SOUTHERN NEW CASTLE COUNTY MASTER PLAN

TRANSPORTATION ELEMENT

September 2020

Wilmington Area Planning Council

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RESOLUTION

BY THE WILMINGTON AREA PLANNING COUNCIL (WILMAPCO) TO ENDORSE THE SOUTHERN NEW CASTLE COUNTY MASTER PLAN

WHEREAS, the Wilmington Area Planning Council (WILMAPCO) has been designated the Metropolitan Planning Organization (MPO) for Cecil County, Maryland and New Castle County, Delaware by the Governors of Maryland and Delaware, respectively; and

WHEREAS, the WILMAPCO Council recognizes that comprehensive planning for future land use, transportation, sustainable economic development, environmental protection and enhancement, and community health and livability are necessary actions to implement the goals and objectives in the 2050 Regional Transportation Plan (RTP); and

WHEREAS, the New Castle County Department of Land Use and DelDOT requested that WILMAPCO coordinate with them to develop a land use and transportation master plan for Southern New Castle County; and

WHEREAS, the Southern New Castle County Master Plan assessed existing demographic, land use, environmental, traffic, and market conditions; and

WHEREAS, the Southern New Castle County Master Plan employed continuous and rigorous public engagement throughout the planning process; and

WHEREAS, the Southern New Castle Master Plan puts forth recommendations which will spur economic development, correct unhealthy land use patterns, mitigate community health concerns, improve the multimodal transportation network, preserve community character, and, generally, spur mixed-use and mixed income reinvestment and redevelopment opportunities;

NOW, THEREFORE, BE IT RESOLVED that the Wilmington Area Planning Council does hereby endorse the final report and recommendations of the Southern New Castle County Master Plan.

9/10/2020
Date:

John Sisson, Chairperson
Wilmington Area Planning Council

Table of Contents

Introduction 3
Outreach and Planning Process 3
Transportation: Existing Conditions and Programs 5
Non-Motorized Facilities and Level of Traffic Stress (LTS) Analysis 8
Safety 12
Scenario Analysis 148
Transportation Recommendations 23
Transit Recommendations 26
Non-Motorized Recommendations 27
Aviation Recommendations 29
Implementation and Next steps 30

LIST OF FIGURES

Figure 1: SNCC Road Functional Classification 5
Figure 2: Average Daily Traffic Volumes 6
Figure 3: Transit Route Ridership 7
Figure 4: Existing Transit Routes 7
Figure 5: Non-Motorized Inventory 8
Figure 6: Level of Traffic Stress for Bicycling. 9
Figure 7: Mode Share to Work: 2000 10
Figure 8: Mode Share to Work: 2016 10
Figure 9: Journey to Work, Year 2015 11
Figure 10: Total Crashes by Road Segment 12
Figure 11: Peak Period Level of Service: 2015 13
Figure 12: 2050 AADT for Land Use Scenarios 15
Figure 13: Forecast Levels of Service for Scenarios 16
Figure 14: 2015 Households 18
Figure 15: Change in Households: 2015-2050 18
Figure 16: 2015 Employment 19
Figure 17: Change in Employment 2015 -2050 19
Figure 18: Phase 2 Study Intersections 21
Figure 19: Planned Improvements - SNCC 23
Figure 20: Signal Re-Timings in Middletown Area 25
Figure 21: DART Route Service Changes 26
Figure 23: Bike Plan Recommendations 28
Figure 22: Future Route Concepts 27
Figure 23: Bike Plan Recommendations 28

LIST OF TABLES

Table 1: Level of Traffic Stress Definitions 9
Table 2: Changes in Mode Share to Work: 2000 vs 10
Table 3: Journey to Work Trends 11
Table 4: Annual Crash Trends by Type 12
Table 5: Land Use Components of Scenario Analysis 15
Table 6: Level of Service Volume to Capacity Ratio 16
Table 7: Improvements Assumed at Study Intersections 17

Introduction

The Southern New Castle County Master Plan establishes a long-term vision for land use and infrastructure in southern New Castle County (NCC) based on sound planning principles and public input. The plan informs development, preservation, infrastructure, and policy decisions in the study area (described in the next paragraph). The findings and recommendations from this plan will be incorporated into the New Castle County Comprehensive Development Plan (2012 Update) and subsequently carried forward into the 2022 New Castle County Comprehensive Development Plan. The results of this plan will also be used to inform the Wilmington Area Planning Council (WILMAPCO) Regional Transportation Plan and the Delaware Department of Transportation (DelDOT) Capital Transportation Program.

The southern New Castle County planning area is composed of the area south of the Chesapeake and Delaware Canal, amounting to roughly 40 percent of the total land area in the county and 11 percent of the population. The study area includes the incorporated towns of Middletown, Odessa, and Townsend (MOT) which are located fully within New Castle County. Small portions of Smyrna and Clayton are also located within the county.

Outreach and Planning Process

The Southern New Castle County Master Plan was informed by an extensive public engagement process that included four in-person public workshops, two virtual workshops, social media promotion, a highly interactive online survey, and an Advisory Committee comprised of public and private stakeholders that included civic and other community associations, state and local agencies, elected officials and business owners who all guided the entire process. A list of Advisory Committee member organizations and a summary of the public outreach process is included below:

ADVISORY COMMITTEE REPRESENTATIVES

DE State Senator Stephanie Hansen
DE State Senator Nicole Poore
DE State Senator Bruce Ennis
DE State Representative Quinton Johnson
DE State Representative Kevin Hensley
DE State Representative Jeff Spiegelman
New Castle County Councilman David Carter
New Castle County Councilman James Bell
DNREC Climate and Sustainability Programs
Delaware Office of State Planning Coordination
Delaware Department of Transportation
New Castle County Department of Community Service
New Castle County Department of Land Use
New Castle County Department of Public Works
Citizens' Hose Company No. 1 (Smyrna)
Volunteer Hose Company of Middletown
Blackbird State Forest
Town of Middletown
Town of Odessa
Town of Smyrna
Town of Townsend
Appoquinimink School District
Colonial School District
St. Andrews School
Smyrna School District
MOT Charter School
Odessa Fire Company
Townsend Fire Company
Stone's Throw Church
Crossroads Presbyterian Church
Connection Community Church
St. Joseph Parish
Ringgold Chapel AME Church
Trinity AME Church
LifeHouse Church
Southern NCC Residents
MOT Chamber of Commerce
Christiana Care
Clifton L. Bakhsh, Jr. Inc.
Committee of 100
Hoober Tractor
Southern States
Summit Aviation
Willey Farms
Delaware Nature Society
Ducks Unlimited
ShoreRivers
Delaware Wild Lands
Middletown Historical Society
Historic Odessa Foundation
Blenheim Homes
Whitehall
LC Homes
Reybold Homes

PUBLIC OUTREACH SUMMARY

- October 2018 – A Kickoff Meeting was held at the Odessa Fire Hall to introduce the Master Plan to the community and gather preliminary information.
- January and March 2019 – Visioning Sessions were held at Odessa and Middletown Fire Halls. During the sessions, existing conditions and growth trends were examined via a technical analysis; and goals, challenges, and assets were gathered via breakout group activities.
- June 2019 – A presentation was provided during a Public Workshop that highlighted a draft of the land use scenarios and projected the growth trends that informed their development. Community concerns were also discussed during this meeting.
- September 2019 – A summary document that included community feedback was shared online and promoted via social media and an email newsletter.
- October 2019 – A Public Workshop was held at the Middletown Fire Hall to seek feedback on refined land use scenarios, and preliminary findings and recommendations. An online project story map and survey was created to help present the workshop content in an easily understood manner and collect public feedback.
- November 2019 – A draft of the plan was provided online. The draft contained the proposed preferred land use scenario, draft recommendations, and a description of the planning process and findings to date. Comments on the draft were received through December 2019.
- February 2020 – Developed and distributed an update and comment summary document.
- August 2020 – A Virtual Public Workshop was held to allow public review and comment on the draft recommendations of the transportation element of the plan.

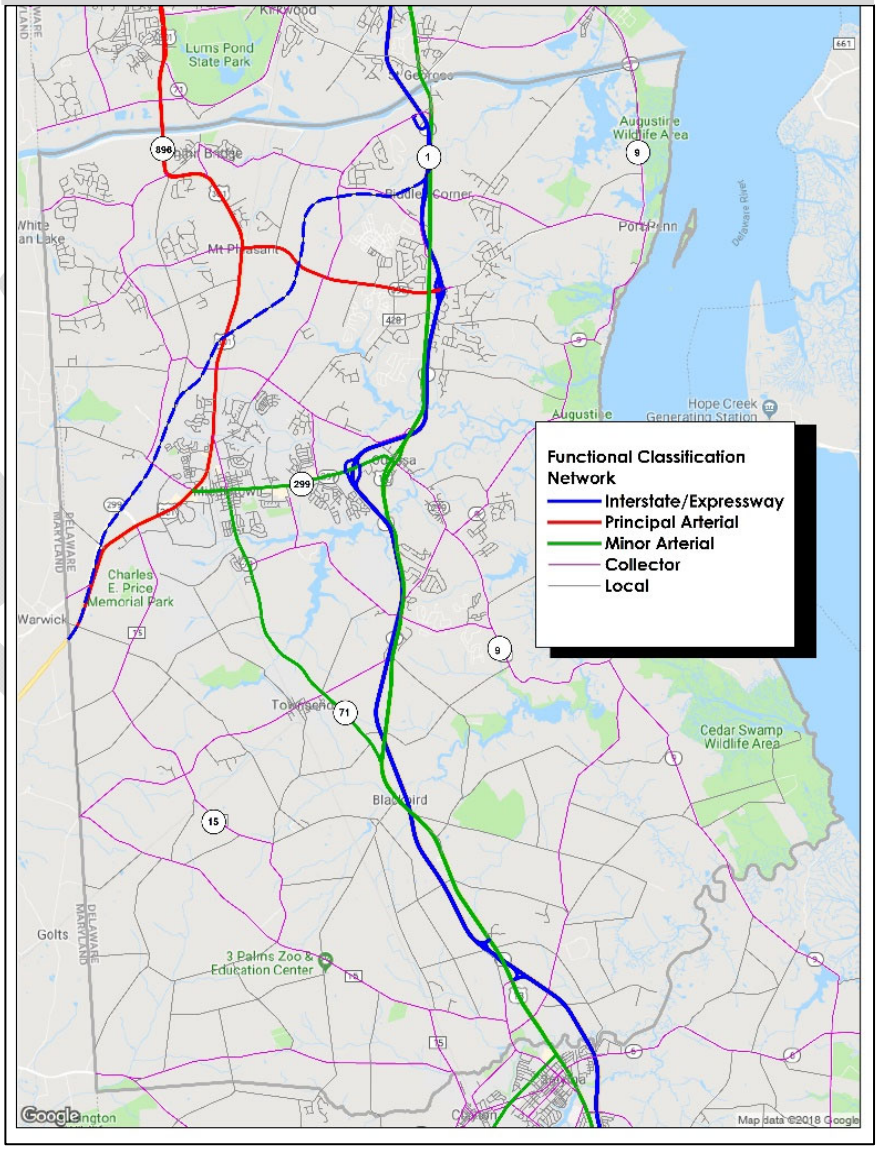
Social media and a project email distribution list were used to promote all opportunities to participate in the development of this plan, along with a project webpage on both the WILMAPCO and New Castle County websites. Targeted Facebook advertising and several project update emails were also sent throughout the study process.

Transportation: Existing Conditions and Programs

ROAD NETWORK

Roadways are grouped into classes, according to the character of service they are intended to provide (Figure 1). As specified by the Federal Highway Administration, the role a roadway should play in serving the flow of traffic through the network is defined by its functional classification. The classifications include: Freeway, Expressway, Principal or Major Arterial, Minor Arterial, Collector, and Local.

Figure 1: SNCC Road Functional Classification



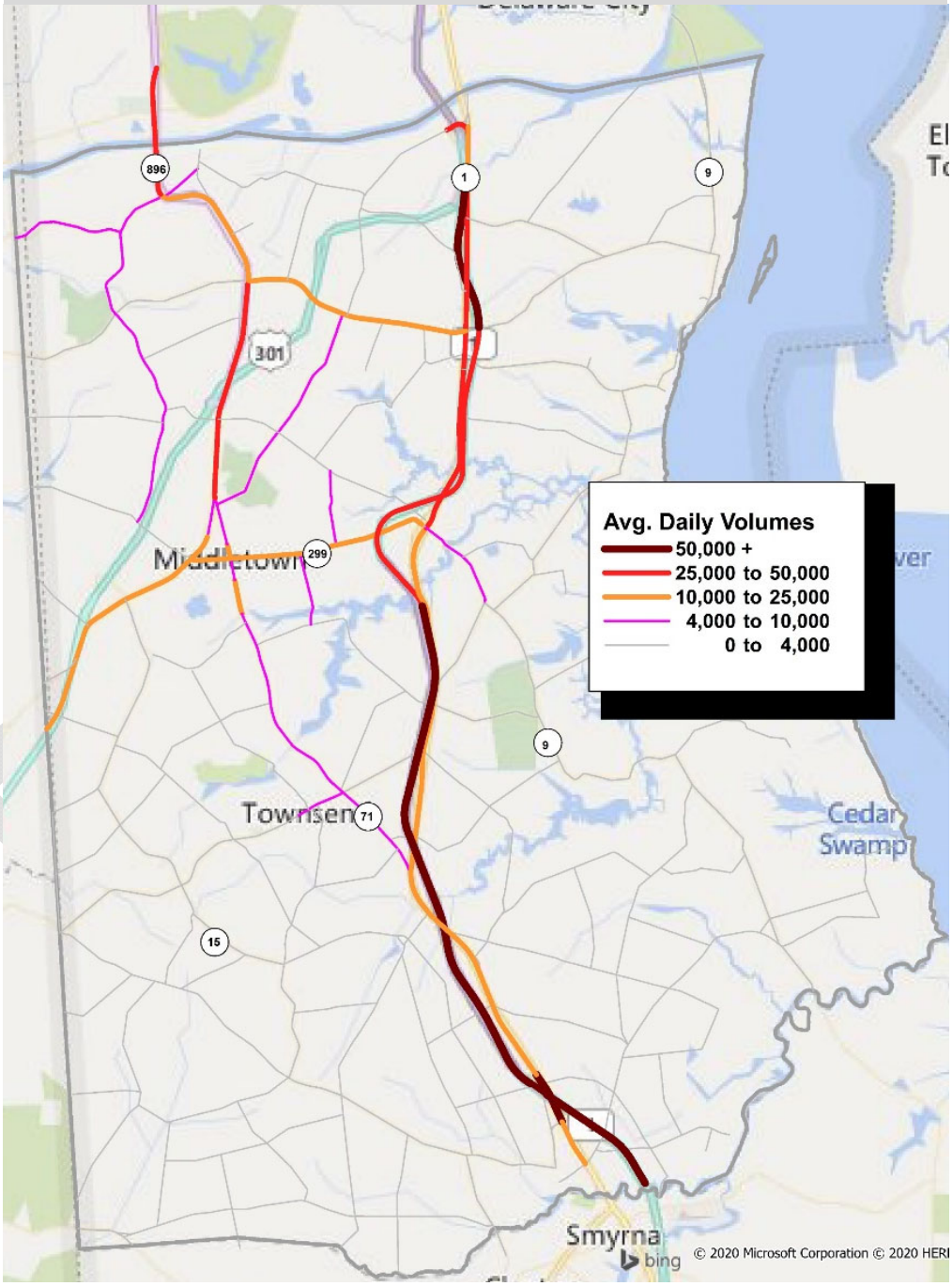
Arterials provide a high level of mobility and a greater degree of access control, while local facilities provide a high level of access to adjacent properties but a low level of mobility. Collector roadways provide a balance between mobility and land access as they connect the arterial roads to local roads and destinations. In southern New Castle County, several of the collector roads are in areas that have experienced, or will experience, significant amounts of residential development primarily in the area to the north of Middletown. Nearly half of all roads in the planning area are classified as local roads, most of which consist of subdivision streets.

US Route 301 in Delaware (DE) is a new limited-access toll highway that opened to traffic in January 2019. US 301 has a partial interchange with DE 1 providing for movements to and from the north on DE 1. US Route 301 in Delaware runs southwest to the Maryland border southeast of Warwick, with interchanges in Delaware at Jamison Corner Road, DE 71, and DE 299. The roadway is tolled in Delaware with all-electronic tolling. At the time of its opening, the toll for vehicles travelling through all four interchanges was $4.00 for passenger vehicles and $12.00 for trucks.

EXISTING TRAFFIC VOLUMES

Because roughly half of the roadway network in the study includes local roads, many of the roads carry a very low Average Annual Daily Traffic (AADT) volume, of less than 4,000 vehicles per day. The major north-south routes such as SR 896, US 13, and DE 1 carry the highest volumes, with portions of DE 1 carrying daily volumes in excess of 50,000 vehicles per day. The east-west routes like SR 299 and Boyd's Corner Road fall between the two extremes, carrying 10,000 to 25,000 vehicles each day.

Figure 2: Average Daily Traffic Volumes



NOTE: These volumes pre-date the construction of the new US 301 limited access road.

TRANSIT ROUTES AND RIDERSHIP

Currently, southern New Castle County is served by six transit routes. Route 301 Intercounty Service (Wilmington to Dover) is the most popular route for commuters, with strong ridership at the Park & Ride lots at Boyds Corner Road, SR 299 in Odessa, and in Smyrna. Route 302 is another Intercounty Route that operates between Newark and Dover and connects with Middletown. Route 43 operates as a circulator with local service between the SR 299 Odessa Park & Ride and western Middletown, with stops at Christiana Care, Dove Run, Middletown Crossing, Marketplace, Westown, and Amazon. Route 45 is another commuter route with service From the SR 299 Odessa Park & Ride to Christiana Mall and Wilmington. Route 47 is new to DART's Middletown service and operates as an employee shuttle for Amazon, originating in Wilmington with stops along the US 13 corridor before ending at the Amazon site. Route 120 provides direct service between the Smyrna Park & Ride and Dover. Due to the low population density in southern New Castle County, the Park & Ride lots along SR 1 have the most consistently strong ridership of all stops in the planning area: Boyds Corner (57 users/day), SR 299 Odessa (265 users/day) and Smyrna (199 riders/day). The bus stop at Merrimac Avenue serving Amazon also has higher ridership at 96 riders/day.

Figure 3: Transit Route Ridership*

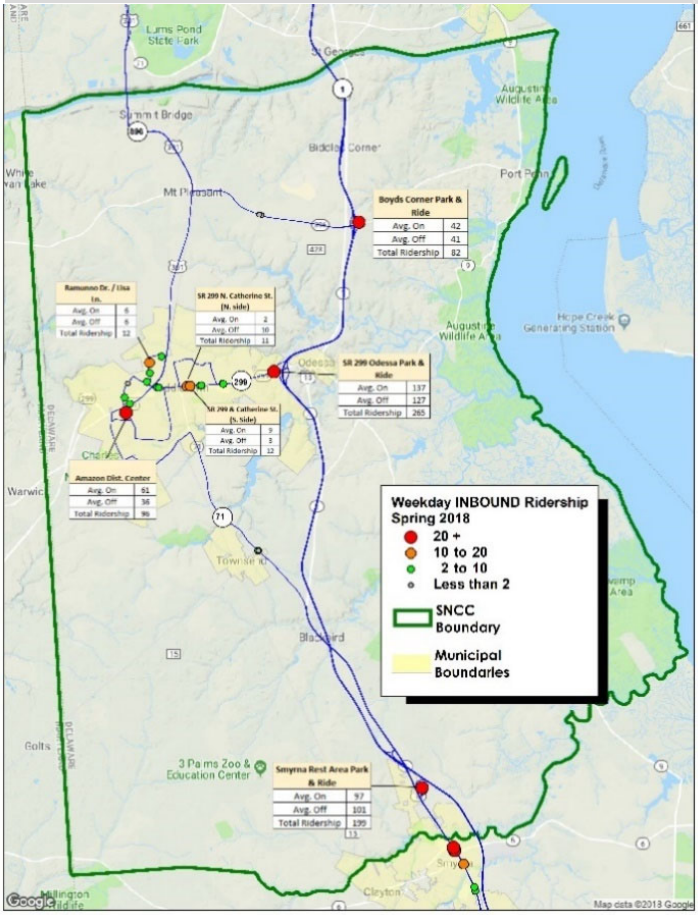
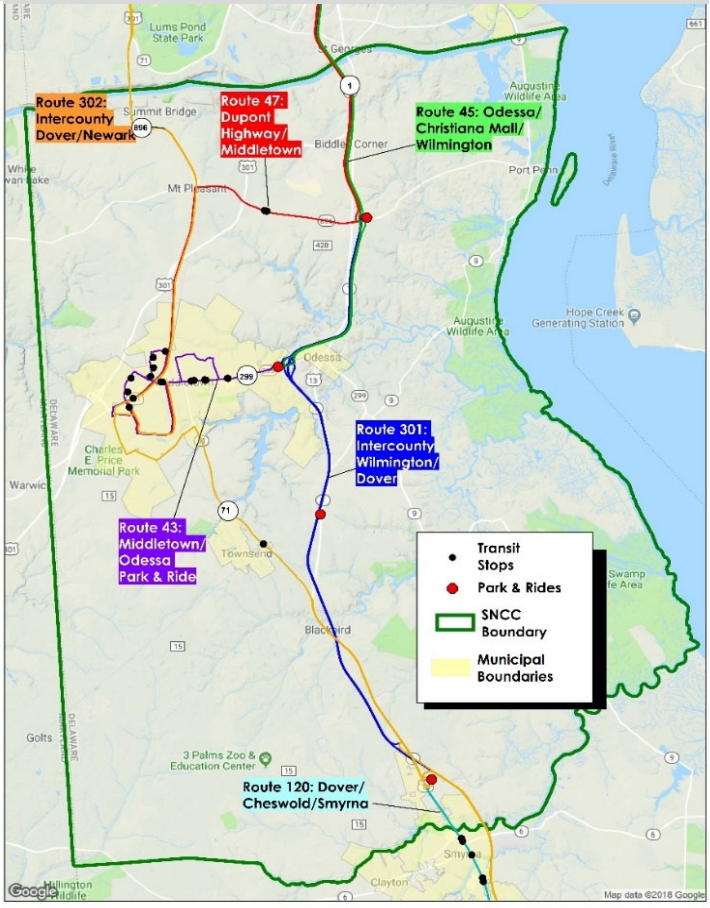


Figure 4: Existing Transit Routes

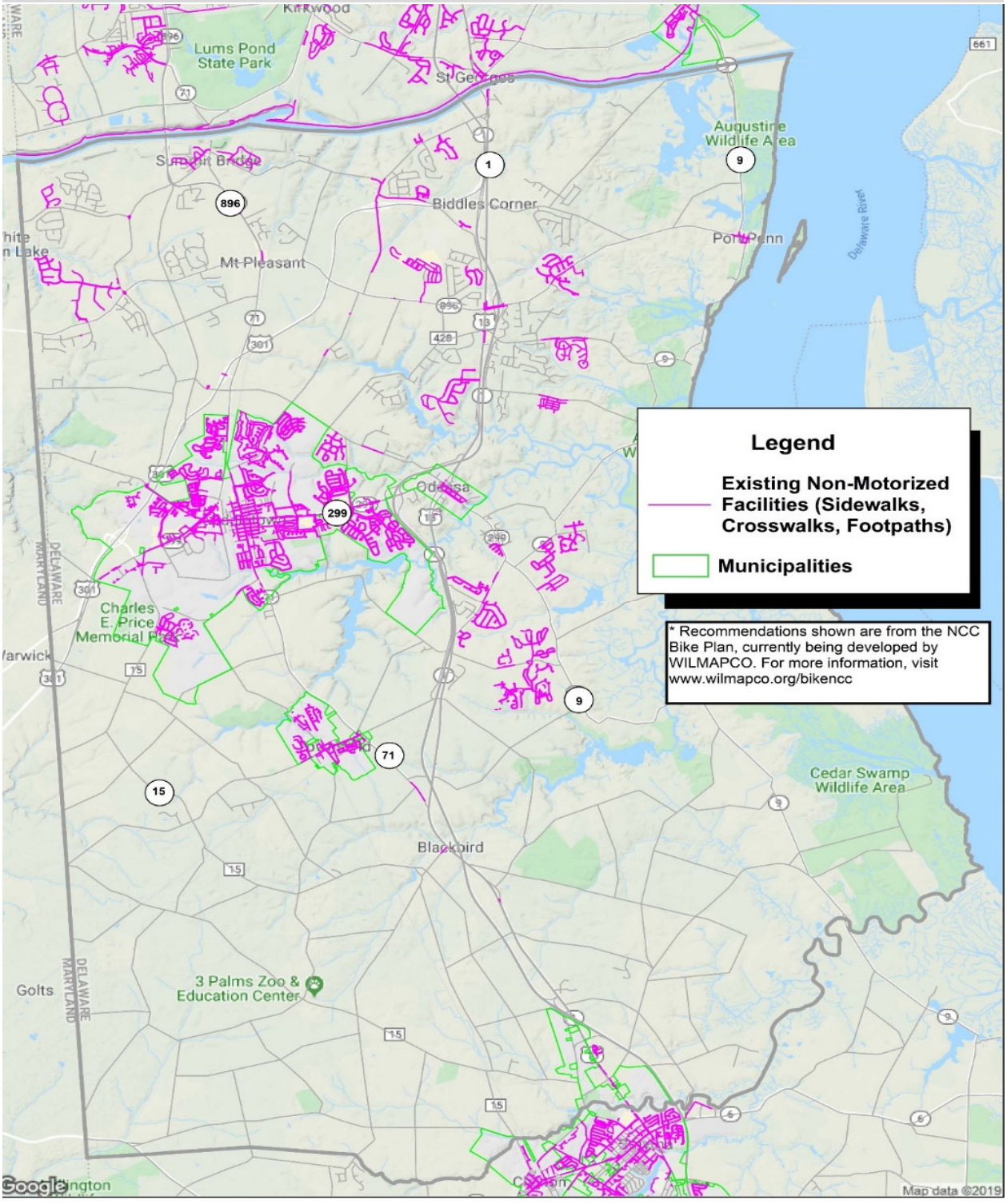


[3]*Transit stop usage is classified as the total number of riders who board and depart the bus at each stop. Ridership data provided by the Delaware Transit Corporation (DTC). Data being used in this analysis is from ridership data collected in May 2018, surveying weekday Inbound riders.

Non-Motorized Facilities and Level of Traffic Stress (LTS) Analysis

Using aerial photos, an inventory of all sidewalks, crosswalks and footpaths was developed for the study area. Most of the current non-motorized infrastructure is concentrated in the Town of Middletown and throughout several subdivisions completed in recent years, which included sidewalks and facilities along the roadway frontage.

Figure 5: Non-Motorized Inventory



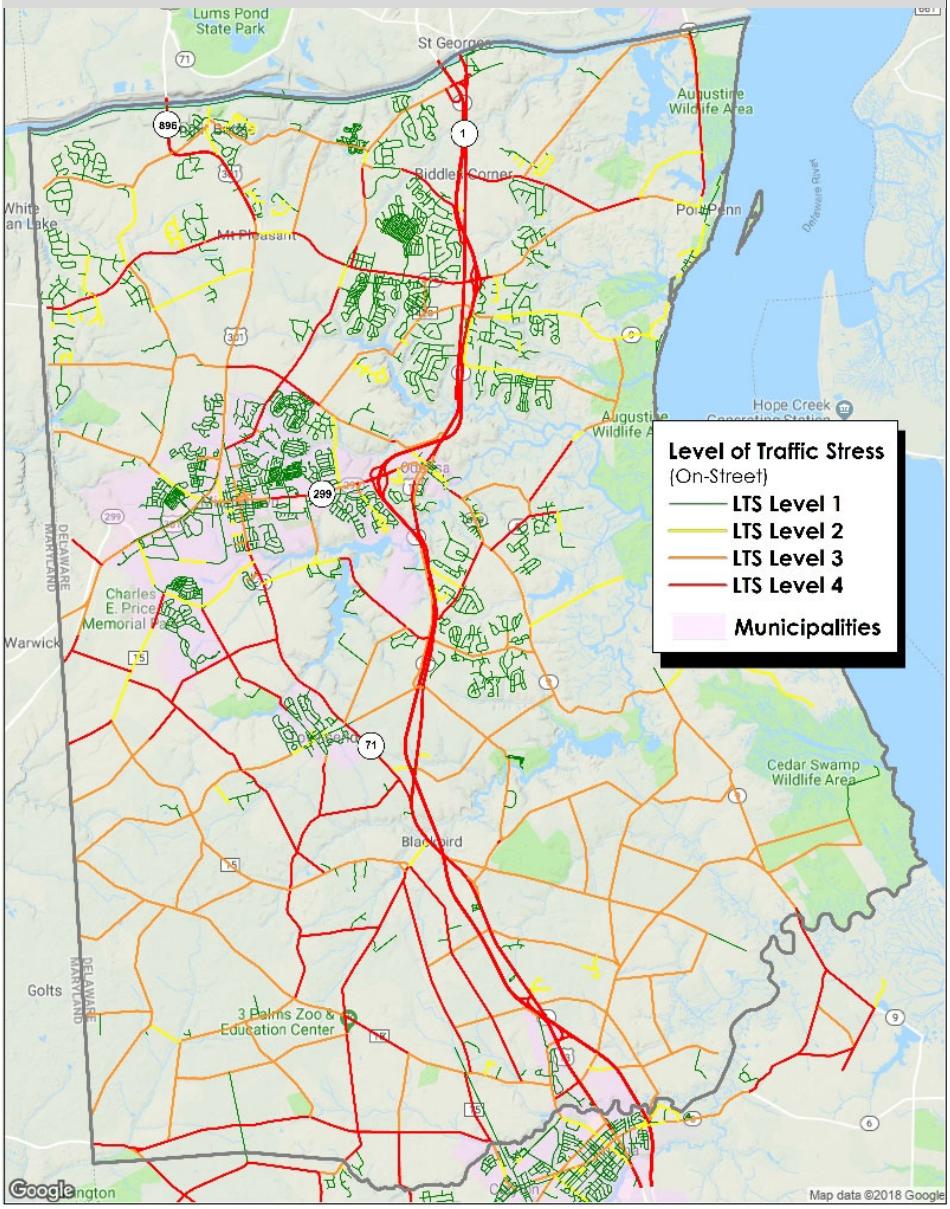
WILMAPCO has worked with DelDOT to map existing bicycle routes and score their "level of traffic stress" (LTS) to highlight places based on how comfortable they are for most cyclists. LTS is used to categorize roads by the type of riders who are willing to use them based on conditions such as traffic volume and speed, presence of bike lanes, bike lane width, and presence of a physical barrier between a bike lane and traffic. Ideally, a person would be able to comfortably ride a bike to most of their daily destinations via a network of low-stress streets and trails. Table 1 provides a brief description of levels of traffic stress.

Table 1: Level of Traffic Stress Definitions

LTS Level	Description
LTS Level 1	Most children can feel safe on these streets
LTS Level 2	The mainstream "interested but concerned" adult population will feel safe on these streets
LTS Level 3	Streets that are acceptable to the "enthused and confident" riders who still prefer having their own dedicated space
LTS Level 4	High stress streets with high speed limits, multiple travel lanes, limited or non-existent bikeways and long intersection crossing distances

As Figure 6 indicates, nearly half of all roads in the study area are classified as LTS Level 1. However, nearly all of these are limited to subdivision streets. Of the remaining network, roughly 44% fall into levels 3 and 4, which are suitable only for experienced riders or not suitable at all. As a result, connectivity between neighborhoods and other destinations can be difficult. Within the LTS analysis language, these are referred to as, "LTS Islands" as traversing from one neighborhood to another destination is impeded by travel on a route that is likely to be LTS Level 3 or 4.

Figure 6 Level of Traffic Stress for Bicycling



Worker Commute Trends by Mode

Southern New Castle County is an area of New Castle County that relies heavily on the single-occupant vehicle (SOV) for transportation. The US Census American Community Survey (ACS) asked respondents to give details about the characteristics of their commute to work. Below are some of the survey results for the SNCC population's commute to work, and the changes between 2000 and 2016.* Between 2000 and 2016, the mode share of those driving increased slightly, by roughly 2%. Those using public transportation represent less than 1% of the total travel to work for SNCC. The trend since 2000 has been an increase in SOV travel and decreases in carpool travel.

Figure 7: Mode Share to Work: 2000

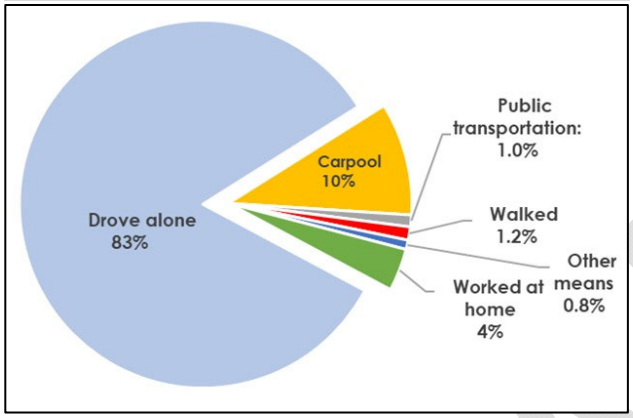
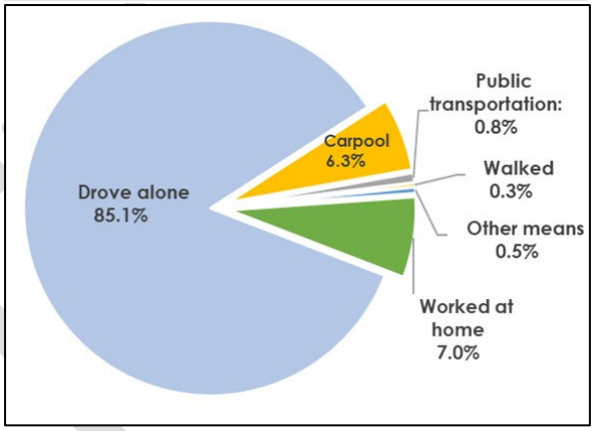


Figure 8: Mode Share to Work: 2016



Coupled with the increase in SOV travel has been an overall increase in the total number of workers in the study area. Since 2000, Southern New Castle County has seen over 12,000 new workers added to the population. As Table 2 indicates, the vast majority of these workers drive alone to work. Those who work at home also increased significantly since 2000.

Table 2: Changes in Mode Share to Work: 2000 vs. 2016

	2000	2016*	2000-2016 Changes
Total Workers	14,225	26,699	12,474
Drove alone	11,851	22,717	10,866
Carpool	1,412	1,675	263
Public transportation:	148	225	77
Walked	165	85	-80
Other means	117	140	23
Worked at home	532	1,857	1,325

Sources: US Census, American Community Survey
* ACS figures from 2012-2016 5-year estimate

Worker Commute Travel Flows

Southern New Castle County functions as a "bedroom community" for the rest of County and the surrounding areas. This has been a growing trend over the last several years and is illustrated by the large increases in the number of workers added to the SNCC population. In 2005, SNCC was home to approximately 17,000 workers. That number grew to over 27,000 workers by 2015. Each day these workers in SNCC travel to multiple destinations in the region. Figure 9 shows where most of the workers in SNCC commuted to work in 2015.

As the map to the right indicates, only 14% of SNCC residents work within the MOT planning district, which has the same boundary as the study area for this plan.

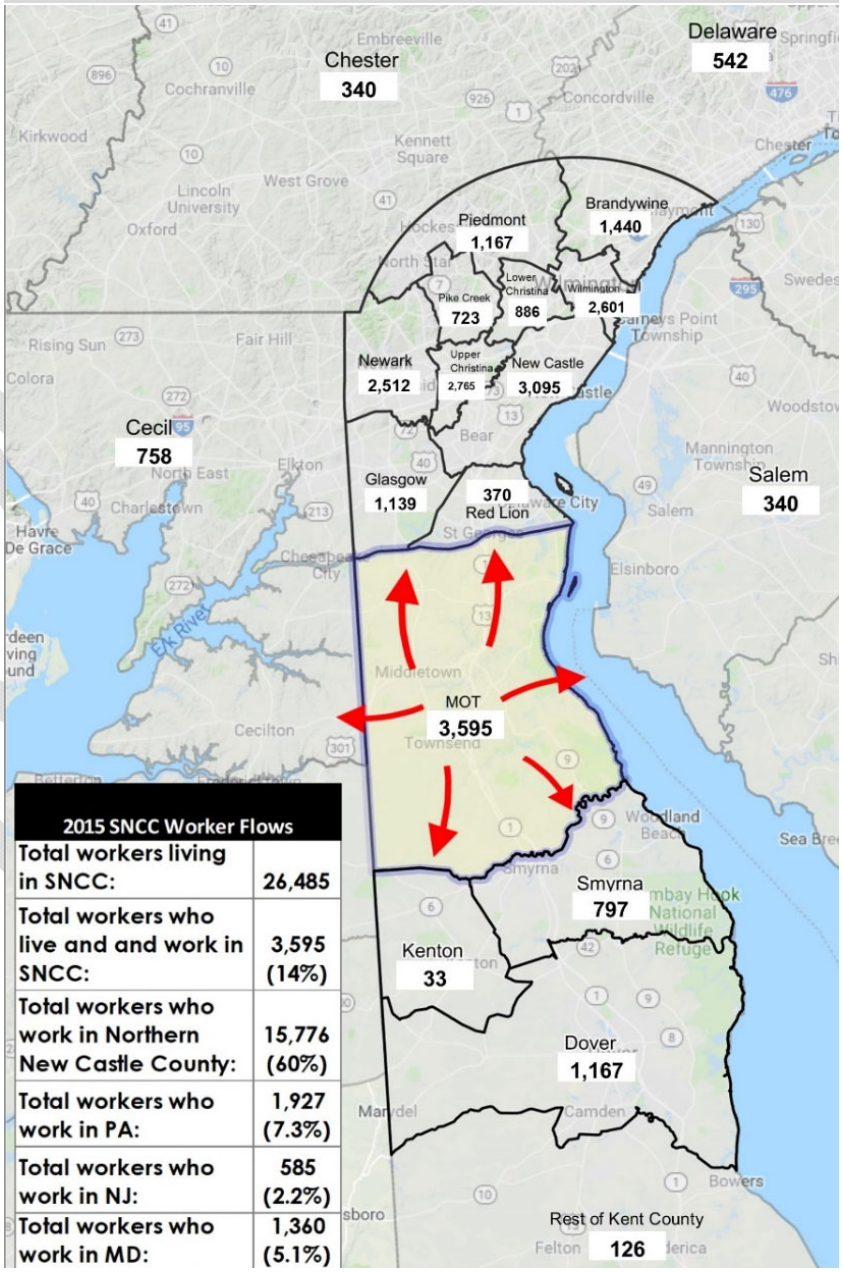
The majority of workers (60%) work within Northern New Castle County, while roughly 15% work in the States of New Jersey, Pennsylvania, or Maryland. The trend over the 10 years from 2005 to 2015, however, shows an increase in the percentage of workers who work outside of New Castle County.

Table 3: Journey to Work Trends

Changes in Worker Flows Between 2005 – 2015	
Total Workers in 2005 Total Workers in 2015 **Net Change in Workers**	17,284 26,485 **9,201**
Total change in workers who live and work in SNCC	+ 1,546
Total change workers who work in Northern New Castle County:	+ 4,128
Total change workers who work outside of New Castle County:	+ 2,532
Total change workers who work in PA:	+ 872
Total change workers who work in NJ:	+ 267
Total change workers who work in MD:	+ 656

Source: US Census Longitudinal Employer-Household Dynamics

Figure 9: Journey to Work, Year 2015



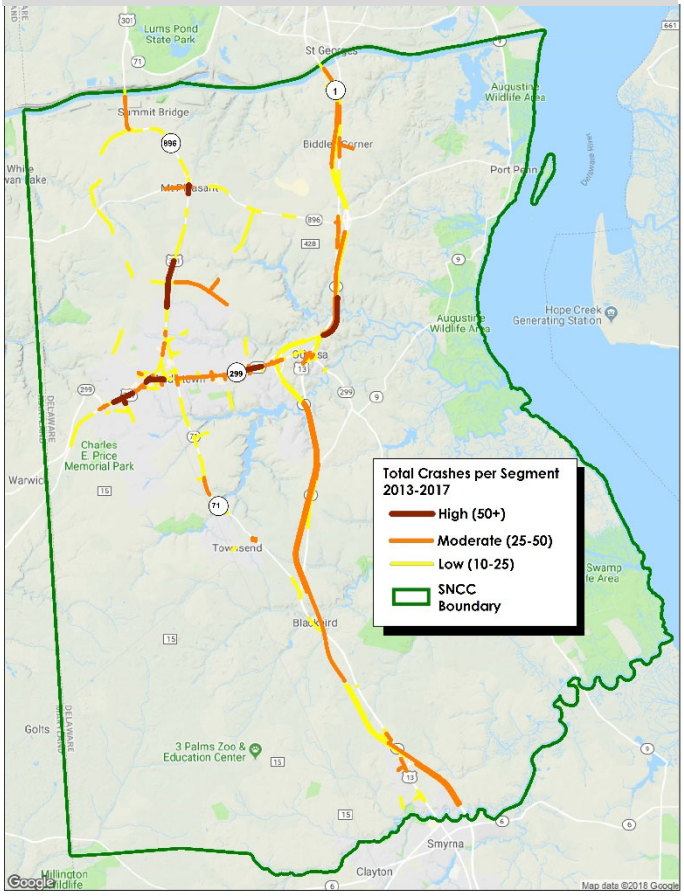
Safety

With an increasing population base coupled with additional vehicular traffic, Southern New Castle County has experienced an increase in automobile crashes. A review of all reported crashes reveals that overall crashes have risen steadily from 2013-2017.

Some notable trends are:

- A total of 6,171 crashes were reported from 2013-2017
- Nearly a third were rear-end collisions
- Crash totals have increased steadily over the 5-year period
- Just over 21% of the crashes occur at signalized intersections. The intersection of US 13 and Boyd's Corner Road was ranked #58 on the Statewide Intersection Crash Analysis, the highest scoring location in SNCC
- 25% of the crashes result in injuries
- 35 crashes were fatal
- 24 crashes involved bicycles and 30 involved pedestrians

Figure 10: Total Crashes by Road Segment



The chart below breaks down the annual crashes by type of crash, severity, and bicycle/pedestrian involvement.

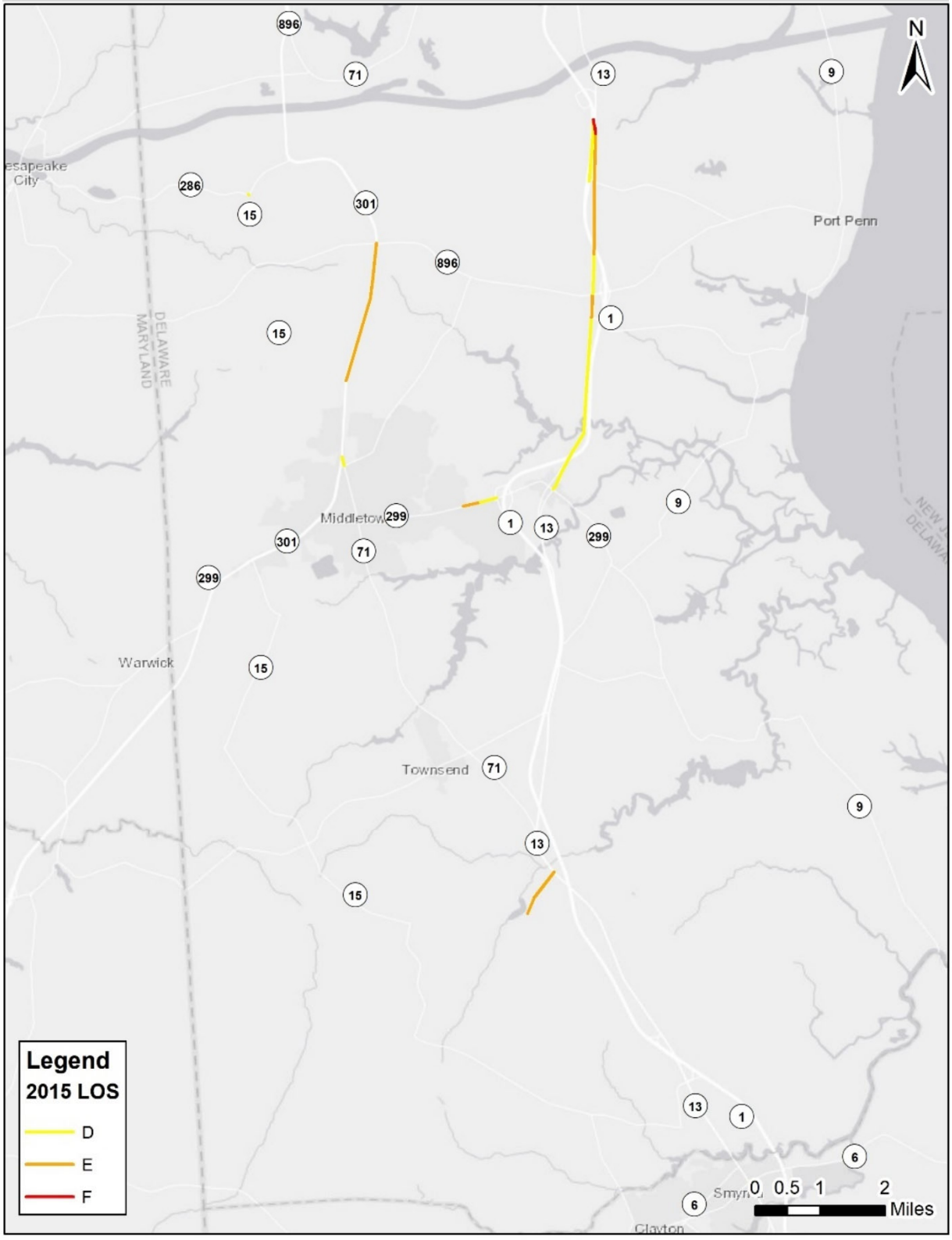
Table 4: Annual Crash Trends by Type: 2013-2017

Year	Total Crashes	Single Car	Rear-end	Head-on	Angle	Side swipe	Other	Bicycle	Pedestrian	Injury	Fatal	Property Damage Only
2013	957	310	337	22	150	96	42	2	12	250	7	700
2014	1091	334	375	46	167	111	58	7	6	264	3	824
2015	1307	419	438	50	219	113	68	6	5	331	8	968
2016	1349	439	461	34	204	154	57	7	3	339	14	996
2017	1467	435	523	36	251	168	54	2	4	351	3	1113
Total	**6,171**	**1,937**	**2,134**	**188**	**991**	**642**	**279**	**24**	**30**	**1,535**	**35**	**4,601**
%		**31.4%**	**34.6%**	**3.0%**	**16.1%**	**10.4%**	**4.5%**					

CONGESTION

Due to the lengthy construction of US 301 over the past several years and the numerous road closures, very little reliable traffic data was available during the development of this plan. Using the DelDOT Peninsula Model link level analysis shows several road segments along US 13, SR 299 and Summit Bridge Road are either at or approaching poor levels of service.

Figure 11: Peak Period Level of Service: 2015



SCENARIO ANALYSIS

Based on the goals and objectives developed with the community and working within the constraints of existing and projected conditions, the project team devised three initial future land use scenarios. These scenarios present varying conditions related to environmental and agricultural preservation, provision of sewer infrastructure, and assumptions about the location of future growth in households and employment. Growth projections used in these scenarios are from the Delaware Population Consortium (DPC) estimates. Presented to the public in June 2019, the three scenarios were revised based on that input and then presented at the "Scenario Analysis and Preliminary Recommendations" workshop in October 2019. The scenarios included three potential futures:

- Scenario 1: As Planned ("Business as Usual"). This alternative explores continuation of development as it has occurred in the past.
- Scenario 2: Planned Growth and Preservation. This alternative strives to achieve preservation of environmental resources and prime agricultural areas east of Route 1, and in the northwest and southwestern portions of the study area. In this scenario, the County would discourage development in, and adjacent to, environmental resources and prime farmland, while providing for future growth.
- Scenario 3: Town Infill Growth and Preservation. This alternative explores a future where additional economic growth is absorbed within the existing municipal boundaries and a larger amount of the total household growth projected for the planning area through 2050 fills into the incorporated towns. Additional growth in Scenario 3 is based on the community goals and objectives that would be most achievable with more concentrated population and economic activity in Middletown, Townsend, and Smyrna.

Considering projected future growth and development in southern New Castle County, traffic volumes can be expected to increase. Questions to be answered by two phases of the transportation analysis of the three alternative scenarios include:

- Is there a significant difference between the land use scenarios in future traffic volumes and roadways with deficient levels of service?
- What transportation improvements are expected to be needed that are not already planned?

The first question has been analyzed as Phase 1 of the analysis. Analysis was performed using Delaware's Statewide Travel Demand Model, also known as the Peninsula Model, to forecast traffic volumes and compare to road capacity. Traffic Analysis Zones (TAZs) locate population and employment in relation to the road network. Each roadway section in the model contains attributes that define the capacity of the link. The model assigns traffic to the road network generally based on shortest travel time between origins and destinations. The model does make an adjustment for some avoidance of tolled roads when a reasonable alternate route is available.

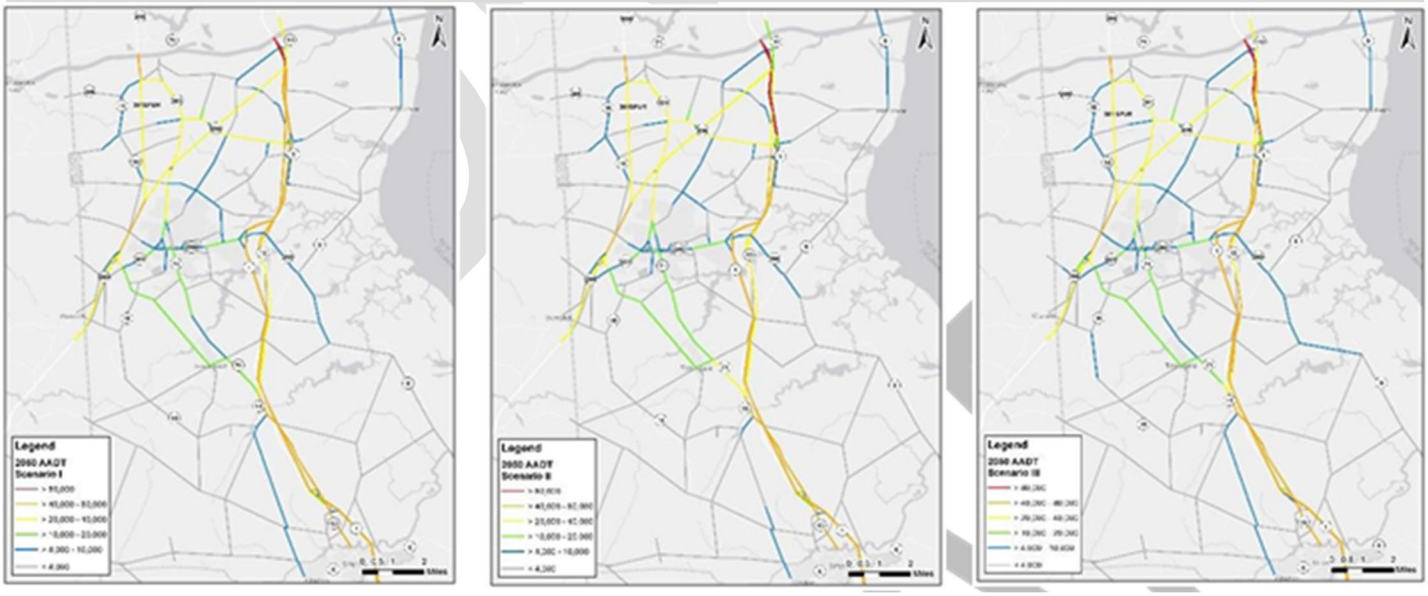
The road network was modified to include limited-access US Route 301, which opened in January 2019. The attributes of other roadway links in the model were modified to reflect road conditions after the completion of improvements planned by 2050. Official demographic forecasts by the Wilmington Area Planning Council (WILMAPCO) for Year 2050 were utilized in the travel demand model for Scenario 1. Modifications were made for Scenarios 2 and 3 to account for differences in location of households and employment in those scenarios. A summary of those changes is listed below in table 5.

Table 5: Land Use Components of Scenario Analysis

Scenario 1: Business as Usual	Scenario 2: Planned Growth and Preservation	Scenario 3: Town Infill and Preservation
•Continuation of development in the way it has occurred in the past.	•Envisions growth where it is currently expected - in the central core and upper western wing - with areas of targeted mixed use/enhanced growth to address community goals	•Envisions additonal growth withini the Town of Middletown and areas between Middletown and Townsend
•Growth area covers the entire northern portion of southern New Castle County	•Reduces HH growth in Eastern portion of SNCC	•Explores a future where additional economic growth is absorbed within the existing municipal boundaries and, to a lesser extent, in the unincorporated areas.
•Current trends suggest that residential	•Reduces future sewer growth areas	•Approx. 2,400 additional jobs in Middletown area ABOVE current forecast
development outside the Central Core is primarily being built on septic systems.		•Added Households to areas around Towns of Townsend & Smyrna
•Use of current household, population and employment trends by TAZ		•Reduces HH growth in Eastern SNCC
		•Reduces future sewer growth areas

Average annual daily traffic volumes (AADT) were mapped for each of the scenarios (Figure 12).

Figure 12: 2050 AADT for Land Use Scenarios



Analysis of congestion uses peak hour volumes rather than AADT. The Peninsula Model forecasts AM and PM peak hour volumes for each roadway link and compares with the link's hourly capacity to obtain a Level of Service (LOS). Level of Service is an indicator of quality of traffic flow. Letter grades from A to F are used with LOS A being free flow and LOS F being over capacity (Table 6).[22]

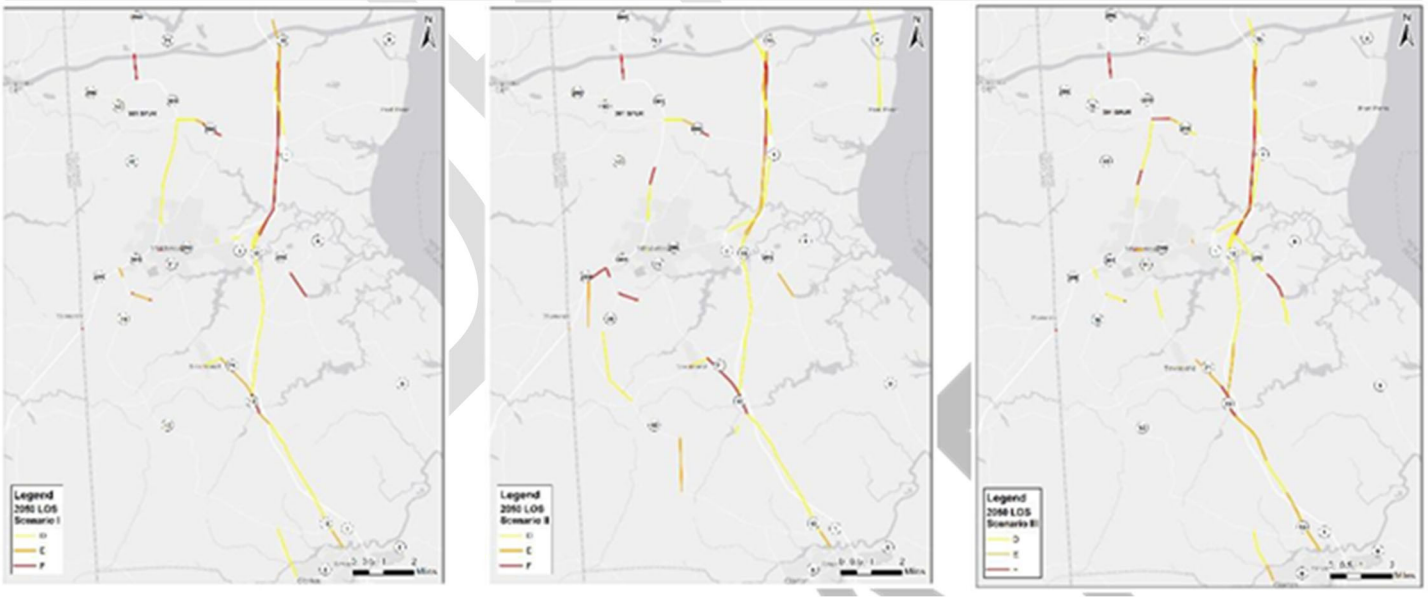
Table 6: Level of Service Volume to Capacity Ratio

Level of Service	Volume to Capacity Ratio
A	0.00 - 0.60
B	0.61 - 0.70
C	0.71 - 0.80
D	0.81 - 0.90
E	0.91 - 1.00
F	> 1.00

New Castle County's standard is minimum LOS D in sewer service areas and minimum LOS C outside sewer service areas. The UDC has more details regarding development in areas in which the existing level of service is lower than LOS D.

Maps of 2050 roadway link levels of service were created for each land use scenario (Figure 13). Because LOS C or better is acceptable in all areas of southern New Castle County regardless of sewer service, the maps show only road links that are forecast to be LOS D or below.

Figure 13: Forecast Levels of Service for Scenarios



Some road links show future deficiencies (LOS E or F) under all three land use scenarios; these are not scenario-dependent. The areas in which these links are located are:

- DE 896 north of Bethel Church Road
- DE 896 between Cedar Lane Road and the junction with DE 71 (the current Regional Transportation Plan calls for DE 896 to be widened to four lanes between DE 1 and Cedar Lane Road but not between Cedar Lane Road and DE 71).
- DE 299 between railroad and DE 71
- DE 9 Taylors Bridge Road south of its junction with DE 299
- US 13 north of DE 299
- DE 71 south of Townsend
- St. Anne's Church Road

Two additional road links show LOS deficiencies in Scenario 2:

- DE 9 north of Port Penn Road is LOS D under Scenario 2; this is below the County standard of LOS C in an unsewered area
- DE 15 south of Middletown has segments with LOS D and LOS E

One road link shows LOS F in Scenarios 2 and 3 but not in Scenario 1:

- DE 71 north of the future US 301 Spur

Since most of the anticipated future LOS deficiencies are not related to a particular scenario, the Phase 1 analysis determined transportation was not a primary factor for the selection of a preferred scenario. The preferred scenario was selected based on other factors.

During the course of this analysis it was learned that DelDOT will be making improvements to two of the Phase 2 study intersections.

Table 7: Improvements Assumed at Study Intersections

Phase 2 Intersection	**Type of Project**	**Scheduled Improvements**
5	Repaving and striping	Stripe eastbound SR 299 with a double left turn lane for turns to US 13 north.
8	Traffic improvement	Improve signalization; lengthen existing left turn lane on northbound US 13 to provide 580 feet of storage.

PREFERRED SCENARIO ANALYSIS METHODOLOGY

In October 2019, the project team received extensive feedback from the public and the Advisory Committee with respect to both the three land use scenarios and other recommendations that were not scenario specific. Comments were collected at the workshop, as well as online through the project website, the story map and through email, as well as from a follow-up conversation with the Town of Townsend. These comments were used to develop the Preferred Scenario, which is a combination of Scenarios 2 & 3, with growth shown in the central and northwestern portion of the study area and additional residential and employment growth within and adjacent to the municipalities of Middletown and Townsend.

Demographic information for year 2015 and year 2050 demographic forecasts for the preferred scenario were developed to reflect population and employment changes in Southern New Castle County (SNCC). These were developed and mapped at the Traffic Analysis Zone (TAZ) level. The number of households in 2015 was 17,688. The distribution of households is illustrated in Figure 14.

The projected number of households in 2050 is 31,433, for an increase of 13,765 new households. New households are expected to be concentrated in the north central and northwestern areas of SNCC, in Middletown, and in the Townsend area (Figure 15).

Figure 14: 2015 Households

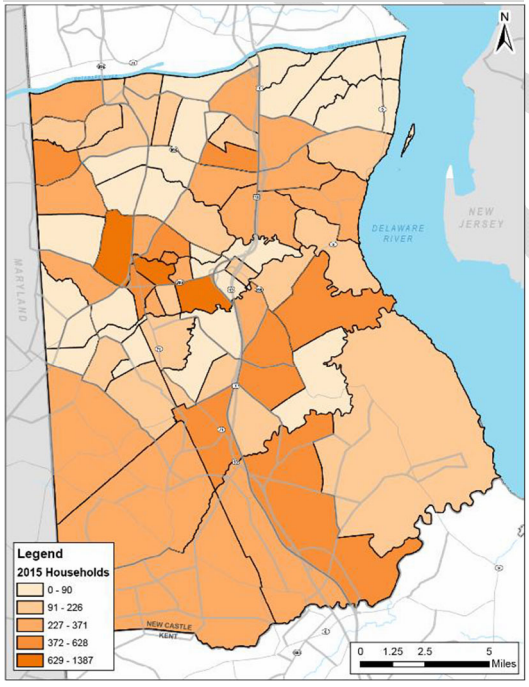
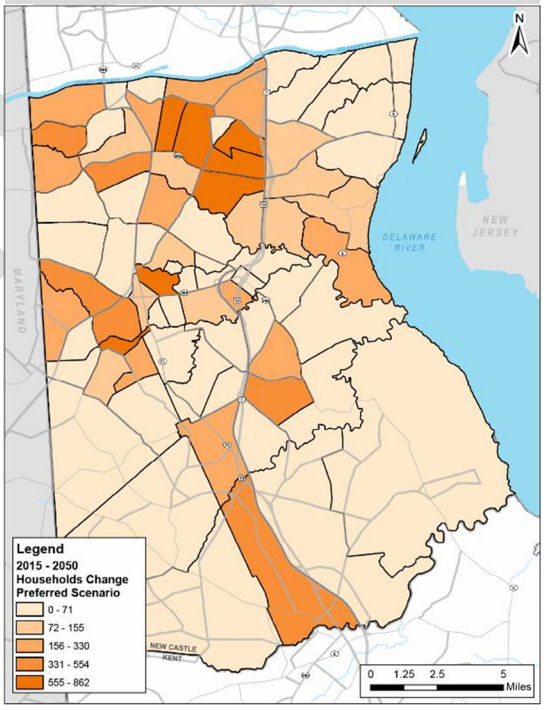


Figure 15: Change in Households: 2015-2050



Employment in SNCC was 10,034 in 2015 (Figure 16). In 2050, the employment is projected to be 15,849, for a total of 5,813 new jobs (Figure 17). It is expected that new jobs will be largely concentrated in Middletown. Modest levels of increased employment are also expected to occur in the north central area and the Townsend area.

Figure 16: 2015 Employment

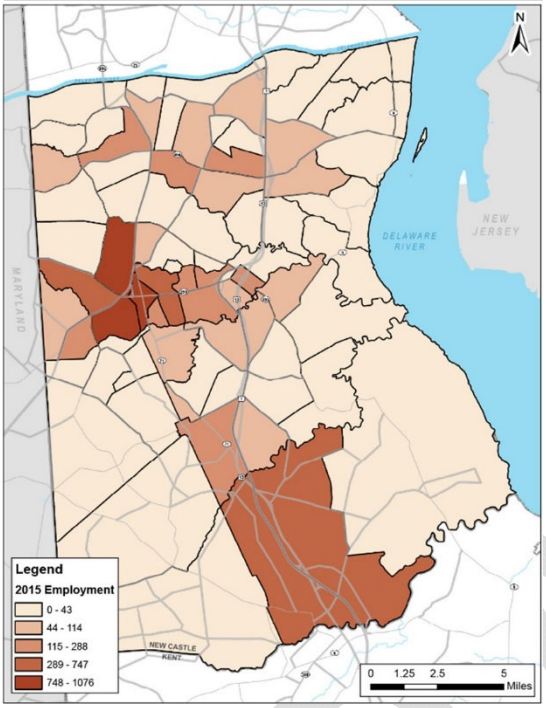
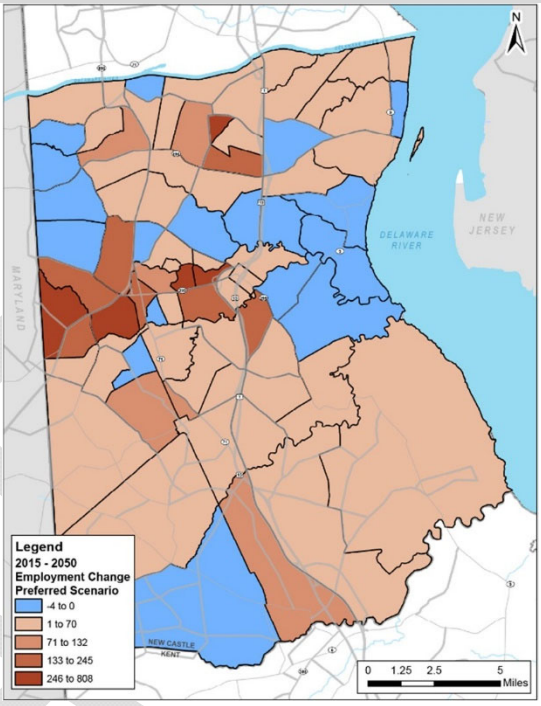


Figure 17: Change in Employment 2015 -2050



TRAFFIC VOLUME FORECASTS AND INTERSECTION ANALYSIS

Existing AM and PM peak hour counts at the eight selected intersections were obtained from DelDOT's traffic data files and used as a base for future intersection volume forecasts.

The change in TAZ population and employment was used to forecast 2050 ADT volumes on roads within SNCC for the preferred scenario. Delaware's statewide travel demand model, also known as the Peninsula model, was used for this forecast, similar to the Phase 1 analysis that was performed for Scenarios 1, 2, and 3 for the draft SNCC Master Plan in fall 2019.

The 2015 – 2050 change in ADT on the individual roadway legs at each Phase 2 intersection was used in conjunction with the existing peak hour intersection turning movement volumes at that intersection to forecast year 2050 intersection peak hour turning movement volumes.

A level of service analysis using Synchro software was performed for the AM and PM weekday peak hours for existing intersection conditions and signal operations, and again for 2050 volumes without improvements. An overall intersection average LOS of E or F was considered a deficiency and improvements were investigated. Also, at intersections with LOS C or D, it is possible that some individual approaches would operate at LOS E or F. These approaches were examined for the volume to capacity ratio (v/c). If the LOS E or F is on a minor street or left turn movement with low volume and the v/c ratio < 0.9, the delay is due to waiting time at the signal rather than a capacity problem. A LOS E or F on a through movement or high volume left turn was examined for possible improvements.

Level of Service Criteria for Unsignalized Intersections (Two-Way Stop Control, All-Way Stop Control and Roundabouts)

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

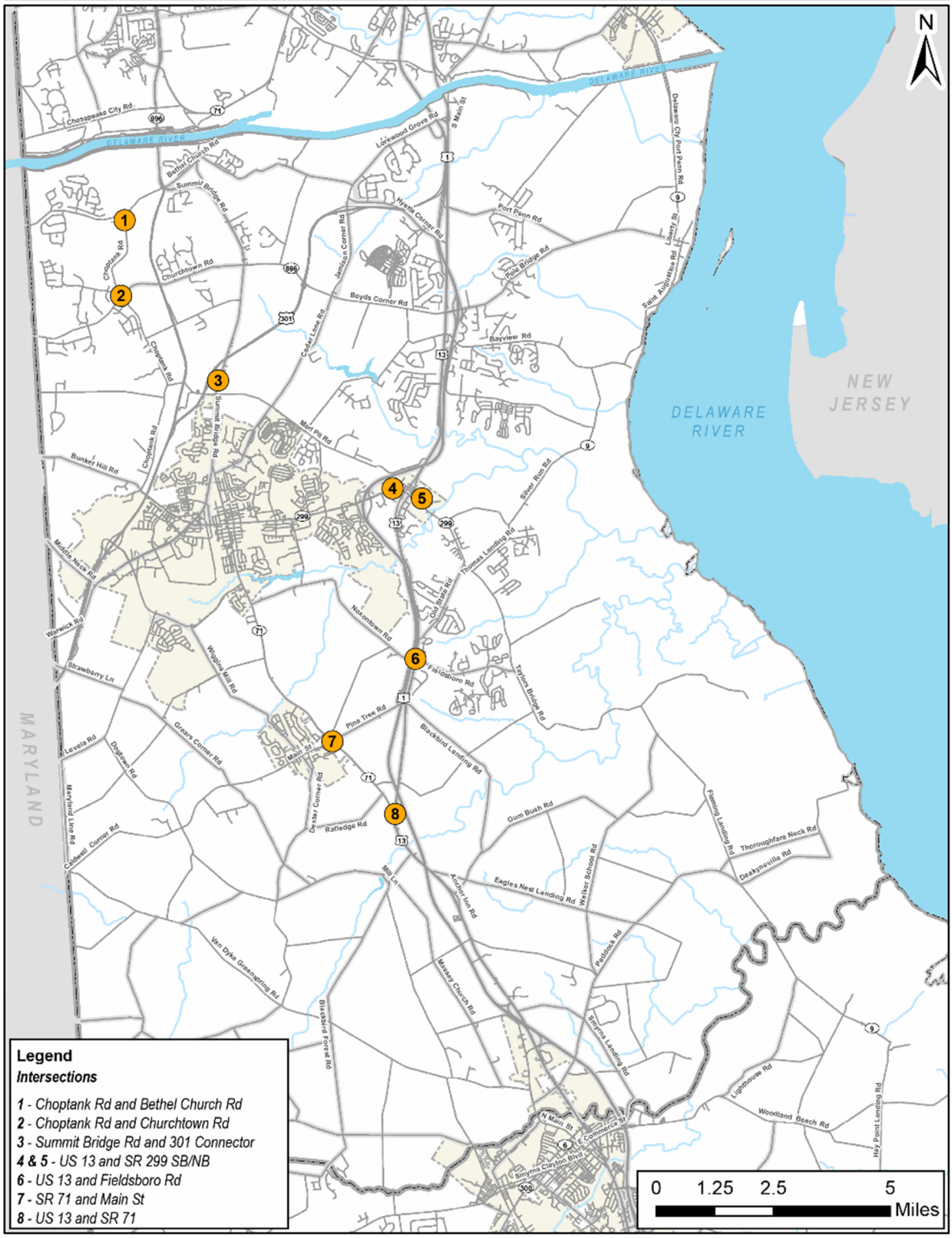
Level of Service Criteria for Signalized Intersections

Level of Service	Average Delay (sec/ veh)	Description
A	0 – 10	This level is assigned when the volume-to-capacity ratio is low and either progression is exceptionally favorable or the cycle length is very short. If it is due to favorable most vehicles arrive during the green indication and travel through the intersection without stopping.
B	>10 – 20	This level is typically assigned when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.
C	>20 – 35	This level is typically assigned when progression is favorable or the cycle length is moderate. Individual *cycle failures* (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.
D	>35 – 55	This level is typically assigned when the volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.
E	>55 – 80	This level is typically assigned when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.
F	>80	This level is typically assigned when the volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

SOURCE: *Highway Capacity Manual 2010*, pages 18-5, 18-6, 19-2, 20-3, and 21-1

A total of 8 intersections were included in the level of service analysis. Several intersections which are located in the existing “Central Core” Transportation Improvement District (TID) were omitted from the analysis as they are part of pre-determined solutions.

Figure 18: Phase 2 Study Intersections



Summary Levels of Service for All Study Intersections

AM and PM peak hour LOS for existing and 2050 conditions without improvements are shown in Tables 2 and 3 respectively.

Table 2: AM Peak Hour LOS

ID	Street 1	Street 2	Existing Control	AM - Peak Hour Existing LOS	AM - Peak Hour Existing Delay (sec/vehicle)	AM - Peak Hour 2050 - No Improvements LOS	AM - Peak Hour 2050 - No Improvements Delay (sec/vehicle)	AM peak Hour 2050 - Planned Improvements [1] LOS	AM peak Hour 2050 - Planned Improvements [1] Delay (sec/vehicle)	Potental additional improvement	AM - Peak Hour 2050 - Additional improvements [2] LOS	AM - Peak Hour 2050 - Additional improvements [2] Delay (sec/vehicle)
1	Choptank Rd	Bethel Church Rd	Roundabout	A	9	B	10				B	10
2	Choptank Rd	Churchtown Rd	Roundabout	A	8	B	11				B	11
3	Summit Bridge Rd (US 301, SR 71)	Connector to US 301 bypass	Signal	C	21	C	25				C	25
4	US 13 southbound	SR 299	Signal	C	23	C	27			Add third lane to EB SR 299; T-T-R	C	25
5	US 13 northbound	SR 299	Signal	C	28	E	73	D	42	Improvement at intersection 4	D	42
6	US 13	Fieldsboro Road	Signal	B	18	C	21				C	21
7	SR 71	Main St/ Pine Tree Rd	Signal	B	14	E	75			Alternative 1 - Add N-S Left turn lanes	C	29
										Alternative 2 - Roundabout	C	25
8	US 13	SR 71	TWSC **	B	12	E	50 (NB US13 left turn)	C	26	Add US 13 double NB left turn	B	12

Table 3: PM Peak Hour LOS

ID	Street 1	Street 2	Existing Control	PM - Peak Hour Existing LOS	PM - Peak Hour Existing Delay (sec/vehicle)	PM - Peak Hour 2050 - No Improvements LOS	PM - Peak Hour 2050 - No Improvements Delay (sec/vehicle)	PM peak Hour 2050 - Planned Improvements [1] LOS	PM peak Hour 2050 - Planned Improvements [1] Delay (sec/vehicle)	Potential additional improvement	PM - Peak Hour 2050 - Additional improvements [2] LOS	PM - Peak Hour 2050 - Additional improvements [2] Delay (sec/vehicle)
1	Choptank Rd	Bethel Church Rd	Roundabout	A	10	B	13				B	13
2	Choptank Rd	Churchtown Rd	Roundabout	A	9	C	17				C	17
3	Summit Bridge Rd (US 301, SR 71)	Connector to US 301 bypass	Signal	C	21	C	24				C	24
4	US 13 southbound	SR 299	Signal	C	29	E	69			Add third lane to EB SR 299; T-T-R	D	40
5	US 13 northbound	SR 299	Signal	C	28	D	36	D	36	Improvement at intersection 4	C	24
6	US 13	Fieldsboro Road	Signal	B	16	B	20				B	20
7	SR 71	Main St/ Pine Tree Rd	Signal	B	14	F	197			Alternative 1 - Add N-S Left turn lanes	C	28
										Alternative 2 - Roundabout	D	30
8	US 13	SR 71	TWSC **	D	29 (SB SR71 right turn)	F	196 (NB US13 left turn)	D	35	Add US 13 double NB left turn	B	16

[1] Intersection 5: DelDOT striping a double left turn on EB SR 299 to US 13 north as part of repaving project
Intersection 8: DelDOT is installing a half-signal and lengthening the NB US13 left turn lane. LOS includes the free NB US13 through movement. Queues on signalized movements led to investigation of further improvements.

[2] Improvements are described in Phase 2 Traffic Analysis Report

** Flasher analyzed as two-way stop controlled intersection (TWSC); LOS and delay is for the major controlled approach

Transportation Recommendations

A wide-range of recommendations were made throughout the development of the Southern New Castle County Master Plan. It must be stressed that funding has not yet been set aside to complete these recommendations. However, DTC and DelDOT are committed to studying the recommendations further (where necessary) and leading the implementation of these ideas in the future. In the meantime, WILMAPCO will add the transportation recommendations to the Regional Transportation Plan for added leverage.

EXISTING PLANNED IMPROVEMENTS

The study area includes three Transportation Improvement Districts (TID). Each of these TIDs (Southern New Castle County TID, Hyett's Corner TID and the Westown TID, with a fourth TID under development). TIDs are created for the purpose of comprehensively coordinating land use and transportation within the specific geographical area of each TID and to secure required improvements to transportation facilities within the TID area. TIDs are created by agreement between DelDOT and the relevant local government or governments. DelDOT performs the traffic study that identifies transportation improvements based on development.

As a result of this there are several projects that have already been analyzed through the TID development process which will be monitored and administered by DelDOT. In addition, there are projects that are included in the most recent Regional Transportation Plan (RTP) developed by WILMAPCO.

In total, there are 23 road improvement projects that are in the pipeline as a result of these planning processes (Figure 19). These identified improvements are expected to be in place by 2050. Many of the projects include pedestrian and bicycle facilities adjacent to the roadway.

Figure 19: Planned Improvements - SNCC

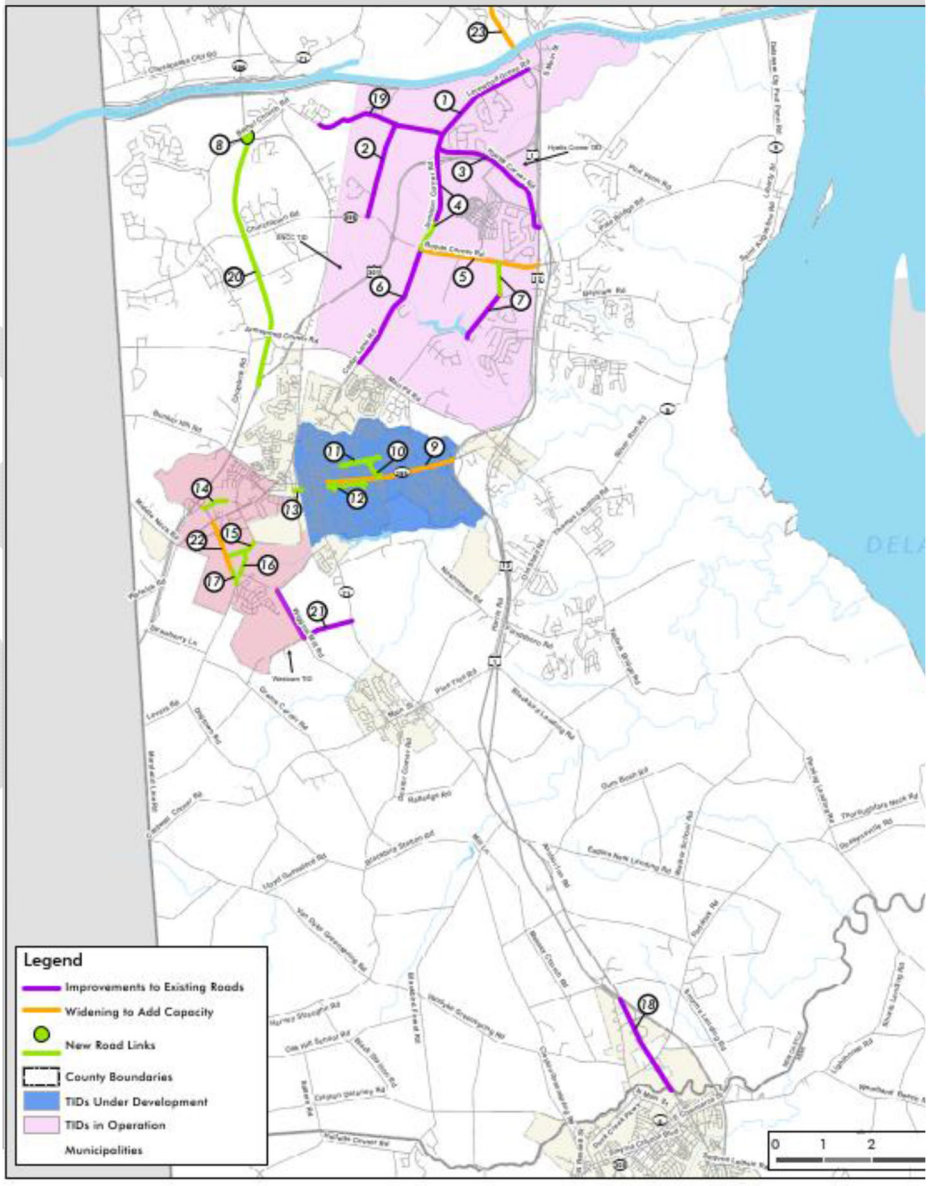


Table 8: Planned Improvements

#	Project	WILMAPCO 2019-2022 TIP	WILMAPCO 2050 RTP	DELDOT 2020-2025 CTP	SNCC TID	EASTOWN TID	WESTOWN TID
1	Lorewood Grove Road East: Hyetts Corner (Rd 412A) - SR 1 - Improve to two 11-foot lanes with 8-foot shoulders and a 10-foot multi-use path on one side of	X	X	X	X		
2	Ratledge Road - Widen to 2-12' lanes, shoulders and 10' bike path				X		
3	Hyetts Corner Road - Widen to 2-12' lanes, 8' shoulders and 10' bike path				X		
4	Jamison Corner Road - Widen to 2-12' lanes, 8' shoulders and 10' bike path, with relocation at Boyds	X		X	X		
5	Boyds Corner Road - Cedar Lane Road to US 13 - Improve to four 12-foot lanes with 10-foot shoul-	X		X	X		
6	Cedar Lane Road: Marl Pit Road to Boyd's Corner Road - Improve to two 12-foot lanes with 8-foot shoulders, 10-foot multi-use path on west side of the roadway, and construction of a roundabout at the intersection of Cedar Lane Road and Marl Pit Road	X	X	X	X		
7	Shallcross Lake Road: Improve to two 11-foot lanes with 5-foot shoulders and a 10-foot path south of Greylag Road; relocate between Greylag Road and Boyds Corner	X		X	X		
8	SR 896/Bethel Church Interchange - Improve high- way safety by removing thru traffic from local roads, while minimizing environmental impacts and accommodating existing and planned develop- ment	X	X	X			
9	SR 299: SR 1 to Catherine Street - Widen to two lanes in each direction from SR 1 to Cleaver Farm Road, and a two-way center turn lane will be added from Cleaver Farm Road to Catherine Street along with pedestrian and bicycle improve- ments	X		X			
10	Silver Lake Road - Eastown TID					X	
11	East Lake Street - Eastown TID					X	
12	East Green Street - Eastown TID					X	
13	West Green Street - Eastown TID					X	
14	Connector from Levels Rd east of US 301 Bypass interchange to Merrimac Ave.						X
15	Connector from Merrimac Ave./ Industrial Rd west to Levels Rd						X
16	Road from #15 Connector to Levels Road round- about						X
17	Right turn bypass lane at Levels Road roundabout						X
18	US 13: Duck Creek - SR 1 - controlled access, side- walk, bike access, and other amenities	X	X				
19	Lorewood Grove Road West: Breakwater Drive - Rd 412A - Improve to two 11-foot lanes with 5-foot shoulders and 10-foot bike path		X		X		
20	US 301 Spur - New limited access highway		X				
21	Wiggins Mill Road - Improve roadway, improve non- motorized access		X				
22	Levels Road - Widen roadway from Middletown-Warwick Road/Old US 301 to where project #17 begins, adding turn lanes and widening to two travel lanes in each direction.						X
23	SR 1 - Expand and reconstruct roadway from Tybouts Corner to the Roth Bridge		X				

ADDITIONAL ROADWAY RECOMMENDATIONS

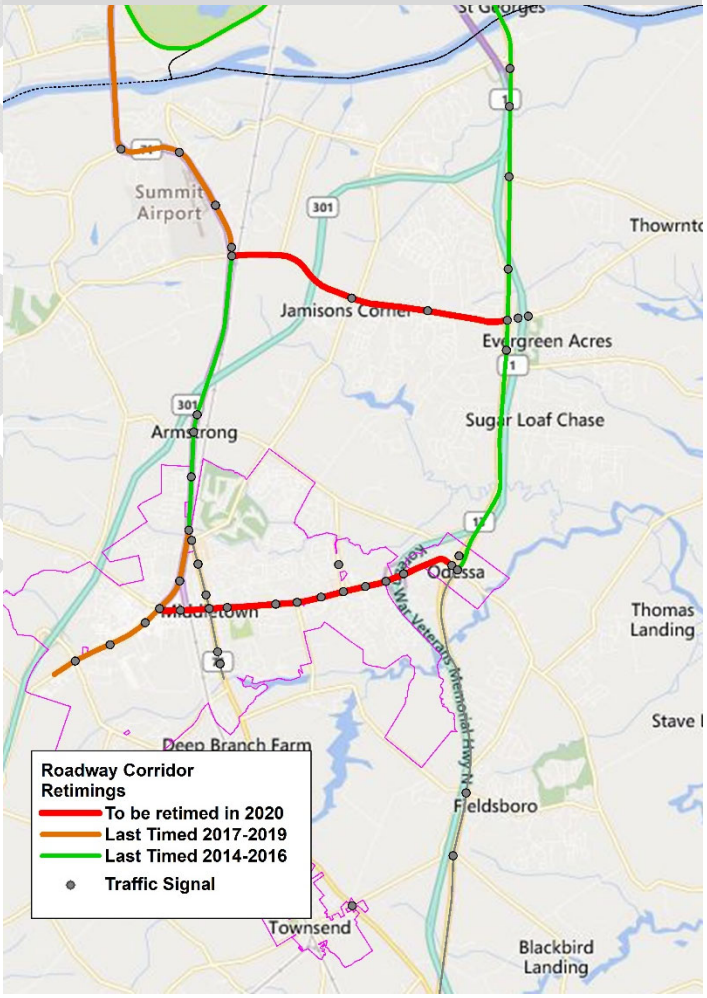
Based on the results of the traffic analysis and other outreach efforts throughout the development of this plan, other recommended improvements have been identified. These recommendations will be included in the next update of the WILMAPCO RTP and other related documents in order for them to be prioritized accordingly once conditions warrant the improvements.

Recommendation #1: Spot Intersection Improvements

Based on the traffic analysis performed for the study area, peak hour LOS deficiencies were found in the AM and/or PM in year 2050 at the following 4 locations (for details of these improvements, see Appendix A):

- US 13 SB and SR 299 (one controller with US 13 NB)
- US 13 NB and SR 299 (one controller with US 13 SB)
- SR 71 and Main Street/Pine Tree Road
- US 13 and SR 71

Figure 20: Signal Re-Timings in Middletown Area



Recommendation #2: Regular Traffic Signal Coordination/Optimization

Traffic signal optimization is the coordination of the timing of a series of traffic lights. Signal optimization improves traffic flow by minimizing stops and delays, which in turn improves safety; reduces bottlenecks, fuel consumption and emissions; and improves air quality and driver satisfaction. The main east/west corridors of SR 299 (between Middletown and Odessa) and Boyd's Corner Road (between US 13 and Summit Bridge Road) should be periodically reviewed as planned development begins to occur. Close coordination with the DelDOT's Traffic Management Center (TMC) is required to review travel time data and any trends that may occur over time. Recent re-timings have taken place in and around the Town of Middletown in recent years and SR 299 and Boyd's Corner Road are scheduled to be evaluated in FY 2020.

Recommendation #3: Monitoring of Traffic in the Townsend Area

In recent years traffic congestion and volume within the Town of Townsend has become a concern, particularly truck traffic. It is recommended that the Town of Townsend work with DelDOT and WILMPACO to establish periodic data collection efforts to monitor the changes in traffic conditions over the next several years, particularly around the SR 71 and Pine Tree Road intersection. Suggested future improvements have been identified in the Traffic Analysis. Through regular monitoring, conditions for moving forward with these improvements can be suggested for implementation when traffic conditions reach those thresholds. For more details of these improvements, see Appendix A.

Transit Recommendations

Throughout the development of the plan, DART has been active in a series of outreach efforts to help shape DART's vision of the future for the greater Middletown area. DART's overall goal for the area is based on several key principles:

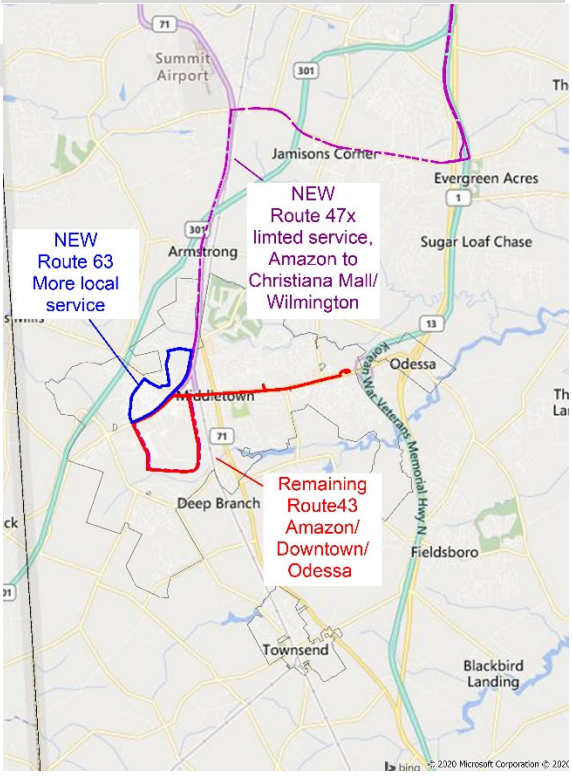
- Create Additional Routes Increasing Coverage for the Greater Middletown Area
- Serve More Residents and Businesses
- Improve Frequency of Service
- Expand Hours of Service (Span of Service)
- Schedule Saturday Service
- To the extent the market allows, expand rideshare and alternative ridesharing network.
- Offer Better Connectivity with Other DART Routes, along with Amtrak and SEPTA Train Services

Recommendation #1: Route and Service Changes by DART

DART has recently implemented several route and service changes to existing routes that will help to improve service in the study area and to fulfill DART's vision for transit in Southern New Castle County. Noted below are the recent changes:

- 43 – Route 43 has been split into two separate routes (43 and 63). Route 43 continues to connect Amazon and downtown Middletown with Odessa Park & Ride where residents can transfer to bus routes to Wilmington or Dover. Route 63 now provides better coverage in Middletown to residential and commercial developments.
- 47 – Additional service is now scheduled to/from Amazon to connect with revised shift times. A new limited-service route (47X) was created connecting Middletown, Christiana Mall and downtown Wilmington. Bus Routes 47, 47X and 302 will serve the future North Middletown Park & Ride when the facility opens in late-2021.

Figure 21: DART Route Service Changes

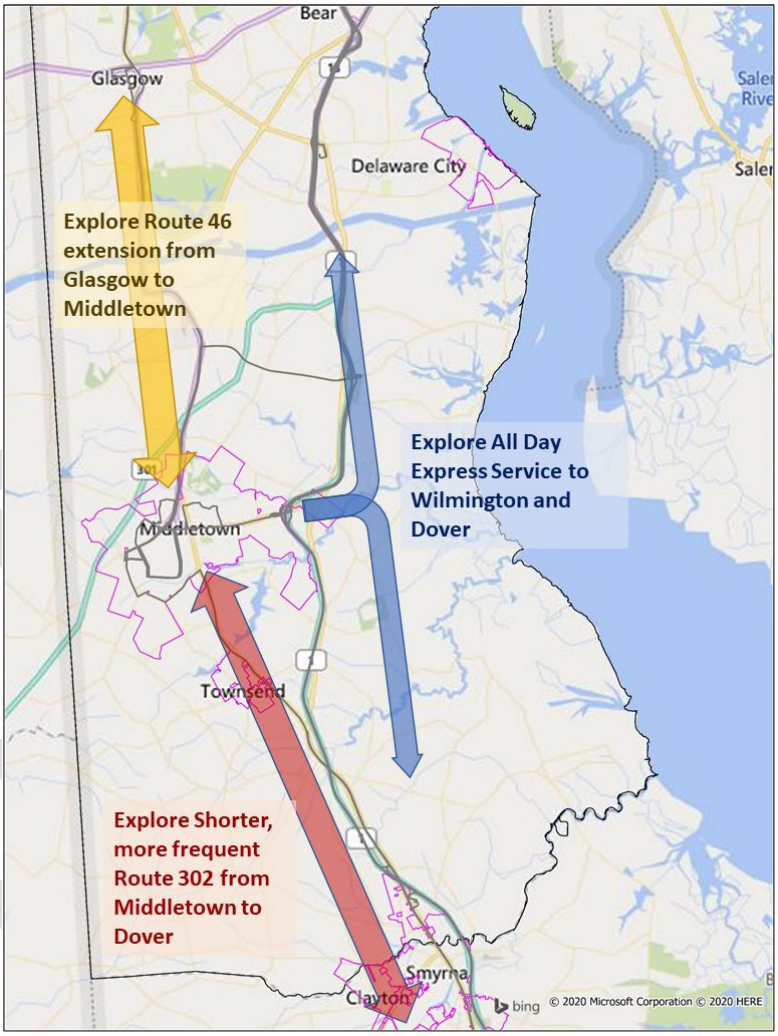


Recommendation #2: Examine Future Route Concepts

During the public outreach process of this study and additional community conversations, DART proposed several other service and bus route changes. Each of these received some positive comments, but also heard criticism as well. These initiatives have been tabled but will be considered for further study.

- *45 and 301 – Create a New Service Initiative That Would Offer All-Day Express Service from Kent County to Wilmington; Improve Local Service from Wilmington to Dover.* This initiative was not implemented. DART presented this proposal at Community Conversations and Public Hearing Workshops and received some positive comments, but also heard criticism as well. This initiative was tabled for further study.
- *46 – Extend to Middletown from Glasgow.* This initiative has not advanced and continues to be studied.
- *302 – Shorten Route and Schedule More Service between Middletown and Dover.* This initiative has not advanced and continues to be studied.

Figure 22: Future Route Concepts



Recommendation #3: Better Transit Stop facilities and coordination with land use development

When considering proposals to enhance transit service, better coordination is needed between DelDOT and developers during the review process to build bus stop pads and connecting sidewalks at new and infill commercial and large residential developments. Depending on the proposed land use, the creation of a large bus stop footprint to include amenities such as shelters, benches, lighting, trash cans and electronic next bus information is recommended. Also, to address the growing senior population in southern New Castle County, 55+ communities and new healthcare facilities should be sited at or located within proximity of existing DART services. Developers should be encouraged to coordinate with DART in the early planning stages.

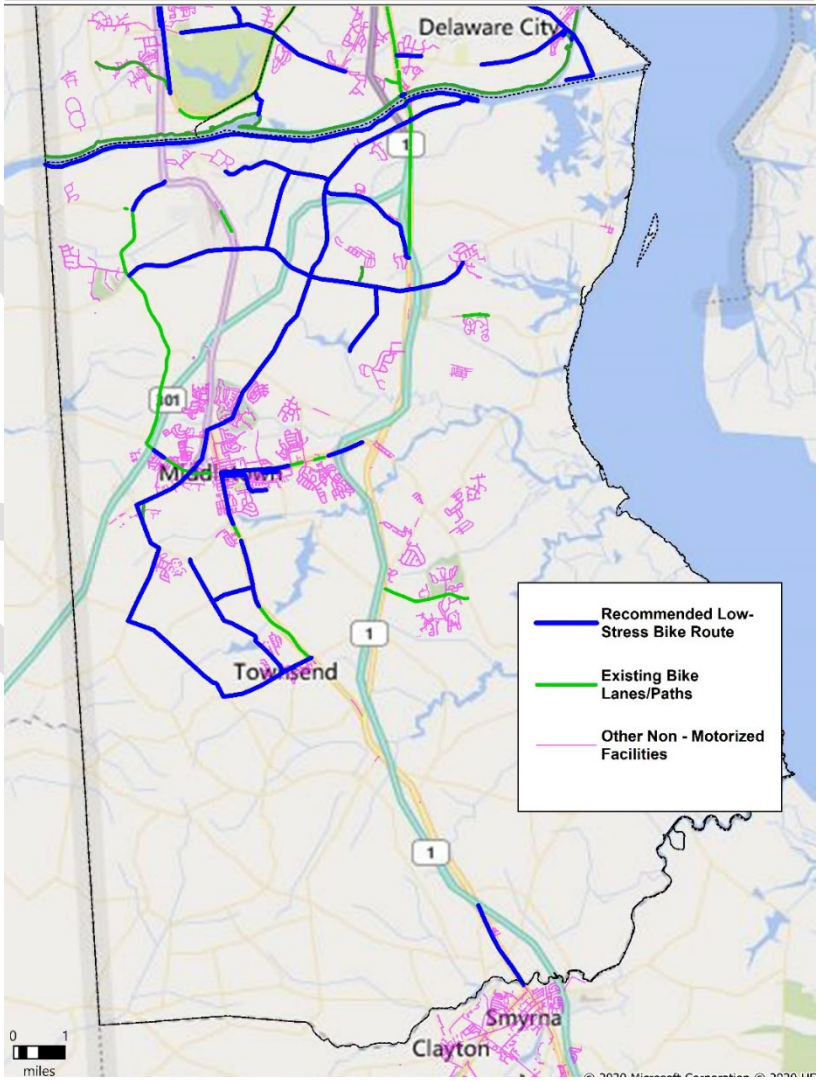
Non-Motorized Recommendations

In May 2020, WILMAPCO completed the New Castle County Bike Plan. The plan includes strategies to improve the safety, access, and comfort of bicycling; prioritizes infrastructure improvements; and identifies programs and policies for education, enforcement, and encouragement in New Castle County. WILMAPCO developed the Plan in coordination with New Castle County, the Delaware Department of Transportation (DelDOT), municipalities, cyclists and other stakeholders. Both plans roughly paralleled the same timeframe, and even shared joint outreach efforts during their development. As a result, input and recommendations were developed and shared between both documents.

Recommendation #1: Work to Implement NCC bike plan recommendations for the study area

The New Castle County Bike Plan includes several recommended low-stress bike routes to be developed within Southern New Castle County. There are existing segments of sidepaths and trails along connector roads, but full trail connections between these areas and municipalities are missing. Likewise, a system of trails and sidepaths that make connections to the broader New Castle County trail network are also absent. It is envisioned that residents will one day be able to leave their neighborhoods and walk or bike to municipalities, and even to connections that lead them to the St. Georges Bridge, where they can safely cross the C&D Canal and connect with the extensive sidepath and trail system that exists north of the Canal.

Figure 23: Bike Plan Recommendations



Within the NCC Bike Plan report there are a wide variety of suggested designs for bicycle routes to focus on safer, lower-stress facilities (Bike LTS Level 1 and 2) that seek to minimize the future maintenance costs. The type of bikeway that is appropriate can vary based on the location, particularly in relation to the speeds, amount of traffic, and the width of the roadway. Also, an otherwise low-stress route will still have high-stress trips if there are challenging gaps and intersections. Through the land use development process and other transportation funding pools, these locations can be included in any further study or combined with other improvement projects.

Recommendation #2: Perform a "gap" analysis of broken links within existing walking / biking paths
Examine the existing non-motorized network, particularly within close proximity of destinations such as schools, grocery stores, pharmacies, libraries, parks, transit stops, and park and ride facilities for missing segments that hinder safe connections to those destinations. Once identified, these improvements can be included for consideration within several programs which are administered by DelDOT to address smaller projects generally too small to be considered a capital project. These programs have their own annual budgets for specific types of projects and each program generally has its own prioritization process.

Aviation Recommendations

While these are a smaller portion of the transportation system, airports enhance Delaware's economic development by fostering and promoting a safe and efficient aviation system for the movement of goods, services, and people and to encourage and promote aviation and aviation safety. The study area included Summit Airport, which is a privately operated general aviation facility and includes services such as maintenance & repair, flight testing/training support, logistical support, and military uses.

Recommendation #1: Develop and maintain compatible land uses in areas surrounding Summit Aviation
Review and refine, as necessary, the New Castle County Unified Development Code (UDC) as it relates to Airport uses, to promote development that is compatible with aviation and designed to mitigate risk to airport operations and the flying public. This could include limiting new residential development in the approaches of Summit Airport runways for the benefit of the quality of life for future residents of southern New Castle County and continued operation of the airport.

Recommendation #2: Work with Summit Airport to understand its future business plans
As Summit continues to expand in southern NCC, it is recommended that there is continued coordination with the DelDOT Office of Aeronautics, including promotion of information on Summit Airport's Economic Impact. In addition, regular contact with New Castle personnel (i.e. County Executive, County Council Members, the Delaware Prosperity Partnership, Economic Development Department, and Department of Land Use staff) to share updates to the "Economic Impact of Delaware Airports" report which details the economic impact of the State Aviation System.

Implementation and Next steps

The recommendations presented in this plan are at the very beginning of the implementation process. It must be stressed that funding has not yet been set aside to complete these recommendations. In the meantime, WILMAPCO will add the transportation recommendations to the Regional Transportation Plan (RTP) for added leverage and inclusion in the project prioritization process. Community members, stakeholders, and interested organizations are also encouraged to make their support known to elected officials and relevant agencies to help ensure that the recommendations are not forgotten and are properly funded and appropriately implemented.

Some projects may move more quickly than others through various departments throughout DelDOT and DTC. Based on the overall project size, they will be handled differently. Typically, the size and complexity of a project can dictate where it ends up in the development process.

- Larger, long-term projects: Added to WILMAPCO Regional Transportation Plan (RTP)
- Moderate-sized Projects: A project page for the plan will be added to the DelDOT CTP and WILMAPCO TIP
- Smaller projects: Projects that can be included as part of regular DOT/DTC and TMC budgets
- TIS/TID recommendations: Include improvements as part of development plans through the TIS process or as specified in a specified Transportation Improvement District (TID), if designated

Transit related projects

Twice a year, DTC holds Community Conversations regarding proposed changes to transit routes such as stops, frequency, destinations, etc. During these Conversations the public has an opportunity to view proposed schedules, interact with staff, and listen to reasons for those changes before the Service Change is implemented. Community members, stakeholders, and interested organizations can use these bi-annual opportunities to get updates on the status of the short-term recommendations as well as continue the discussion on the future concepts presented in this plan.

Non-Motorized Projects

Within the recently completed New Castle County Bike Plan, further steps have been identified to begin to move these recommendations forward. Taking concepts from the broad view within the New Castle County Bike Plan to the implementation of individual projects will require additional planning, public outreach, engineering, and refinement of details. This public process will allow new input and ideas to emerge for these projects with regard to coordination through other planning initiatives, road projects, parks projects, and development activities.

Projects can be completed through multiple funding programs available through DelDOT and the USDOT. Primary ways to get projects built include:

- Low hanging fruit: small, low cost projects that can be quickly done using in-house resources or existing contracts.
- Land use development: new and redevelopment land use applications should be evaluated for opportunities to expand the bicycle network.
- Restriping: routine roadway restriping provides an opportunity to reallocate space for a lower-stress route. This might include narrowing motor vehicle travel or parking lanes or buffering

wide bike lanes. If possible, preserving old markings, may significantly decrease the cost and may reduce damage to the pavement.

- Paving and rehabilitation: resurfaced pavement gives a blank slate for placing lane markings. Routine street maintenance provides an opportunity to upgrade bike facilities at a lower cost than a stand-alone project.
- Capital projects: stand-alone projects may be done through projects in the WILMAPCO

Transportation Improvement Program (TIP) and DelDOT Capital Transportation Program (CTP). Other small project programs include:

- Transportation Alternatives Program (TAP)
- Bicycle and Pedestrian Improvements Program
- Community Transportation Fund (CTF)

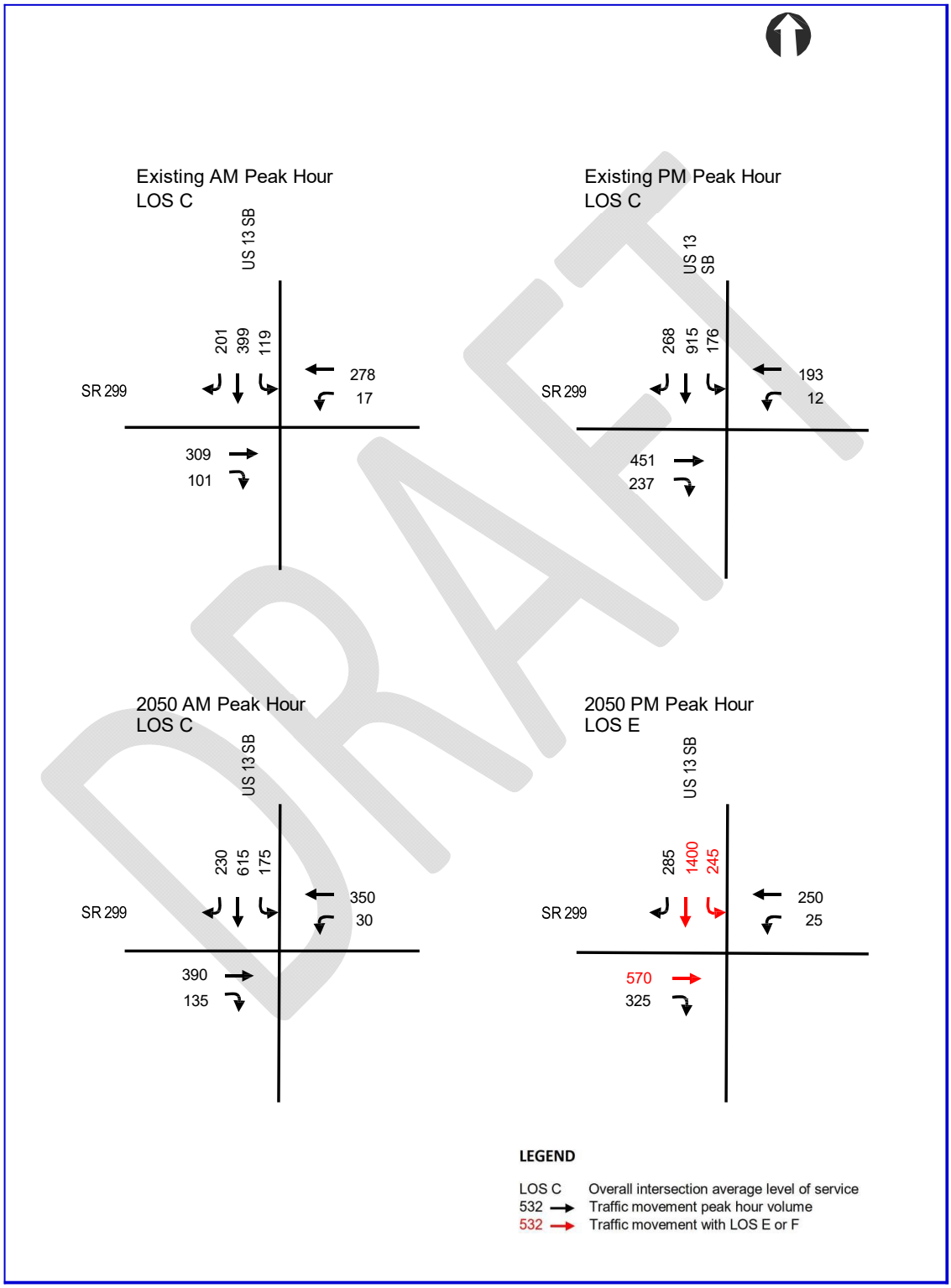
Appendix A

Intersection Improvements Analysis

Analysis of Intersections with Anticipated Deficiencies in 2050

Intersection 4: US 13 SB and SR 299 (one controller with US 13 NB)

Figure 7: Existing and 2050 volumes at US 13 SB and SR 299



US 13 SB and SR 299

Control Type	2050 LOS and Delay (seconds) Without Improvements	
	AM Peak	PM Peak
Signal	C (27)	E (69)

Deficient movements in 2050 are summarized below:

- EB SR 299 through movement operates at LOS E (61) in the PM peak
- SB US 13 through movement operates at LOS F (96) in the PM peak
- SB US 13 operates at LOS F (85)

The existing intersection provides one through lane and a dedicated right turn lane on EB SR 299, one through lane and a dedicated left turn lane on WB SR 299, and two through lanes (left turns made from the left through lane) and a dedicated right turn lane on SB US 13. On SR 299, the curbed road width of 60 feet west of the intersection is utilized for three travel lanes and shoulders. The curb-to-curb width is sufficient for four travel lanes and bicycle lanes if the existing shoulder area were to be repurposed.

Proposed Improvement:

Improvement	2050 LOS and Delay (seconds) with Improvement	
	AM Peak	PM Peak
Provide two EB through lanes on SR 299 by lengthening the existing EB SR 299 right turn lane and utilizing the existing shoulder area for the right turn lane. The leftmost through lane will feed into the double left turn lane at US 13 NB. Westbound SR 299 at US 13 SB continues to have one through lane and one left turn lane. US 13 SB continues to have two through lanes (left turns made from the left through lane) and a dedicated right turn lane.	C(25)	D(40)

It is anticipated that bicycle facilities will be installed on SR 299. There are several options to achieve this. The SR 299 road width and curb locations differ slightly west of US 13 SB, between intersections, and east of US 13 NB. In addition, SR 299 between US 13 SB and US 13 NB currently has curb parking lanes on both sides.

Alternative 1 – Add bike lanes in each direction within existing curb lines

To accommodate bike lanes by restriping and provide good lane alignment through the intersections, the curb parking on the north side of SR 299 between the US 13 intersections would be eliminated. Curb parking would remain on the south side.

Alternative 2 - Retain existing parking on SR 299 on both sides between intersections

This option would have bicyclists use the parking lanes as they do today. Separate bike lanes can be striped east of US 13 NB and west of US 13 SB.

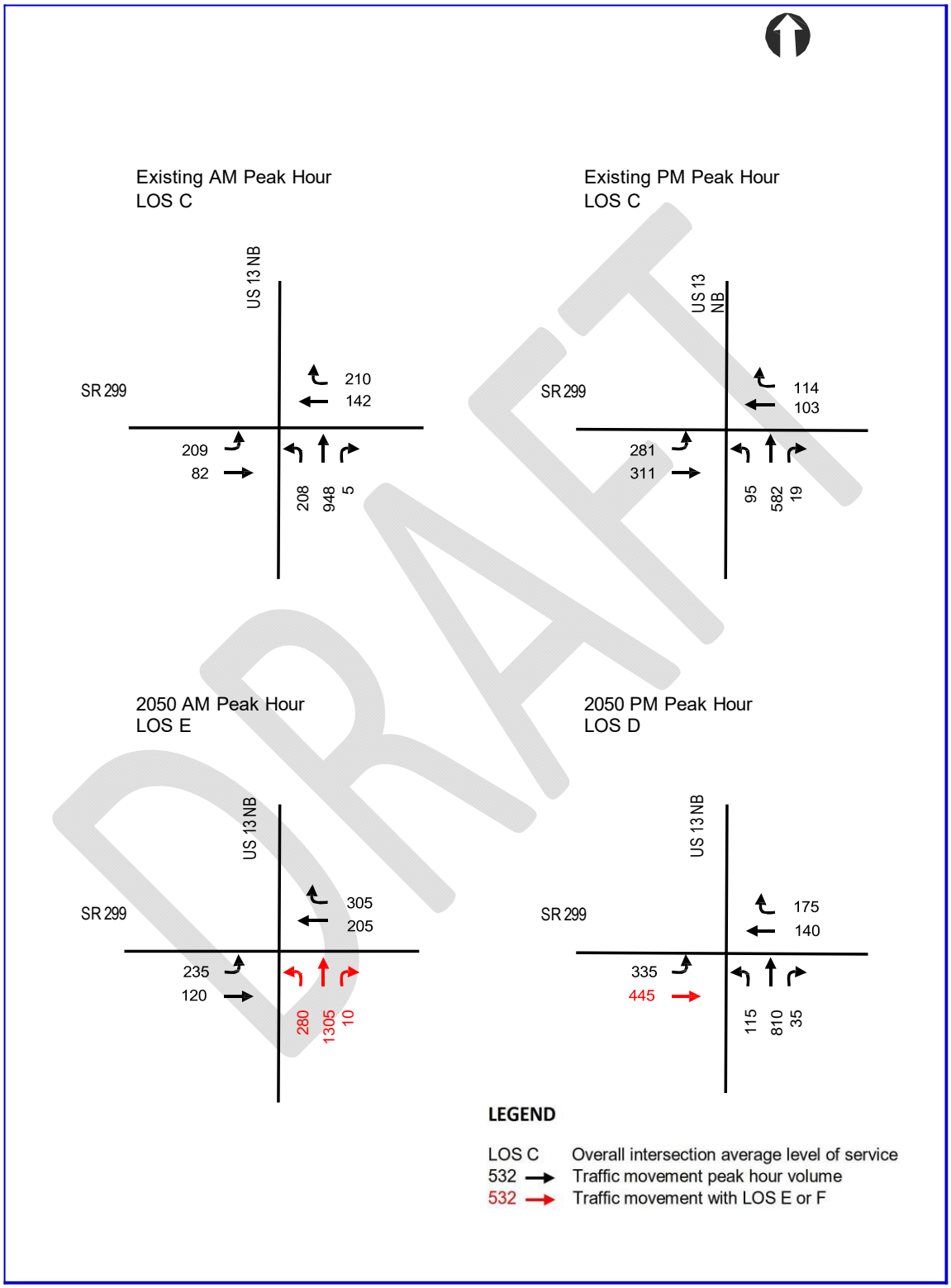
Alternative 3 – Add bike lanes and accommodate parking between intersections

If needed to accommodate required residential parking and good vehicle lane alignment across intersections, parking bays could be constructed behind the existing curb.

An appropriate alternative should be selected in consultation with the Odessa community.

Intersection 5: US 13 NB and SR 299 (one controller with US 13 SB)

Figure 8: Existing and 2050 volumes at US 13 NB and SR 299



US 13 NB and SR 299

Control Type	2050 LOS and Delay (seconds) Without Improvements	
	AM Peak	PM Peak
Signal	E (73)	D (36)

Deficient movements in 2050 are summarized below:

- EB SR 299 through movement operates at LOS E (72) in the PM peak
- NB US 13 operates at LOS F (99) in the AM peak

DelDOT has a paving and restriping project that will add a second EB left turn lane on SR 299 at US 13 northbound.

Improvement	2050 LOS and Delay (seconds) with Improvement	
	AM Peak	PM Peak
Restripe EB SR 299 for double left turn	D(42)	D(36)

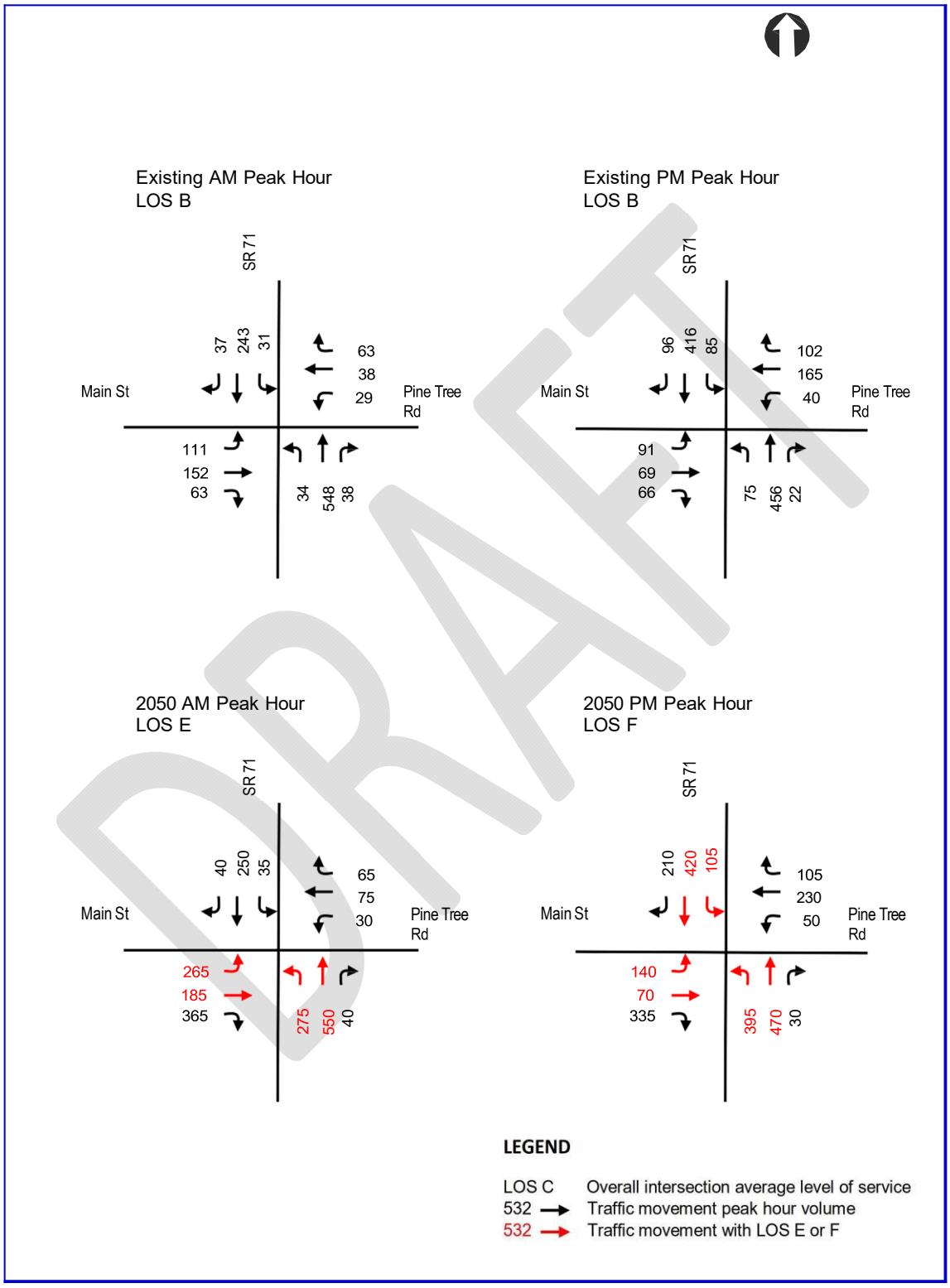
The proposed improvement at Intersection 4 results in additional benefits at US 13 and SR 299 in the PM peak period.

Improvement	2050 LOS and Delay (seconds) with Improvement at Intersection 4	
	AM Peak	PM Peak
Add second EB through lane on SR 299 at US 13 SB	D(42)	C(24)

The DelDOT repaving and restriping project includes a bike lane on the WB SR 299 approach. The bike lane transitions into the existing parking lane. There are several alternatives for completing bike facilities along SR 299 as noted in the discussion of Intersection 4. An appropriate alternative should be selected in consultation with the Odessa community.

Intersection 7: SR 71 and Main Street/Pine Tree Road

Figure 9: Existing and 2050 volumes at SR 71 and Main Street/Pine Tree Road



SR 71 and Main Street/Pine Tree Road

Control Type	2050 LOS and Delay (seconds) Without Improvements	
	AM Peak	PM Peak
Signal	E (75)	F (197)

Deficient movements in 2050 are summarized below:

- EB Main Street operates at LOS F (116) in the AM peak and LOS E (59) in the PM peak
- NB SR 71 operates at LOS E (68) in the AM peak and LOS F (353) in the PM peak
- SB SR 71 operates at LOS F (197) in the PM peak

At this intersection, two alternatives were analyzed. Alternative 1 retains a traffic signal and constructs dedicated left turn lanes on SR 71. Alternative 2 converts the intersection to a roundabout.

Improvement Alternative 1 – Signalized intersection	2050 LOS and Delay (seconds) with Improvement	
	AM Peak	PM Peak
Add dedicated left turn lanes to NB and SB SR 71. Each approach already has a dedicated right turn lane. Resulting lane configuration with improvement is: NB SR 71 - left turn, through, right turn SB SR 71 – left turn, through, right turn EB Main Street – shared left turn and through, right turn WB Pine Street – shared left turn and through, right turn	C(29)	C(28)

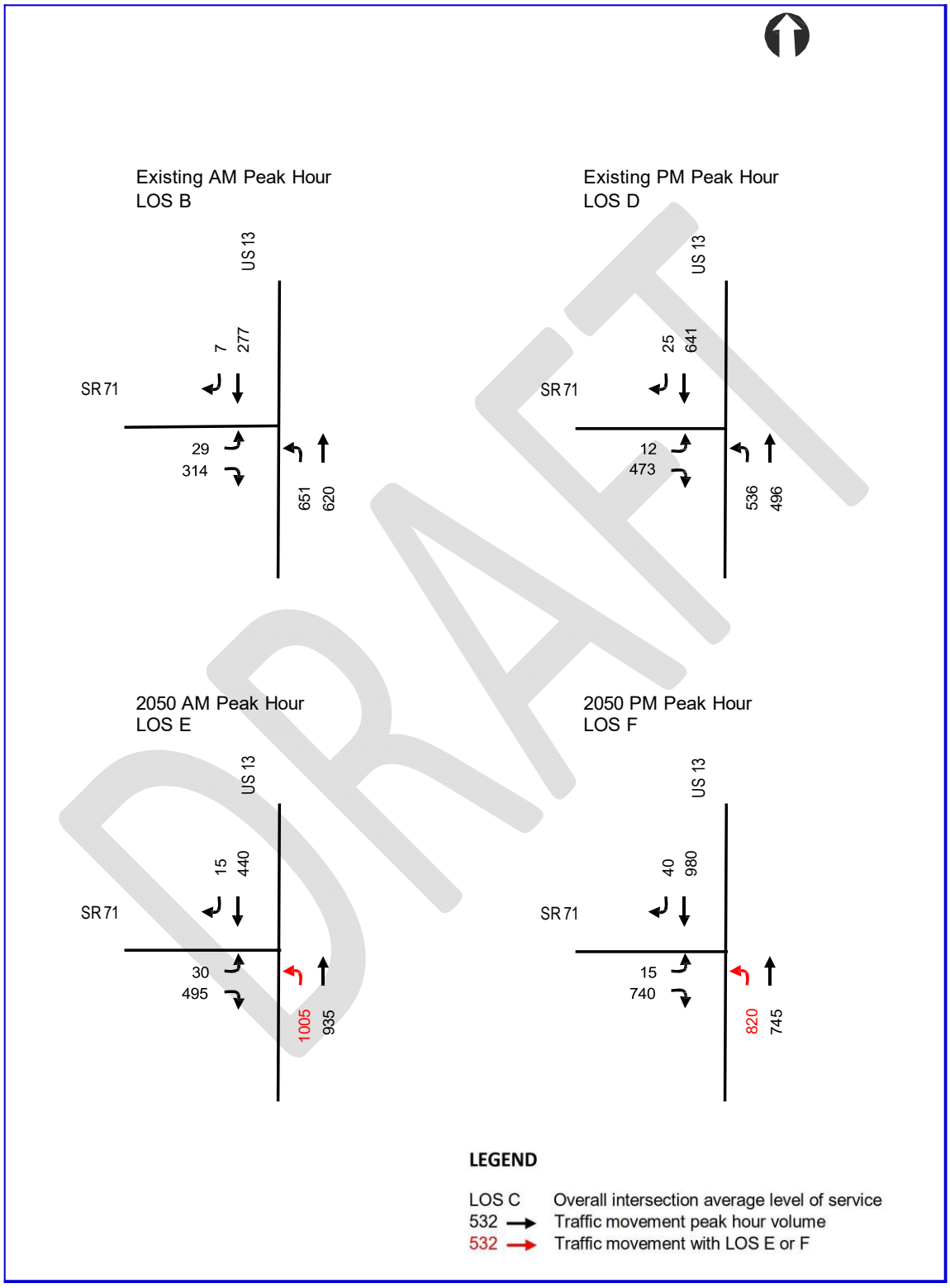
Improvement Alternative 2 – Roundabout	2050 LOS and Delay (seconds) with Improvement	
	AM Peak	PM Peak
Convert the existing signalized intersection to a roundabout with the following approach lanes: NB SR 71 - dedicated left turn, shared through and right turn SB SR 71 - shared through and left turn, dedicated right turn EB Main Street – one lane for all movements WB Pine Street – one lane for all movements Requires two circulating lanes within the roundabout from the NB SR 71 entry to the NB SR 71 exit (for NB left turn lane)	C(25)	D(30)

Future selection of the appropriate alternative at this location would be based not only on operations, but on anticipated property impacts. In particular, the auto repair shop on the southwest corner is subject to impacts to its access and parking.

Any potential improvements will need to accommodate pedestrians and bicyclists in accordance with the goals of the SNCC Master Plan and DelDOT's Complete Streets policy.

Intersection 8: US 13 and SR 71

Figure 10: Existing and 2050 volumes at US 13 and SR 71



US 13 and SR 71

2019 Control Type	2050 LOS and Delay (seconds) Without Improvements	
	AM Peak	PM Peak
Flasher (analyzed as Stop on SR 71 left turn, Free on US 13 NB and SB, and Yield on NB US 13 left. SR 71 SB movement to US 13 SB was analyzed as a ramp junction merge.	E (50) [NB US 13 left turn] SR 71 SB merge is LOS A	F (196) [NB US 13 left turn] SR 71 SB merge is LOS B

DelDOT is now in the process of converting this intersection from a flasher to a half-signal. Northbound US 13 will operate with free flow at all times. The NB US 13 left turn and SB US 13 through movements will operate with signal control during the weekday PM peak period and flasher control at other times. The northbound US 13 left turn lane storage will also be lengthened by 295 feet for a total storage length of 580 feet. The plans for the improvement were just completed in April 2020.

For 2050 analysis it is assumed that the NB US 13 left turn and SB US 13 through movements will operate with signal control during both the AM and PM peak periods.

With the half-signal, the NB US 13 left turn would require 70% of the cycle time in the AM peak, and also would require additional lengthening of the left turn lane.

Current Improvement	2050 LOS and Delay (seconds)	
	AM Peak	PM Peak
Half signal (SR 71 SB merge to US 13 SB is not included in intersection overall average LOS.)	C(26) including the free NB US 13 through movement. SB US 13 LOS is D(37). NB US 13 left turn LOS is D(45) with 95% queue of 973'.	D(35) including the free NB US 13 through movement. Signalized movements are LOS D(50) with v/c near 1.0. NB US 13 left turn queue is 753'.

The left turn from SR 71 to US 13 NB has a separate intersection on US 13 just north of the signal. This left turn is stop controlled and makes a two-stage left turn using the wide median. This movement is very low volume today and is expected to remain low in 2050. However, the short storage area for this movement holds only three vehicles and will become inadequate due to higher conflicting volume on SB US 13 and more frequent blockage by queues on US 13. When the left turn queue exceeds the storage, it will block the single SB through lane on SR 71. The recommendation to remedy this problem is:

- Close the median opening, so that the low-volume movement from SR 71 to US 13 NB is made by turning right onto US 13 SB and making a U-turn at the existing left turn lane 1,000 feet to the south.

Alternatively, a double left turn lane on NB US 13 may be considered in addition to the signal to reduce queues and allow a more balanced signal timing. This would require constructing an additional receiving lane on SR 71, which would then merge back to a single lane. The decision on whether to add a second NB left turn lane on US 13 would be based on DelDOT's judgment including factors other than peak hour levels of service.

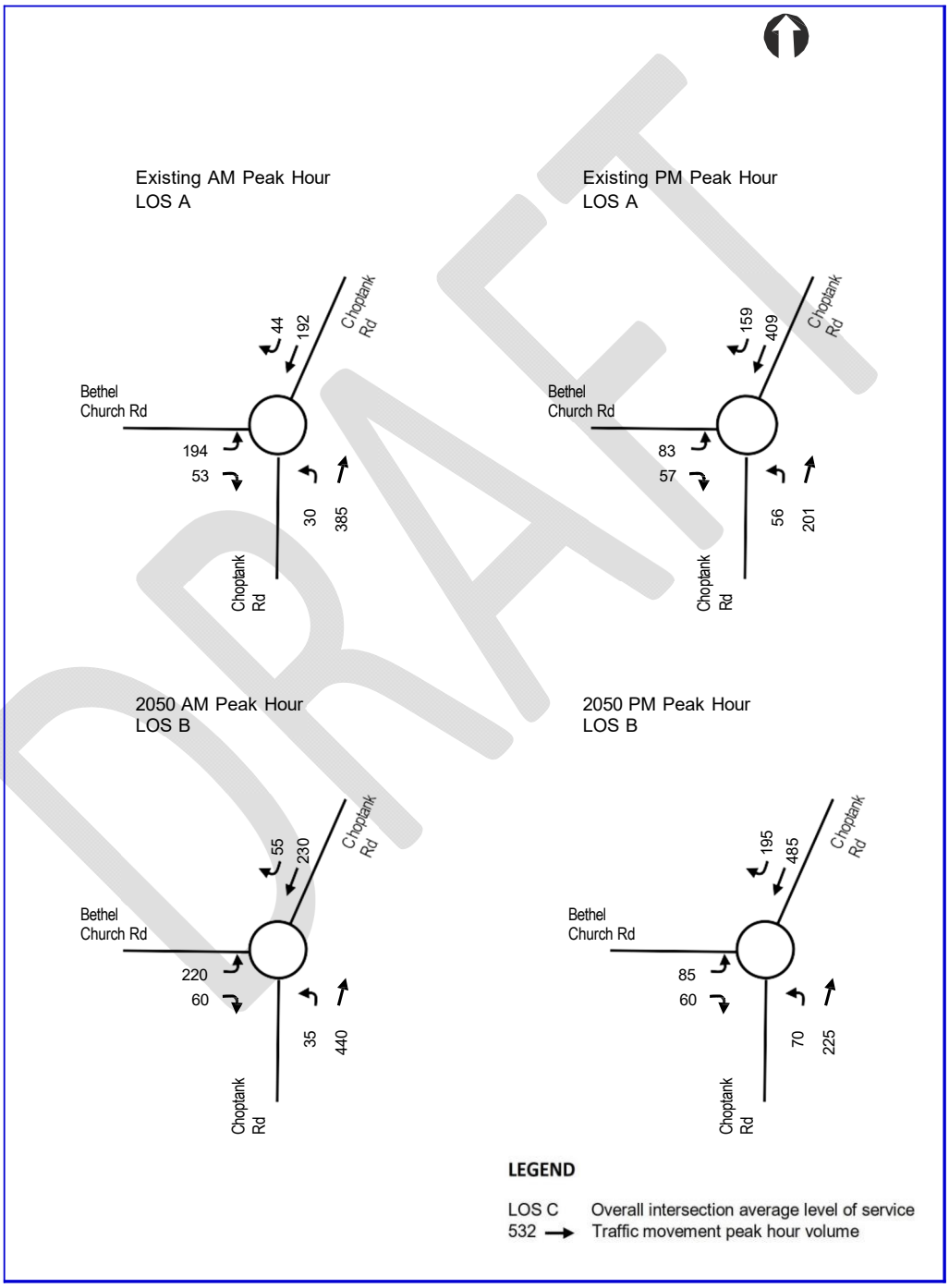
Additional Improvement	2050 LOS and Delay (seconds) with Improvement	
	AM Peak	PM Peak
Add 2nd NB left turn lane on US 13 (and 2nd receiving lane on NB SR 71) (SR 71 SB merge to US 13 SB is not included in intersection overall average LOS.)	B(12) including the free NB US 13 through movement. Signalized movements are C(21)	B(16) including the free NB US 13 through movement. Signalized movements are C(27) and B(20)

Intersections with Acceptable Levels of Service in 2050

This section includes study intersections with anticipated future LOS of LOS D or better. A figure is provided for each intersection illustrating existing and year 2050 traffic volumes and LOS without improvements.

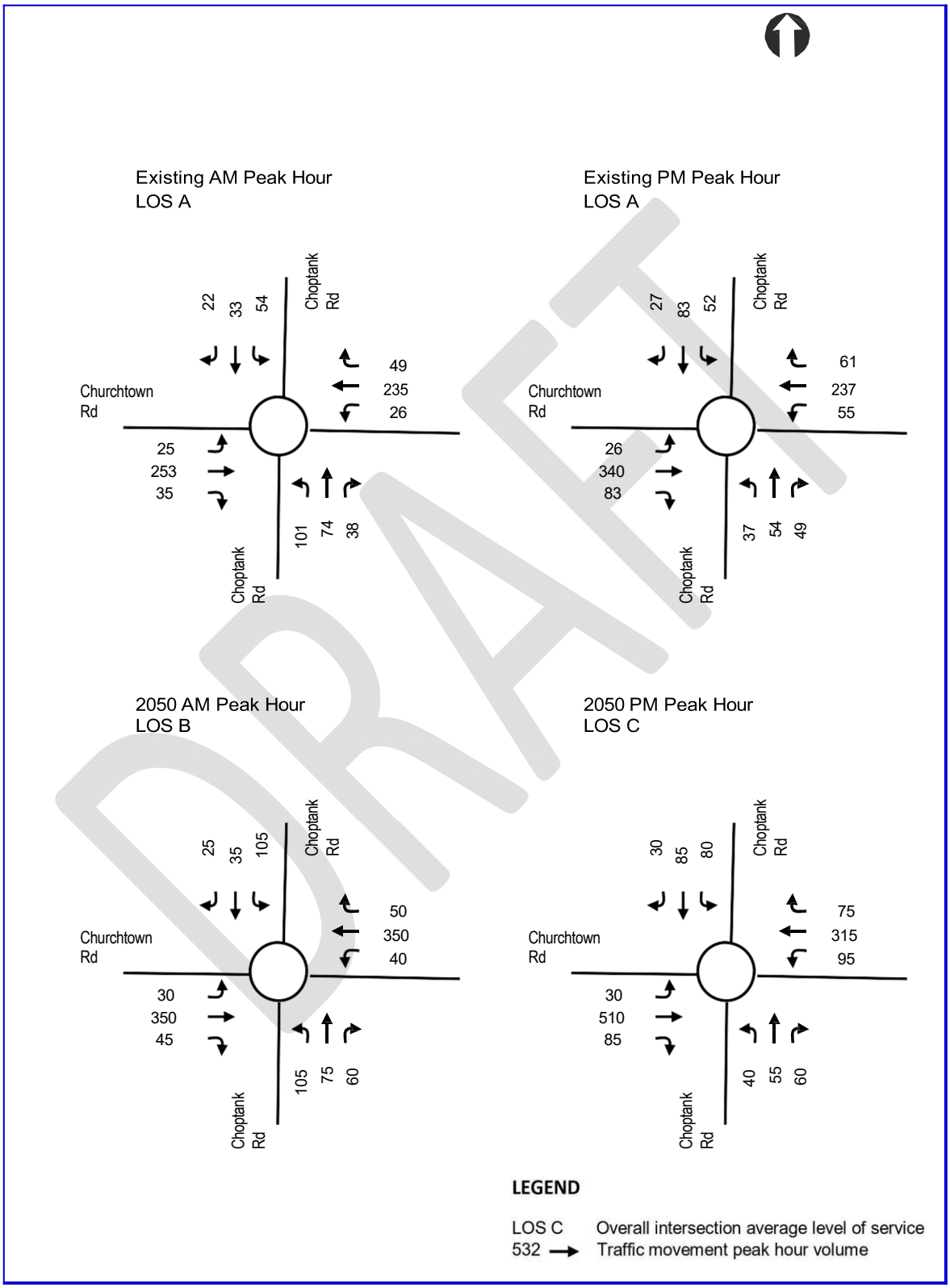
Intersection 1: Choptank Road and Bethel Church Road

Figure 11: Existing and 2050 volumes at Choptank Road and Bethel Church Road



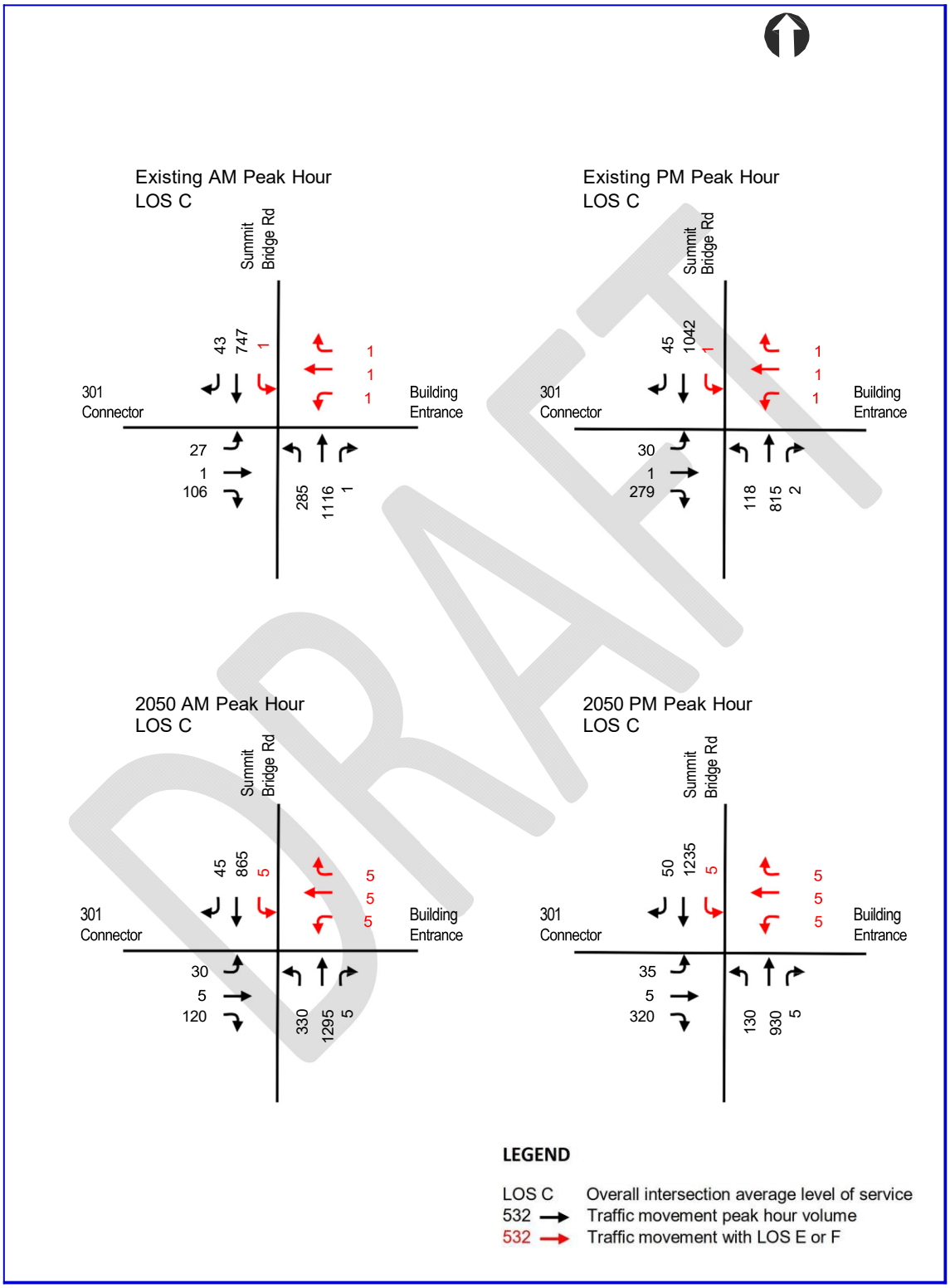
Intersection 2: Choptank Road and Churchtown Road

Figure 12: Existing and 2050 volumes at Choptank Road and Churchtown Road



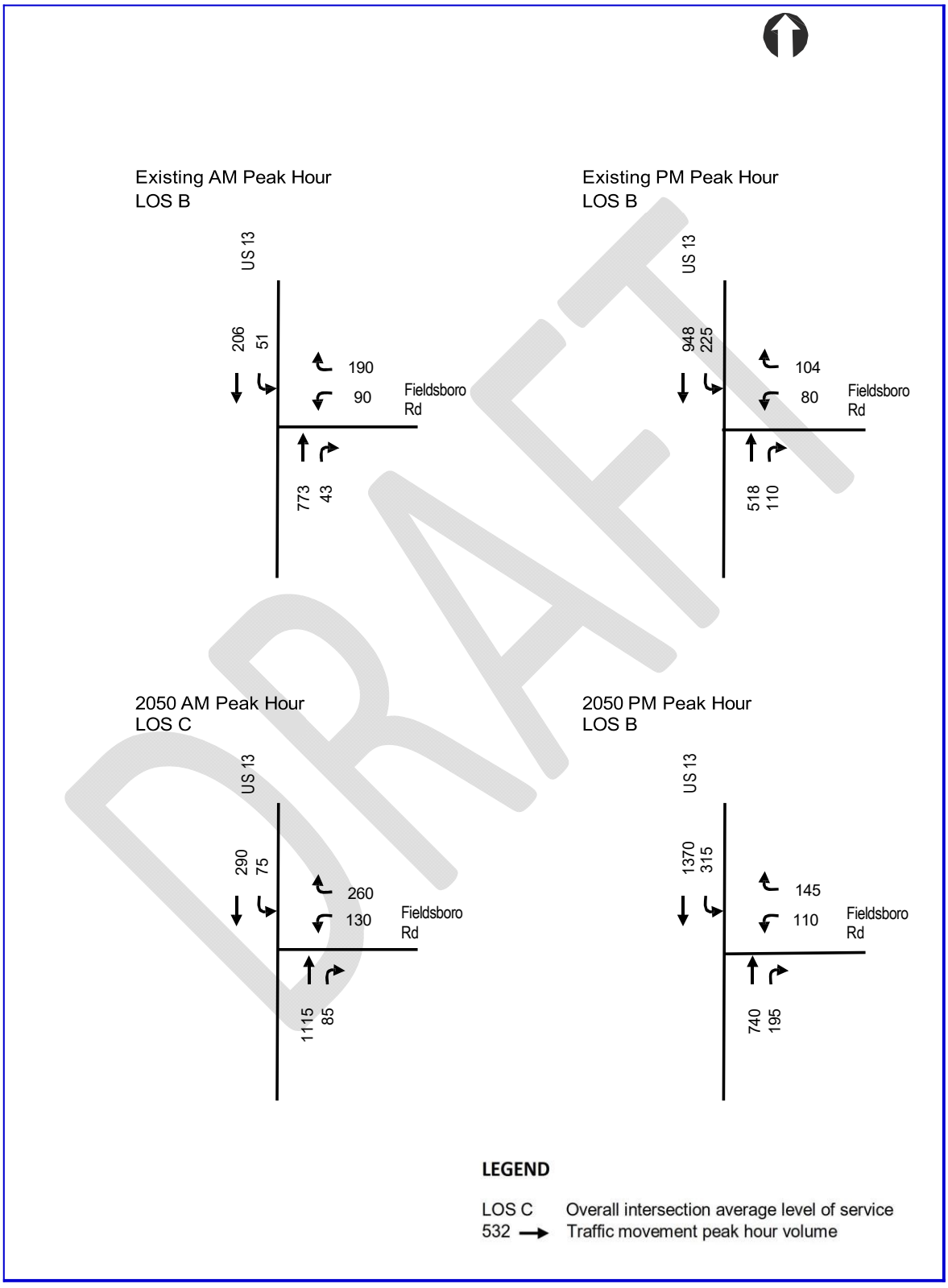
Intersection 3: Summit Bridge Road and 301 Connector

Figure 13: Existing and 2050 volumes at Summit Bridge Road and 301 Connector



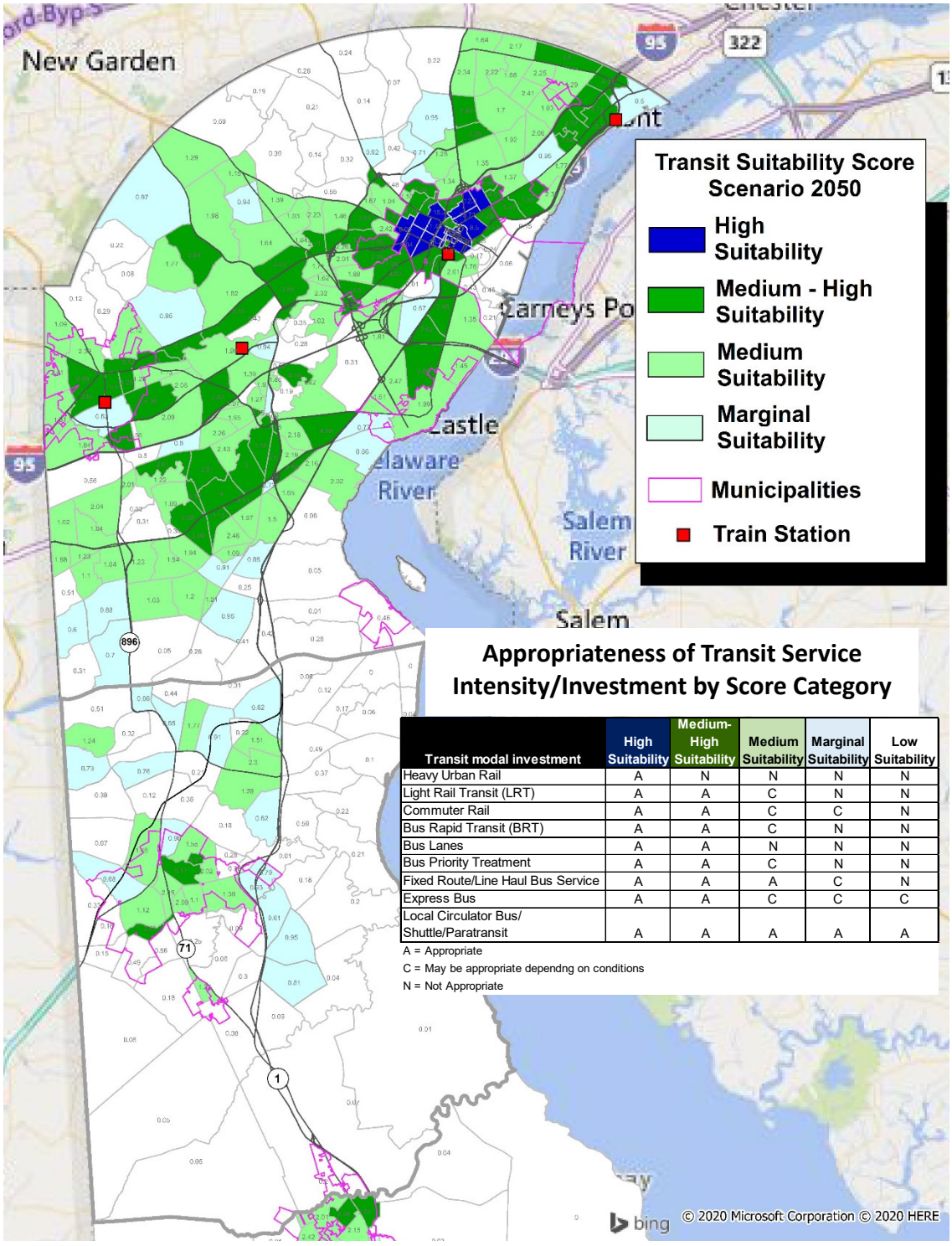
Intersection 6: US 13 and Fieldsboro Road

Figure 14: Existing and 2050 volumes at US 13 and Fieldsboro Road



Appendix B Transit Suitability Analysis of Preferred Scenario

Using a methodology developed by the Delaware Valley Regional Planning Commission (DVRPC), we can assess the appropriateness of various modes and intensities of transit service on a regional scale. The analysis measures the combined impacts of population, employment and zero-car household densities by Traffic Analysis Zone (TAZ) to determine the type(s) of transit that could potentially be supported. Each of the three land use scenarios were analyzed using the transit score methodology. The chart to the right breaks down the color designations.



Appropriateness of Transit Service Intensity/Investment by Score Category

Transit modal investment	High Suitability	Medium-High Suitability	Medium Suitability	Marginal Suitability	Low Suitability
Heavy Urban Rail	A	N	N	N	N
Light Rail Transit (LRT)	A	A	C	N	N
Commuter Rail	A	A	C	C	N
Bus Rapid Transit (BRT)	A	A	C	N	N
Bus Lanes	A	A	N	N	N
Bus Priority Treatment	A	A	C	N	N
Fixed Route/Line Haul Bus Service	A	A	A	C	N
Express Bus	A	A	C	C	C
Local Circulator Bus/ Shuttle/Paratransit	A	A	A	A	A

A = Appropriate
C = May be appropriate dependng on conditions
N = Not Appropriate

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