providing a comparative analysis from which to gauge transportation impacts of projected future growth to be addressed in Phase Two of the TID analysis.

The impetus for the proposed Southeast Milford TID originates from the amending of the Southeast Master Plan into the City of Milford 2011 Comprehensive Plan. The Southeast Neighborhood Master Plan, which includes a mix of commercial, residential, and agricultural preservation, is expected to be the primary area for new development as the City moves into the future. The 2018 update of the Comprehensive Plan specifically calls for the creation of a TID for areas included in the Southeast Master Plan by way of a written agreement or memorandum of understanding (MOU) with DelDOT.

Following the signing of the MOU, the City, Sussex County and DelDOT will work collaboratively to develop future year land use projections that will be utilized for transportation modeling purposes and to arrive at a series of transportation recommendations and projects to be carried out through the TID program and the DelDOT Capital Transportation Program (CTP).

Key findings:

Overall, the majority of intersections within the proposed TID are generally operating with minimum capacity issues under existing conditions at this time (figure 1). It is anticipated, however, that the establishment and implementation of the Southeast Neighborhood Master Plan and accompanying job and residential growth, could lead to increases in traffic and deteriorating capacity levels of service within the proposed TID boundary. Additionally, the opening of a new $300 million Bayhealth hospital and campus off of SR 1 at Wilkins and Cedar Creek roads is also expected to generate numerous new employee and patient related trips within the TID study area.

Following the adoption of the proposed TID, DelDOT will work closely with the City and Sussex County to analyze the potential impacts of future land use on the transportation network while also identifying new opportunities to leverage the TID program for improving the transportation network.

- AM & PM Peak Hours: Six percent of the intersections in the study area have at least one approach operating at Level of Service (LOS) D or greater in both the AM and PM peak hours.

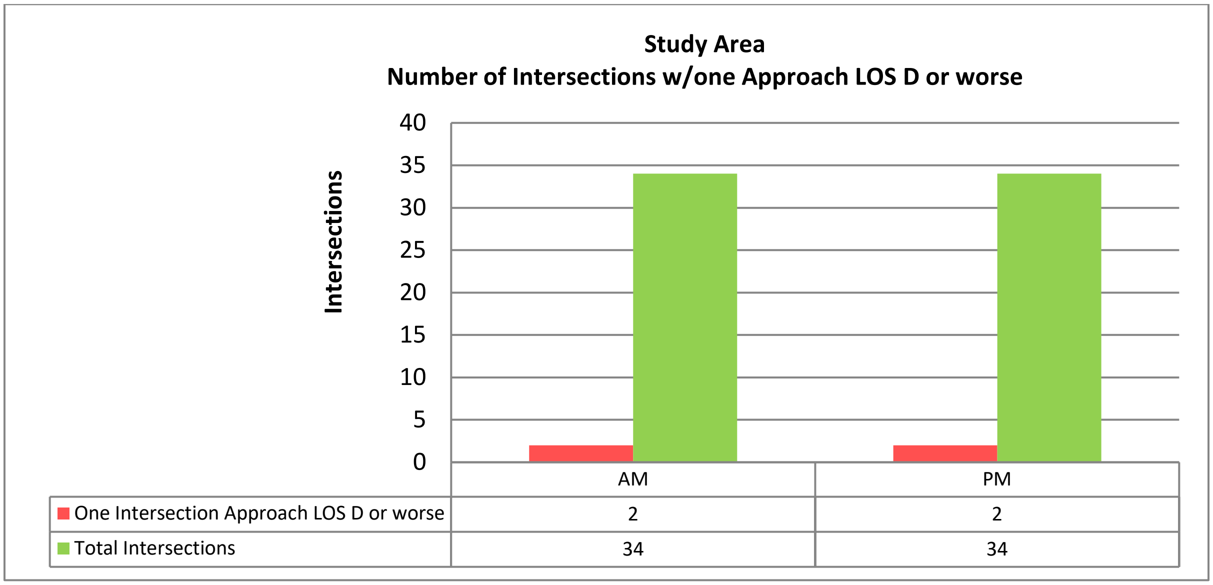


Figure 1. Study Area Level of Service (LOS)

TID DESCRIPTION

The proposed Milford TID is located in the City of Milford and Sussex County (Figure 2), with the participant boundary generally extending from Cedar Beach Road, Deep Branch and Herring Branch in the north, Norfolk Southern rail line in the west, Cedar Creek in the south, and Sharps Rd in the east.

The participant boundary covers an area of approximately 8.27 square miles. This is the area within which parcels are covered by the TID requirements and the land use planning area identified in the SE Milford Master Plan. There are 34 intersections (7 signalized, and 27 unsignalized) within and adjacent to the participant boundary. These make up the facilities boundary

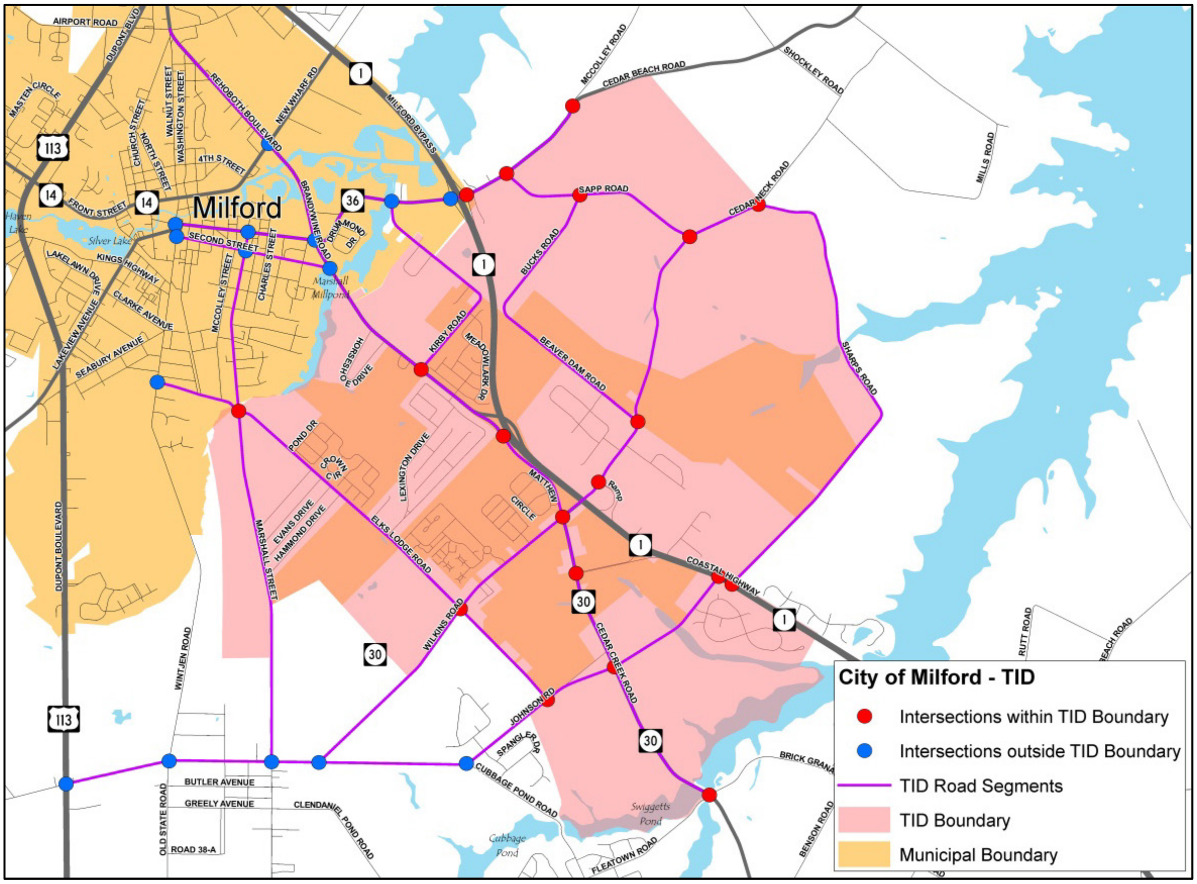


Figure 2. Location Map

BACKGROUND

Population

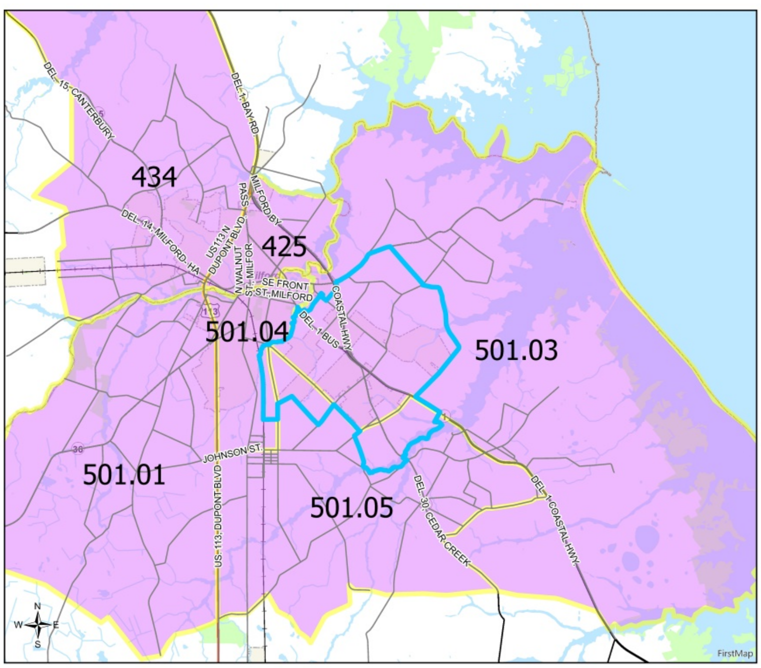
According to the Delaware Population Consortium, the City of Milford (Kent County portion) is expected to grow from 3,997 to 4,859 (+22%) between the years 2015 and 2040. The Sussex County portion of the City is expected to grow from 5,996 to 6,297 (+5%). It should be noted that Sussex County portion is the area where the City is pursuing new annexations as part of the Southeast Neighborhood Master Plan which could result in faster population growth as compared to current projections.

Commuting Habits

The American Community Survey (ACS), administered by the U.S. Census Bureau, assists state and local governments by providing statistical data to enhance understanding about demographic trends within their communities. Travel related data was extracted from the survey for census tracts encompassing the proposed TID study area (Table 1).

Table 1.
American Community Survey –2016

Statistics	American Community Survey 2016 (5-Year Estimates)													
	Census Tract 425, Kent County, Delaware		Census Tract 434, Kent County, Delaware		Census Tract 501.01, Sussex County, Delaware		Census Tract 501.03, Sussex County, Delaware		Census Tract 501.04, Sussex County, Delaware		Census Tract 501.05, Sussex County, Delaware		TOTAL (All Selected Census Tracts)	
SE:T1. Total Population														
Total Population	3,768		4,518		3,685		4,575		4,495		6,019		27,060	
SE:T2. Population Density (per Sq. Mile)														
Total Population	3,768		4,518		3,685		4,575		4,495		6,019		27,060	
Population Density (Per Sq. Mile)	1,261.8		177.0		184.8		97.6		1,235.1		372.1		235.0	
Area (Land)	2.99		25.53		19.94		46.88		3.64		16.18		115.14	
SE:T128. Means of Transportation to Work for Workers 16 Years and Over														
Workers 16 Years and Over:	1,532		2,029		1,772		2,168		2,070		2,479		12,050	
Car, Truck, or Van	1,418	92.6%	1,987	97.9%	1,632	92.1%	2,011	92.8%	1,897	91.6%	2,339	94.4%	11,284	93.6%
Drove Alone	1,226	80.0%	1,759	86.7%	1,518	85.7%	1,846	85.2%	1,842	89.0%	2,037	82.2%	10,228	84.9%
Carpooled	192	12.5%	228	11.2%	114	6.4%	165	7.6%	55	2.7%	302	12.2%	1,056	8.8%
Public Transportation (Includes Taxicab)	26	1.7%	0	0.0%	9	0.5%	10	0.5%	10	0.5%	9	0.4%	64	0.5%
Motorcycle	0	0.0%	0	0.0%	9	0.5%	12	0.6%	0	0.0%	0	0.0%	21	0.2%
Bicycle	0	0.0%	0	0.0%	0	0.0%	10	0.5%	0	0.0%	0	0.0%	10	0.1%
Walked	58	3.8%	3	0.2%	26	1.5%	12	0.6%	39	1.9%	38	1.5%	176	1.5%
Other Means	0	0.0%	15	0.7%	0	0.0%	0	0.0%	17	0.8%	40	1.6%	72	0.6%
Worked At Home	30	2.0%	24	1.2%	96	5.4%	113	5.2%	107	5.2%	53	2.1%	423	3.5%
SE:T129. Travel Time to Work for Workers 16 Years and Over														
Workers 16 Years and Over:	1,532		2,029		1,772		2,168		2,070		2,479		12,050	
Did Not Work At Home:	1,502	98.0%	2,005	98.8%	1,676	94.6%	2,055	94.8%	1,963	94.8%	2,426	97.9%	11,627	96.5%
Less than 10 Minutes	354	23.1%	197	9.7%	248	14.0%	390	18.0%	372	18.0%	246	9.9%	1,807	15.0%
10 to 19 Minutes	275	18.0%	536	26.4%	585	33.0%	580	26.8%	546	26.4%	489	19.7%	3,011	25.0%
20 to 29 Minutes	269	17.6%	521	25.7%	294	16.6%	460	21.2%	254	12.3%	600	24.2%	2,398	19.9%
30 to 39 Minutes	310	20.2%	478	23.6%	382	21.6%	348	16.1%	534	25.8%	667	26.9%	2,719	22.6%
40 to 59 Minutes	118	7.7%	208	10.3%	100	5.6%	169	7.8%	139	6.7%	325	13.1%	1,059	8.8%
60 to 89 Minutes	153	10.0%	17	0.8%	31	1.8%	56	2.6%	105	5.1%	73	2.9%	435	3.6%
90 or More Minutes	23	1.5%	48	2.4%	36	2.0%	52	2.4%	13	0.6%	26	1.1%	198	1.6%
Worked At Home	30	2.0%	24	1.2%	96	5.4%	113	5.2%	107	5.2%	53	2.1%	423	3.5%



Milford TID Boundary

TID Boundary

MilfordCensusTracts

Census Tracts within and bordering the proposed TID boundary indicates that non-auto trips comprise only a small portion of transportation to work trips. Single- occupancy vehicles account for 80% - 90% of work trips.

Figure 3. Study Area Census Tracts

Comprehensive Plan

The 2018 City of Milford Comprehensive Plan documents the City's plans and preparations for expected future housing and population growth. Community character goals within the Plan include the encouragement of "compatible, resilient, connected development, redevelopment, and growth…" and the prioritization of growth of "significant developable and vacant areas" inside the City's boundaries.

Transportation goals and objectives within the Plan include a multi-modal transportation system that is "safe and interconnected" and also the aforementioned creation of a Transportation Improvement District (TID) for areas within the Southeast Master Plan.

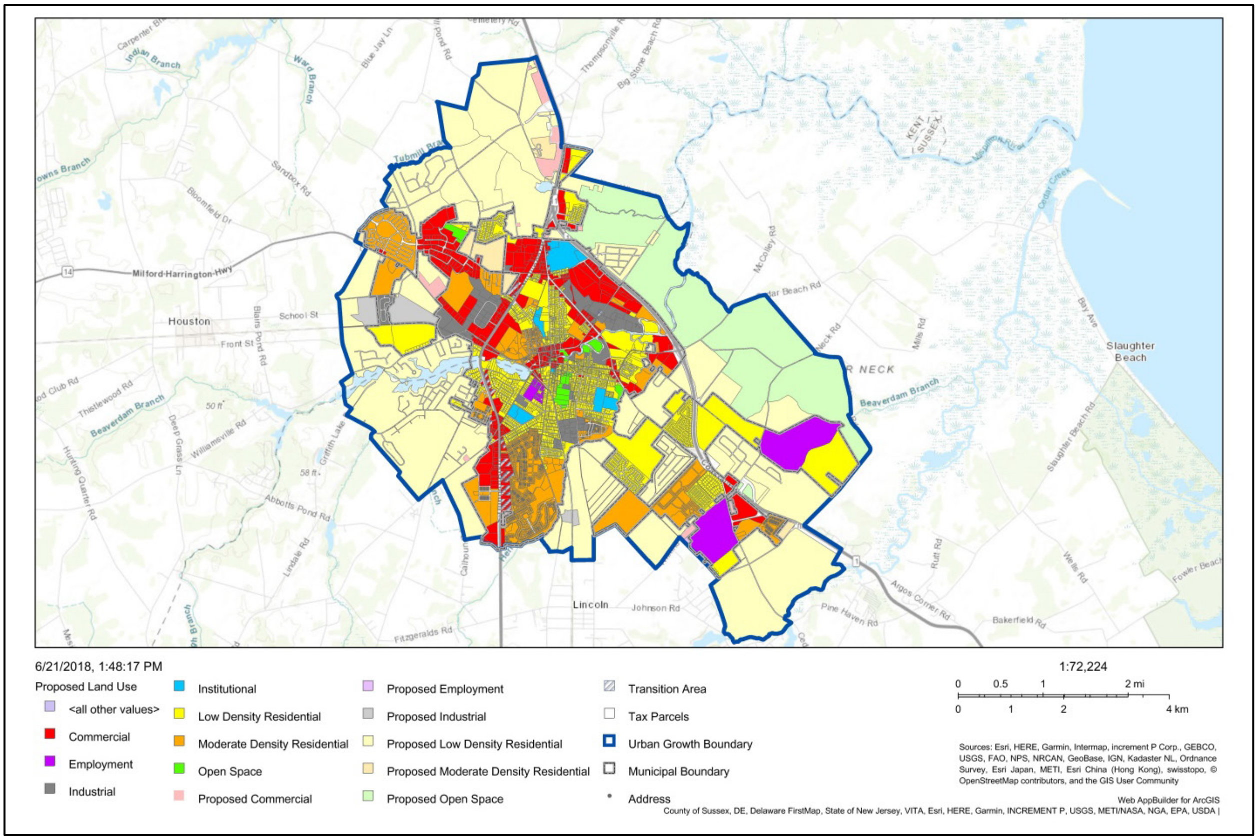


Figure 4. City of Milford – 2017 Comprehensive Plan – Proposed Land Use

Current DelDOT Capital Transportation Projects (CTP)

There are currently two DelDOT CTP project within the proposed Southeast Milford TID study area. The NE Front Street, Rehoboth to SR 1 project (in project development/design) will begin preliminary engineering in fiscal year 2021 and the SR 1, NE Front Street Grade Separated Intersection project which is currently in construction with an expected completion in fiscal year 2020.

Annual Average Daily Traffic

Annual Average Daily Traffic (AADT) volumes for roads within and adjacent to the proposed TID boundary were compiled from the DelDOT Delaware Vehicle Volume Summary 2017 (Traffic Summary) for years 2008 and 2018 and are shown in Table 2. Roadways with the largest increase in AADT include:

- Johnson Rd – (Cubbage Pond Rd to Cedar Creek Rd) +89%
- Cedar Neck Rd – Bucks Rd to Sapp Rd +98%
- Elks Lodge Rd – Johnson Rd to Wilkens Rd +106%
- Cedar Beach Rd – Beaver Dam Rd to Cedar Creek (Slaughter Beach) +132%
- Johnson Rd – Cedar Creek Rd to SR 1 +164%
- Wilkens Rd – Johnson Rd to Cedar Creek Rd +244%

Table 2.
Annual Average Daily Traffic – 2008-2017

Road	From	To	Year 2008	Year 2017	Last Year Counted	% Change
2nd St	S Walnut St	Marshall St	3,612	4,160	2015	15%
Bucks Rd	Sapp Rd	Cedar Neck Rd	548	730	2012	33%
Cedar Beach Rd	S Rehoboth Bvd	Beaver Dam Rd	1,718	1,863	2014	8%
Cedar Beach Rd	Beaver Dam Rd	Cedar Creek	1,041	2,414	2012	132%
Cedar Creek Rd	Fleatown Rd / Pine Haven Rd	Johnson Rd	5,656	6,198	2014	10%
Cedar Creek Rd	Johnson Rd	Rehoboth Blvd	3,923	6,397	2014	63%
Cedar Neck Rd	SR 1	Bucks Rd	507	676	2003	33%
Cedar Neck Rd	Bucks Rd	Sapp Rd	171	338	2011	98%
Cedar Neck Rd	Sapp Rd	Mills Rd	260	405	2011	56%
Elks Lodge Rd	Johnson Rd	Wilkens Rd	826	1,705	2011	106%
Elks Lodge Rd	Wilkens Rd	Marshall St	1,762	2,563	2014	45%
Johnson Rd	US 113	N Old State St	3,785	5,433	2014	44%
Johnson Rd	N Old State St	Wilkens Rd	3,259	4,411	2014	35%
Johnson Rd	Wilkens Rd	Cubbage Pond Rd	1,680	2,510	2014	49%
Johnson Rd	Cubbage Pond Rd	Cedar Creek Rd	1,061	2,000	2014	89%
Johnson Rd	Cedar Creek Rd	SR 1	799	2,107	2012	164%
Marshall St	Johnson Rd	McCoy St / Elks Lodge Rd	1,547	2,406	2012	56%
Marshall St	McCory St / Elks Lodge Rd	SE Front St	2,379	3,035	2015	28%
McCoy St	S Walnut St	Marshall St	4,173	3,458	2010	-17%
N. Old State St	Johnson Rd	S. Milford Limits	1,806	1,822	2015	1%
NE Front St	US 113	S Rehoboth Blvd	6,818	6,124	2012	-10%
NE Front St	S Rehoboth Bvd	SR 1	2,092	2,994	2017	43%
Rehoboth Blvd	SR 1	Deep Branch	7,922	10,666	2010	35%
Rehoboth Blvd	Deep Branch	SE Front St	8,239	8,596	2014	4%
Rehoboth Blvd	SE Front St	Mispillion River	8,594	9,445	2014	10%
Rehoboth Blvd	Mispillion River	NE 10th St	8,530	10,687	2012	25%
S. Walnut St	S. Milford Limits	Causey Ave	1,736	2,216	2010	28%
Sapp Rd	Cedar Beach Rd	Cedar Neck Rd	338	544	2014	61%
SE Front St	US 113	S Rehoboth Blvd	6,143	6,356	2014	3%
SR 1	Cedar Beach Rd	North of Cedar Neck Rd / Wilkins Rd	18,296	19,856	2015	9%
SR 1	North of Cedar Neck Rd/Wilkins Rd	Pine Haven Rd / Slaughter Beach Rd	23,060	24,578	2015	7%
US 113	Locust Ln	Fitzgeralds / Johnson Rd	17,636	15,672	2015	-11%
US 113	Fitzgeralds / Johnson Rd	Beach Hhwy / Main St (SR 16)	15,330	20,839	2015	36%
Wilkens Rd	Johnson Rd	Cedar Creek Rd	827	2,841	2012	244%
Wilkens Rd	Cedar CreekRd	SR 1	2,900	3,269	2015	13%

Intersection Traffic Counts

Intersection traffic count data for the proposed Southeast Milford TID served as the primary inputs for the traffic Level of Service (LOS) model that was used to assess existing traffic conditions. Count data was collected during January, 2017 at 34 locations.

Table 3.
2017 – Intersection Count Locations

No.	Street 1	Street 2	Inside/Outside Participant Boundary	Control Type
1	US Route 113	Johnson Rd / Fitzgeralds Rd	Out	Signal
2	DE Route 1	Johnson Rd	In	TWSC
3	DE Route 1	Sharps Rd	In / Border	TWSC
4	Business Route 1 (Rehoboth Blvd)	DE Route 14 (NE Front St)	Out	Signal
5	Business Route 1 (Rehoboth Blvd)	DE Route 36 (SE Front St / Cedar Beach Rd)	Out	Signal
6	Business Route 1 (Rehoboth Blvd)	SE 2nd St	Out	TWSC
7	Business Route 1 (Rehoboth Blvd)	Kirby Rd	In	TWSC
8	DE Route 30 (Cedar Creek Rd)	DE Route 1 SB Slip Ramp	In	TWSC
9	DE Route 30 (Cedar Creek Rd)	Wilkins Rd / Cedar Neck Rd	In	Signal
10	DE Route 30 (Cedar Creek Rd)	DE Route 1 SB Ramps / Bayhealth Medical	In	TWSC
11	DE Route 30 (Cedar Creek Rd)	Johnson Rd	In	TWSC
12	DE Route 30 (Cedar Creek Rd)	Fleatown Rd / Pine Haven Rd	In / Border	TWSC
13	DE Route 36 (SE Front St / Cedar Beach Rd)	S Walnut St	Out	Signal
14	DE Route 36 (SE Front St / Cedar Beach Rd)	Marshall St	Out	TWSC
15	DE Route 36 (SE Front St / Cedar Beach Rd)	Beaver Dam Rd	Out	TWSC
16	DE Route 36 (SE Front St / Cedar Beach Rd)	DE Route 1 SB Ramps	Out	TWSC
17	DE Route 36 (SE Front St / Cedar Beach Rd)	DE Route 1 NB Ramps	In / Border	TWSC
18	DE Route 36 (SE Front St / Cedar Beach Rd)	Sapp Rd	In / Border	TWSC
19	DE Route 36 (SE Front St / Cedar Beach Rd)	McColley Rd	In / Border	TWSC
20	Sapp Rd	Bucks Rd	In	TWSC
21	Sapp Rd	Cedar Neck Rd	In	TWSC
22	Cedar Neck Rd	DE Route 1 NB Ramps	In	TWSC
23	Cedar Neck Rd	Beaver Dam Rd (Bucks Rd)	In	TWSC
24	Cedar Neck Rd	Sharps Rd	In / Border	TWSC
25	Marshall St	SE 2nd St	Out	Signal
26	Marshall St	Elks Lodge Rd / McCoy St	In / Border	AWSC
27	S Walnut St	SE 2nd St	Out	TWSC
28	McCoy St	S Walnut St	Out	TWSC
29	Elks Lodge Rd	Wilkins Rd	In / Border	AWSC
30	Elks Lodge Rd	Johnson Rd	In / Border	TWSC
31	Johnson Rd	North Old State Road	Out	TWSC
32	Johnson Rd	Marshall St / 3rd St (Lincoln)	Out	Signal
33	Johnson Rd	Wilkins Rd	Out	TWSC
34	Johnson Rd	Cubbage Pond Rd	Out	TWSC

Notes: TWSC - Two Way Stop Control; AWSC - All Way Stop Control

METHODOLOGY

Level of Service (LOS) Analysis

Each of the thirty four intersections within the study area was analyzed for capacity and delay through the use of Synchro/SimTraffic software which includes implementation of the 2010 Highway Capacity Manual (Transportation Research Board, 2010). Tables 4 and 5 provide a description of level-of-service (LOS) for both signalized and unsignalized intersections

Table 4.
Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)
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 4 is shown below.

Table 5.
Level of Service – Qualitative Descriptions

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 is 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.

Table 6.
Level of Service Criteria for Unsignalized Intersections

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

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

Table 7.
AM & PM Level of Service Results

					Intersection Level of Service (LOS)			
					AM Peak Hour		PM Peak Hour	
No.	Street 1	Street 2	Inside/Outside Participant Boundary	Control Type	Overall LOS	Approach LOS	Overall LOS	Approach LOS
1	US Route 113	Johnson Rd / Fitzgeralds Rd	Out	Signal	C	EB-C; WB-F; NB-B; SB-B	C	EB-E; WB-E; NB-B; SB-C
2	DE Route 1	Johnson Rd	In	TWSC		NE-B		NE-B
3	DE Route 1	Sharps Rd	In / Border	TWSC		SW-D		SW-C
4	Business Route 1 (Rehoboth Blvd)	DE Route 14 (NE Front St)	Out	Signal	C	SE-B; NW-B; NE-C; SW-C	C	SE-B; NW-C; NE-C; SW-D
5	Business Route 1 (Rehoboth Blvd)	DE Route 36 (SE Front St / Cedar Beach Rd)	Out	Signal	B	EB B; WB-B; NB-B; SB -A	A	EB-B; WB-B; NB-A; SB-A
6	Business Route 1 (Rehoboth Blvd)	SE 2nd St	Out	TWSC		EB-C		EB-C
7	Business Route 1 (Rehoboth Blvd)	Kirby Rd	In	TWSC		SW-B		SW-B
8	DE Route 30 (Cedar Creek Rd)	DE Route 1 SB Slip Ramp	In	TWSC		N/A**		N/A**
9	DE Route 30 (Cedar Creek Rd)	Wilkins Rd / Cedar Neck Rd	In	Signal	B	NB-B; SB-B; NE-B; SW-B	B	NB-B; SB-B; NE-B; SW-B
10	DE Route 30 (Cedar Creek Rd)	DE Route 1 SB Ramps / Bayhealth Medical	In	TWSC	B	EB-C; WB -C; NB-B; SB-B	C	EB-C; WB-C; NB-C; SB-C
11	DE Route 30 (Cedar Creek Rd)	Johnson Rd	In	TWSC		EB-C; WB-C		EB-B; WB-C
12	DE Route 30 (Cedar Creek Rd)	Fleatown Rd / Pine Haven Rd	In / Border	TWSC		EB-C; WB-B		EB-C; WB-B
13	DE Route 36 (SE Front St / Cedar Beach Rd)	S Walnut St	Out	Signal	B	WB-B; NB-B; SB-A	B	WB-A; NB-B; SB-A
14	DE Route 36 (SE Front St / Cedar Beach Rd)	Marshall St	Out	TWSC		NB-A; SB-B		NB-B; SB-B
15	DE Route 36 (SE Front St / Cedar Beach Rd)	Beaver Dam Rd	Out	TWSC		NB-B		NB-A
16	DE Route 36 (SE Front St / Cedar Beach Rd)	DE Route 1 SB Ramps	Out	TWSC		SB-A		SB-A
17	DE Route 36 (SE Front St / Cedar Beach Rd)	DE Route 1 NB Ramps	In / Border	TWSC		NE-B		NE-A
18	DE Route 36 (SE Front St / Cedar Beach Rd)	Sapp Rd	In / Border	TWSC		NW-A		NW-A
19	DE Route 36 (SE Front St / Cedar Beach Rd)	McColley Rd	In / Border	TWSC		N/A**		N/A**
20	Sapp Rd	Bucks Rd	In	TWSC		NB-A		NB-A
21	Sapp Rd	Cedar Neck Rd	In	TWSC		EB-A		EB-A
22	Cedar Neck Rd	DE Route 1 NB Ramps	In	TWSC		NW-B		NW-A
23	Cedar Neck Rd	Beaver Dam Rd (Bucks Rd)	In	TWSC		SE-A		SE-A
24	Cedar Neck Rd	Sharps Rd	In / Border	TWSC		WB-A		WB-A
25	Marshall St	SE 2nd St	Out	Signal	B	EB-B; WB-B; NB-B; SB-A	B	EB-B; WB-B; NB-A; SB-A
26	Marshall St	Elks Lodge Rd / McCoy St	In / Border	AWSC	B	EB-A; WB-B; NB-B; SB-B		EB-A; WB-A; NB-A; SB-A
27	S Walnut St	SE 2nd St	Out	TWSC		WB-C		WB-B
28	McCoy St	S Walnut St	Out	TWSC		WB-B		WB-B
29	Elks Lodge Rd	Wilkins Rd	In / Border	AWSC	A	SE-A; NW-A; NE-A; SW-A	A	SE-A; NW-A; NE-A; SW-A
30	Elks Lodge Rd	Johnson Rd	In / Border	TWSC		SE-B		SE-B
31	Johnson Rd	North Old State Road	Out	TWSC		NB-B; SB-B		NB-C; SB-B
32	Johnson Rd	Marshall St / 3rd St (Lincoln)	Out	Signal	B	EB-A; WB-A; NB-C; SB-C	B	EB-A; WB-A; NB-C; SB-C
33	Johnson Rd	Wilkins Rd	Out	TWSC		SW-A		SW-A
34	Johnson Rd	Cubbage Pond Rd	Out	TWSC		WB-A		WB-A

Notes: TWSC - Two Way Stop Control; AWSC - All Way Stop Control
*Maintained by the City of Milford
** Geometric configuration cannot be analyzed in Highway Capcity Software

Level of Service Analysis Maps

The following maps identify the intersections that were analyzed in the traffic model and associated Levels of Service (LOS).

Figure 4. AM Peak Hour Level of Service

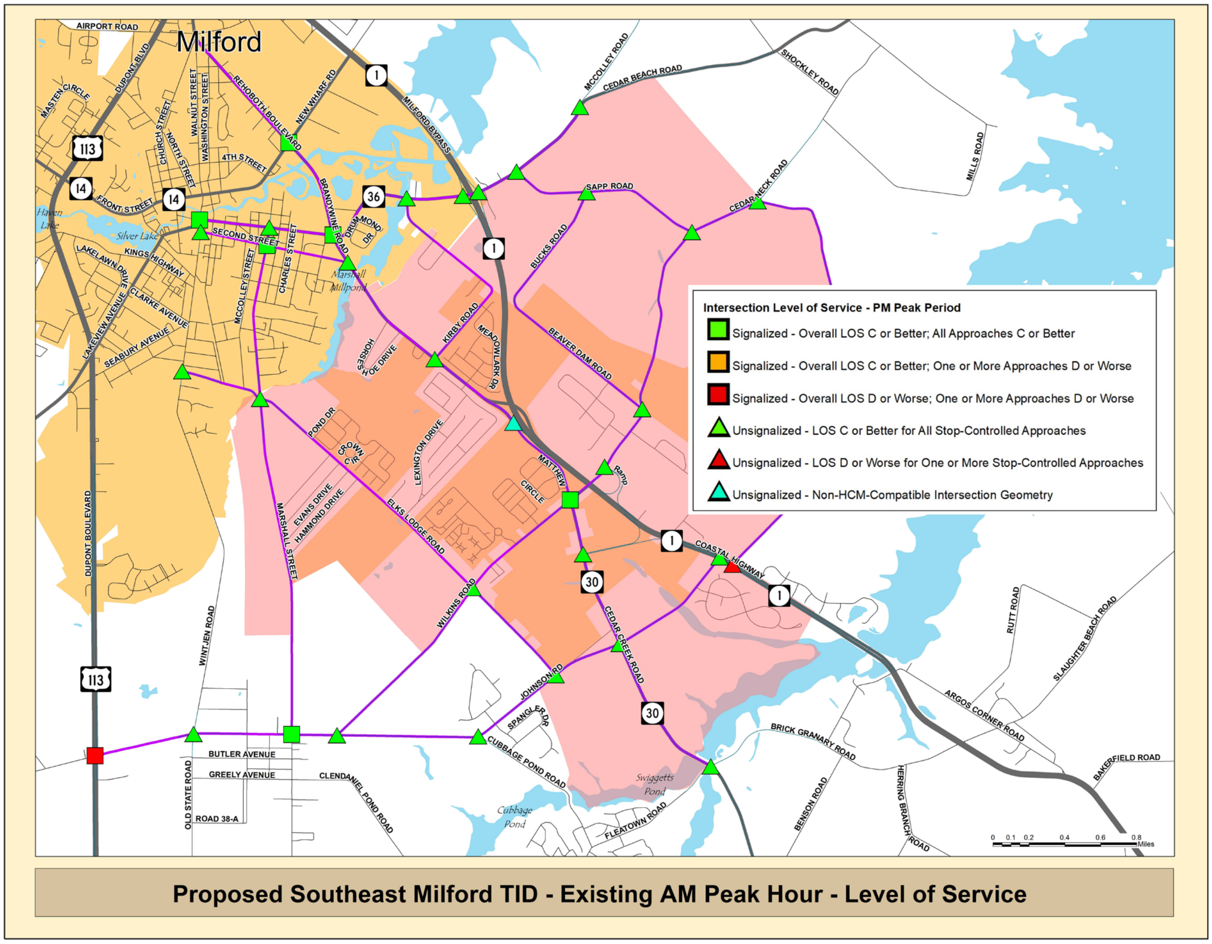
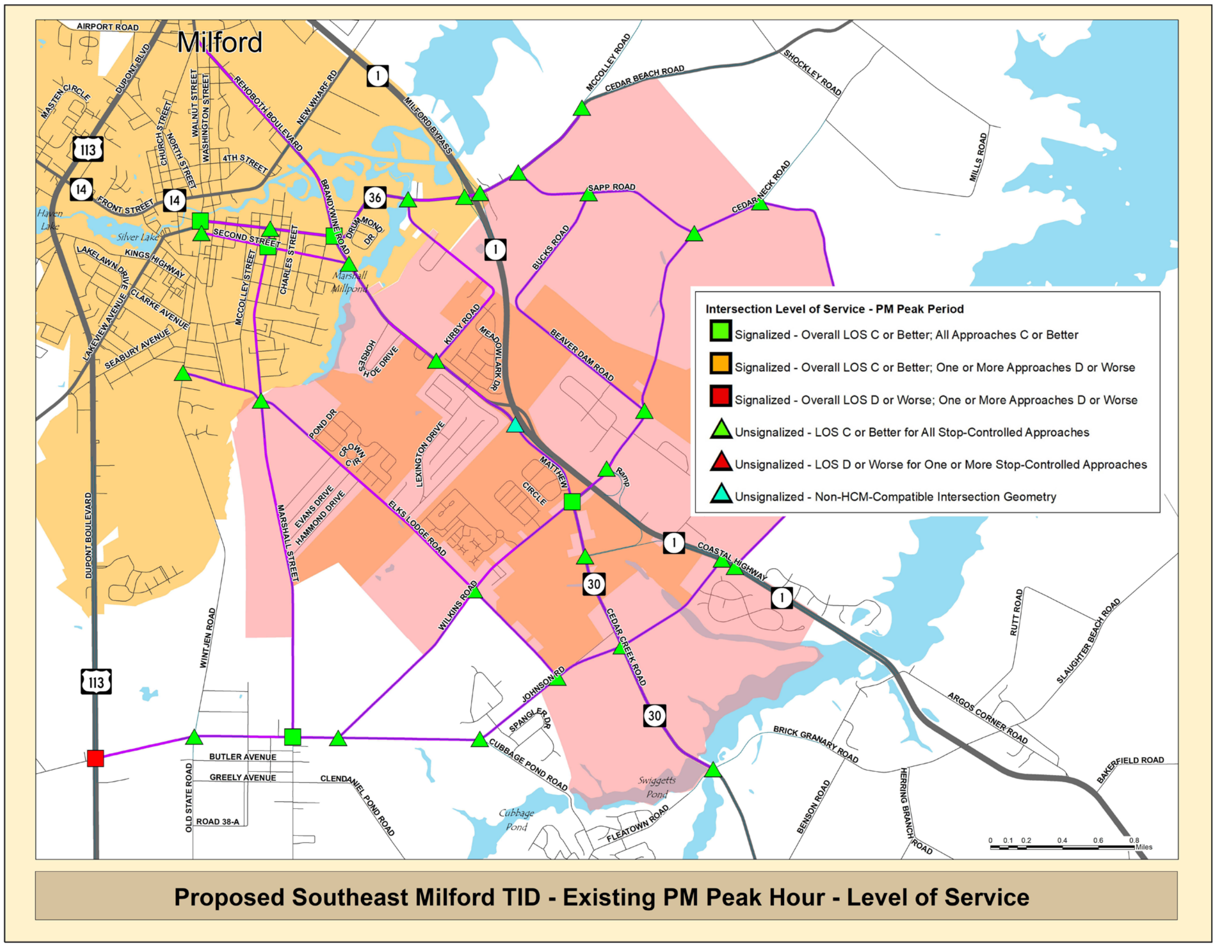


Figure 5. PM Peak Hour Level of Service



Intersection Approaches with Level of Service D or Worse

Highway Capacity Manual (HCM 2010) software reports were generated through the Synchro traffic model software to provide detailed descriptions of operations for each intersection in the TID study area. The following tables provide information related to intersections containing one or more approaches with a Level of Service (LOS) D or worse.

US 113 & Fitzgeralds Rd/Johnson Rd

- Overall intersection LOS = C (AM & PM)
- Fitzgeralds Rd and Johnson Rd approaches
  - LOS E & F (AM)
  - LOS E & E (PM)
  - Limited geometric capacity and limited green time due to US 113 green time demands

Table 8.

US 113 & Fitzgeralds Rd / Johnson Rd - AM Level of Service Results

HCM 2010 Signalized Intersection Summary
1: US 113 & Fitzgeralds Rd/Johnson Rd

06/27/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	51	25	95	52	82	13	554	43	45	665	10
Future Volume (veh/h)	10	51	25	95	52	82	13	554	43	45	665	10
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1782	1881	1900	1731	1727	1900	1759	1792	1810	1743	1727
Adj Flow Rate, veh/h	12	64	0	109	60	0	14	602	0	48	707	0
Adj No. of Lanes	0	1	1	0	1	1	1	2	1	1	2	1
Peak Hour Factor	0.80	0.80	0.80	0.87	0.87	0.87	0.92	0.92	0.92	0.94	0.94	0.94
Percent Heavy Veh, %	8	8	1	13	13	10	0	8	6	5	9	10
Cap, veh/h	15	82	88	117	64	159	28	1926	878	61	1974	875
Arrive On Green	0.05	0.05	0.00	0.11	0.11	0.00	0.02	0.58	0.00	0.04	0.60	0.00
Sat Flow, veh/h	279	1488	1599	1081	595	1468	1810	3343	1524	1723	3312	1468
Grp Volume(v), veh/h	76	0	0	169	0	0	14	602	0	48	707	0
Grp Sat Flow(s),veh/h/ln	1768	0	1599	1677	0	1468	1810	1671	1524	1723	1656	1468
Q Serve(g_s), s	5.1	0.0	0.0	12.0	0.0	0.0	0.9	11.2	0.0	3.3	13.2	0.0
Cycle Q Clear(g_c), s	5.1	0.0	0.0	12.0	0.0	0.0	0.9	11.2	0.0	3.3	13.2	0.0
Prop In Lane	0.16		1.00	0.64		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	97	0	88	182	0	159	28	1926	878	61	1974	875
V/C Ratio(X)	0.78	0.00	0.00	0.93	0.00	0.00	0.50	0.31	0.00	0.78	0.36	0.00
Avail Cap(c_a), veh/h	162	0	147	182	0	159	106	1926	878	201	1974	875
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	56.0	0.0	0.0	53.1	0.0	0.0	58.6	13.2	0.0	57.4	12.4	0.0
Incr Delay (d2), s/veh	12.7	0.0	0.0	47.1	0.0	0.0	13.0	0.4	0.0	19.0	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	0.0	0.0	7.9	0.0	0.0	0.6	5.2	0.0	1.9	6.1	0.0
LnGrp Delay(d),s/veh	68.7	0.0	0.0	100.2	0.0	0.0	71.6	13.6	0.0	76.4	12.9	0.0
LnGrp LOS	E			F			E	B		E	B	
Approach Vol, veh/h		76			169			616			755	
Approach Delay, s/veh		68.7			100.2			14.9			17.0	
Approach LOS		E			F			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.3	77.1		13.6	6.9	79.5		20.0
Change Period (Y+Rc), s	5.0	8.0		7.0	5.0	8.0		7.0
Max Green Setting (Gmax), s	14.0	55.0		11.0	7.0	62.0		13.0
Max Q Clear Time (g_c+I1), s	5.3	13.2		7.1	2.9	15.2		14.0
Green Ext Time (p_c), s	0.0	9.8		0.1	0.0	9.9		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	27.3
HCM 2010 LOS	C

Table 9.

US 113 & Fitzgeralds Rd / Johnson Rd - PM Level of Service Results

HCM 2010 Signalized Intersection Summary
1: US 113 & Fitzgeralds Rd/Johnson Rd 06/28/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	46	22	52	64	79	22	750	98	109	736	18
Future Volume (veh/h)	11	46	22	52	64	79	22	750	98	109	736	18
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1840	1827	1900	1881	1863	1900	1792	1881	1863	1810	1900
Adj Flow Rate, veh/h	13	56	0	65	80	0	26	893	0	124	836	0
Adj No. of Lanes	0	1	1	0	1	1	1	2	1	1	2	1
Peak Hour Factor	0.82	0.82	0.82	0.80	0.80	0.80	0.84	0.84	0.84	0.88	0.88	0.88
Percent Heavy Veh, %	4	4	4	1	1	2	0	6	1	2	5	0
Cap, veh/h	17	73	76	78	96	149	44	1862	874	150	2089	981
Arrive On Green	0.05	0.05	0.00	0.09	0.09	0.00	0.02	0.55	0.00	0.08	0.61	0.00
Sat Flow, veh/h	343	1480	1553	825	1015	1583	1810	3406	1599	1774	3438	1615
Grp Volume(v), veh/h	69	0	0	145	0	0	26	893	0	124	836	0
Grp Sat Flow(s),veh/h/ln	1823	0	1553	1840	0	1583	1810	1703	1599	1774	1719	1615
Q Serve(g_s), s	4.5	0.0	0.0	9.3	0.0	0.0	1.7	19.3	0.0	8.3	15.1	0.0
Cycle Q Clear(g_c), s	4.5	0.0	0.0	9.3	0.0	0.0	1.7	19.3	0.0	8.3	15.1	0.0
Prop In Lane	0.19		1.00	0.45		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	90	0	76	173	0	149	44	1862	874	150	2089	981
V/C Ratio(X)	0.77	0.00	0.00	0.84	0.00	0.00	0.59	0.48	0.00	0.82	0.40	0.00
Avail Cap(c_a), veh/h	167	0	142	199	0	172	106	1862	874	207	2089	981
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	56.4	0.0	0.0	53.4	0.0	0.0	58.0	16.7	0.0	54.0	12.2	0.0
Incr Delay (d2), s/veh	12.9	0.0	0.0	23.2	0.0	0.0	12.2	0.9	0.0	17.2	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.0	0.0	5.8	0.0	0.0	1.0	9.3	0.0	4.8	7.4	0.0
LnGrp Delay(d),s/veh	69.3	0.0	0.0	76.6	0.0	0.0	70.2	17.6	0.0	71.2	12.8	0.0
LnGrp LOS	E			E			E	B		E	B	
Approach Vol, veh/h		69			145			919			960	
Approach Delay, s/veh		69.3			76.6			19.1			20.3	
Approach LOS		E			E			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.2	73.6		12.9	7.9	80.9		18.3
Change Period (Y+Rc), s	5.0	8.0		7.0	5.0	8.0		7.0
Max Green Setting (Gmax), s	14.0	55.0		11.0	7.0	62.0		13.0
Max Q Clear Time (g_c+I1), s	10.3	21.3		6.5	3.7	17.1		11.3
Green Ext Time (p_c), s	0.1	13.8		0.1	0.0	15.1		0.1

Intersection Summary			
HCM 2010 Ctrl Delay			25.3
HCM 2010 LOS			C

SR 1 & Sharps Rd

- Sharps Rd approach
  - LOS D (AM)
  - Limited geometric capacity and limited gaps on SR 1 due to high traffic volumes and median cross-over requirement to access southbound SR 1

Table 10.
SR 1 & Sharps Rd - AM Level of Service Results

HCM 2010 TWSC
3: SR 1 & Sharps Rd
06/27/2018

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	7	845	885	0	5	5
Future Vol, veh/h	7	845	885	0	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	300	-	-	650	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	91	91	50	50
Heavy Vehicles, %	14	8	2	0	0	20
Mvmt Flow	9	1030	973	0	10	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	973	0	-	0	1505	486
Stage 1	-	-	-	-	973	-
Stage 2	-	-	-	-	532	-
Critical Hdwy	4.38	-	-	-	6.8	7.3
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.34	-	-	-	3.5	3.5
Pot Cap-1 Maneuver	635	-	-	-	114	482
Stage 1	-	-	-	-	332	-
Stage 2	-	-	-	-	559	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	635	-	-	-	112	482
Mov Cap-2 Maneuver	-	-	-	-	112	-
Stage 1	-	-	-	-	332	-
Stage 2	-	-	-	-	551	-

Approach	EB	WB	SW
HCM Control Delay, s	0.1	0	27.2
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	635	-	-	-	182
HCM Lane V/C Ratio	0.013	-	-	-	0.11
HCM Control Delay (s)	10.7	-	-	-	27.2
HCM Lane LOS	B	-	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Bicycle Facilities

Increasing the safe and efficient use of bicycles as an alternative mode of transportation is a high priority within the Delaware Department of Transportation. Recently, as part of its Bicycle Master Plan update, DelDOT adopted a new way of ranking bicycle suitability on the state roadway network. Known as "Bicycle Level of Traffic Stress (LTS)", this approach looks at our roadways through the perspective of a potential rider and their respective comfort levels related to using a bicycle for their transportation needs.

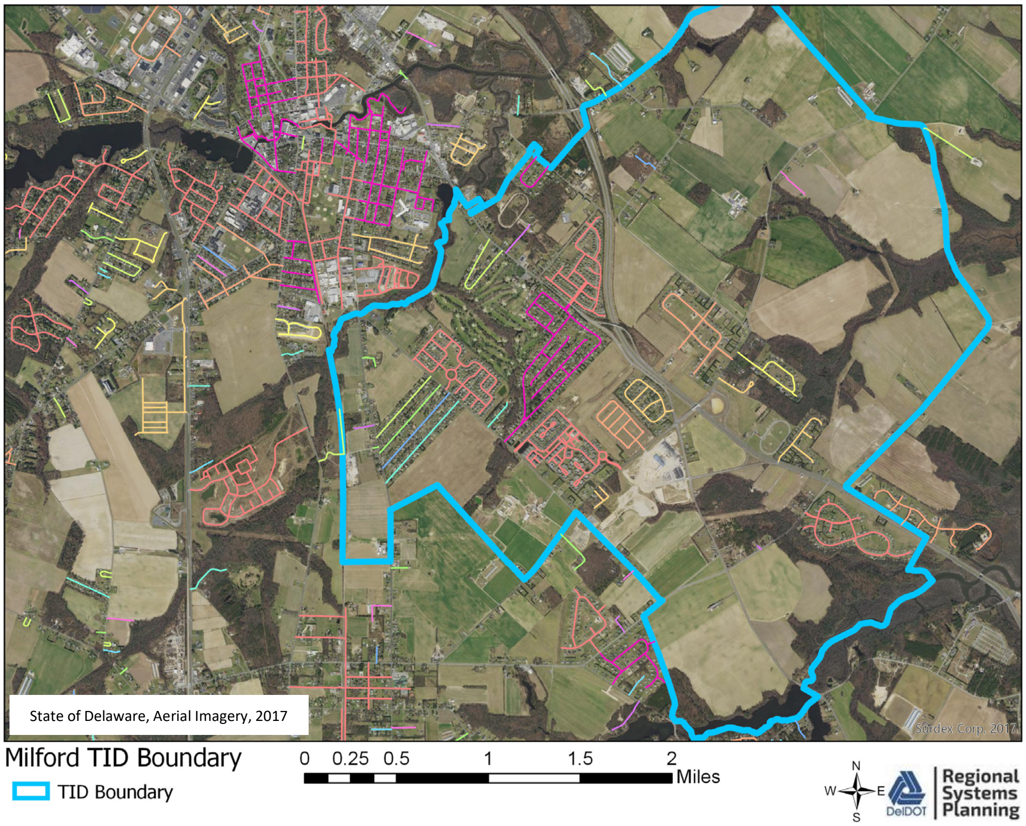
Bicycle Level of Traffic Stress (LTS) takes into account the number of lanes, size of the shoulder, traffic volume, and the speed limit. LTS shows how comfortable a biker would be traveling on a road. A LTS of Level 1 would be very comfortable for a biker, and they may feel comfortable enough to include 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 Traffic 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 lanes are on roads considered level 3 or 4.

Figure 6. Bicycle Level of Traffic Stress (LTS)

Figure 7. TID Study Area - Bicycle Level of Traffic Stress (LTS)

Connectivity between similarly classified LTS bicycle facilities are an important factor in encouraging bicycle usage because potential riders often want to maximize trip lengths based on the LTS facility that best matches their individual comfort level. Within the proposed TID boundary there are significant clusters or "islands" of LTS 1 facilities but very little connectivity between those clusters. The identification of barriers or impediments between these islands will be an important first step in developing mitigation strategies to improve the bicycle friendliness within the proposed TID study area.

Figure 8. TID Study Area - Bicycle Level of Traffic Stress (LTS) – LTS 1 "Islands"



The map above shows bicycling "islands."

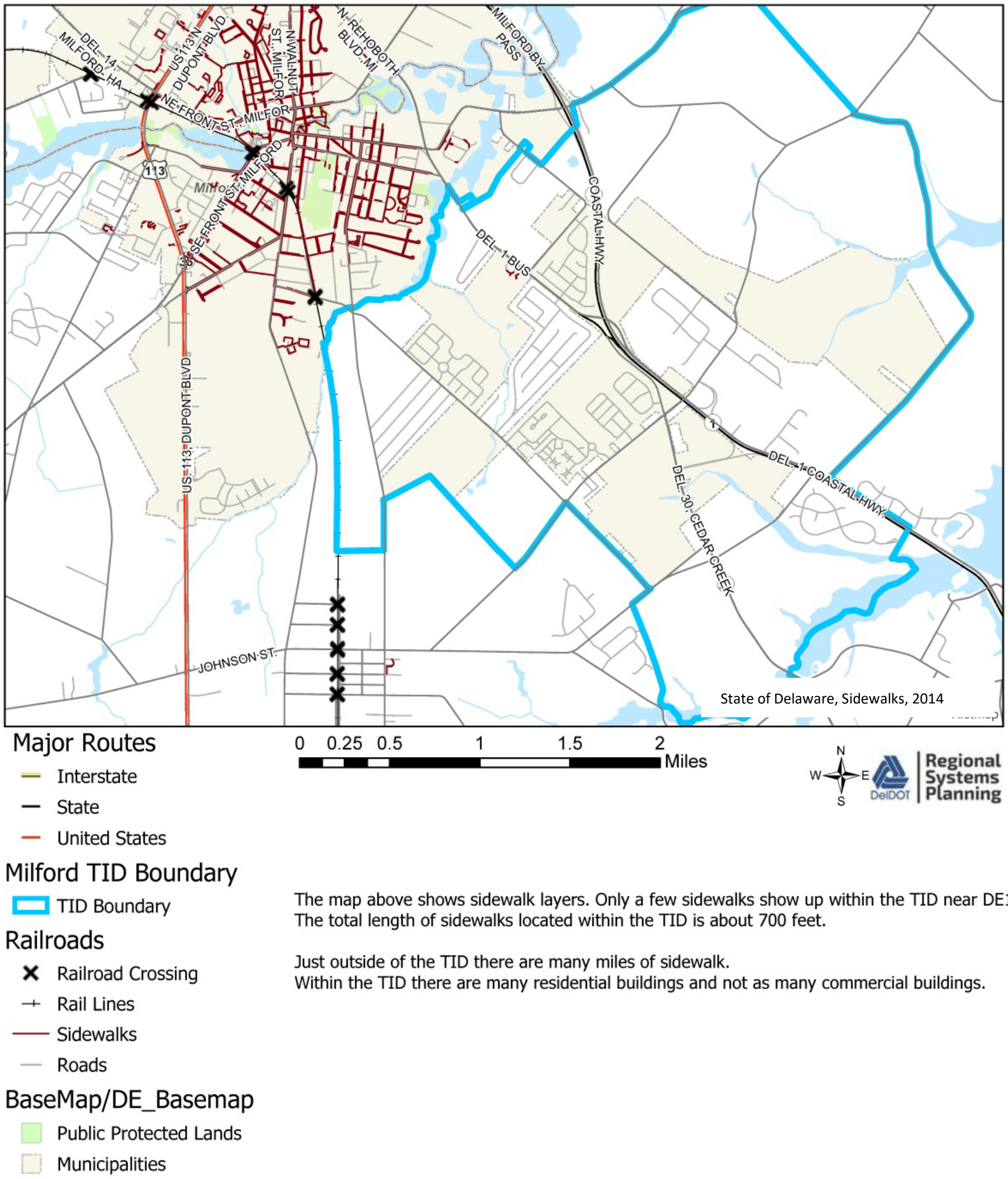
These islands are clusters or networks of navigable paths of the same dificulty.

Lines that are connected and have the same color are a part of the same island.

Pedestrian Facilities

Pedestrian facilities also play a vital role in providing connections from home to other amenities such as school, employment centers, and recreation. DelDOT is highly invested in increasing the number of sidewalks and multi-use trails constructed throughout the state as both stand alone and companion projects to its capital roadway projects. Supporting the disabled community by removing mobility barriers is also a priority that is carried out through requirements found in the Americans with Disabilities Act (ADA).

Figure 9. TID Study Area – Pedestrian Facilities



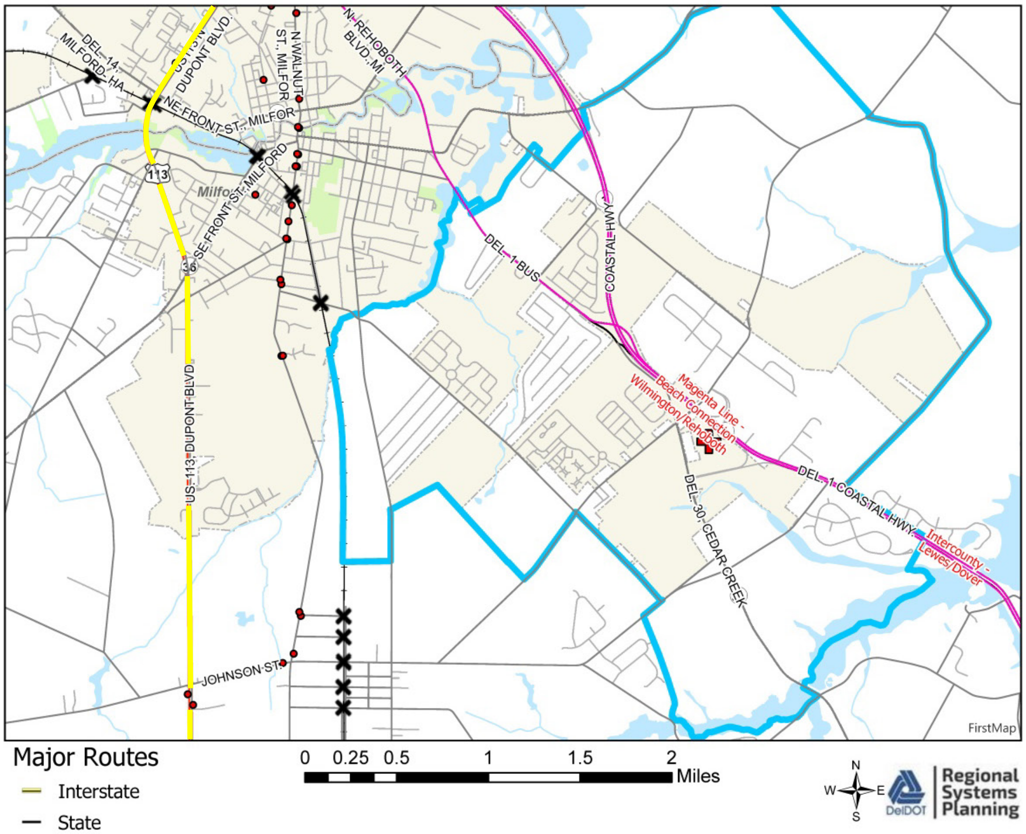
The map above shows sidewalk layers. Only a few sidewalks show up within the TID near DE1 Business. The total length of sidewalks located within the TID is about 700 feet.

Just outside of the TID there are many miles of sidewalk.
Within the TID there are many residential buildings and not as many commercial buildings.

Public Transit Facilities

The Intercounty-Lewes/Dover route serves as the primary existing bus route currently operating within the proposed Milford TID boundary. The Intercounty-Dover/Georgetown bus route provides service to the west and north of the TID along US 113, South Walnut St, West Clarke Ave, and NE Front St. The Delaware Transit Corporation is also actively developing a plan to provide new transit service to the Bayhealth Hospital and medical facility when opened.

Figure 10. TID Study Area – Public Transit Facilities



Proposed bus stop location at the new medical center

Additional Transportation Analysis

Following an expected agreement to move forward with the proposed TID, DelDOT will conduct an inventory of additional transportation infrastructure within the study area for the purpose of developing preliminary project concept recommendations. The inventory consists of the following sample components and selected data categories:

(1) Roadway Data
- DelDOT Road Rating (pavement condition)

(2) Roadway Conditions
- Presence or absence of shoulders and shoulder material
- Shoulder width
- Americans with Disabilities Act (ADA) ramp condition
- Drainage
- Lighting
- Above ground utility conflicts
- Intersection geometry

(3) Design Elements
- Assessment of existing roadway curvatures for compatibility with the American Association of State Highway and Transportation Officials (AASHTO) guidance as found in the "A Policy on the Geometric Design of Highways and Streets".

(4) Potential for Future Development
- Identification of tax parcels and properties that contain existing site plans or appear to be amenable for future development activity.

Proposed Milford TID - Existing Conditions Report - Conclusion

Milford has been very proactive in working with the community to develop a comprehensive future vision for the southeastern area of the City. DelDOT is posed to assist in this effort through the successful implementation of a Transportation Improvement District that will bring together both land use and transportation elements in a way that benefits both parties and the private sector development community.

While there are some current challenges with the existing transportation network, the TID study area is nevertheless fortunate in that there is a unique opportunity to plan for and mitigate any future landuse related transportation impacts before they occur. The development of a Master Plan for the area prior to the establishment of the TID has provided a valuable blueprint for how DelDOT and the City can approach the challenges and opportunities of balancing new economic growth while still maintaining and building an efficient transportation network that benefits all of its users.

Next Steps

This report provides an overall view of existing operating conditions within the Milford TID boundary. The following provides a list and status of next steps as they relate to the Department and the County's respective responsibilities:

1. DelDOT, the City of Milford 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.
   Status: Ongoing

2. The City of Milford and Sussex County provides DelDOT with parcel based land use data inventory, including estimated future households and/or employment square footage, within the study area.
   Status: Ongoing

3. DelDOT, the City of Milford and Sussex County enter into a formal agreement to proceed with the Milford Transportation Improvement District.
   Status: Incomplete

4. DelDOT technical team conducts physical inventory of study area transportation assets/constraints and provides preliminary project concepts in advance of final future year-build-out land scenario modeling analysis.
   Status: Incomplete

5. DelDOT technical team completes transportation modeling and analysis of future year build-out land use scenarios and develops project recommendations and financial implementation plan for TID.
   Status: Incomplete