



**Southern New
Castle County**
LOCAL ROAD PLAN

prepared by
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for the
**New Castle County
Department of Land Use**
and the
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Transportation**
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INTRODUCTION

Purpose

In recent years, the portion of New Castle County, Delaware immediately south of the Chesapeake and Delaware Canal has experienced rapid growth. The suburbanization of areas closer to employment centers in the Wilmington-Newark corridor and the corresponding increase in congestion in those areas has made living “south of the canal” more desirable. Furthermore, the completion of the SR 1 bridge over the canal in 1995 improved access to commercial, retail, and cultural destinations in northern New Castle County. Finally, the County has funded a substantial sanitary sewer network in the area to order expected growth and provide economic development opportunities. The existing rural roadway network was not designed to accommodate the thousands of additional dwelling units anticipated in the study area, leading the agencies responsible for roadway sufficiency in New Castle County to take action.

The purpose of this study, undertaken by the New Castle County Department of Land Use in conjunction with the Delaware Department of Transportation (DelDOT), is to evaluate existing and forecast conditions in the study area and recommend potential improvements to local roadways to accommodate anticipated growth until 2025. The intent is for the County and DelDOT to use the recommendations contained in this report to:

- Develop an implementation plan, including timing and costs, for roadway improvements in the study area. DelDOT has programmed \$43 million in its draft FY 2004-2009 Capital Transportation Program for southern New Castle County; some portion of those funds will be used for local roads.
- Ensure that developers in the area pay their fair share for transportation improvements required as a result of their projects.

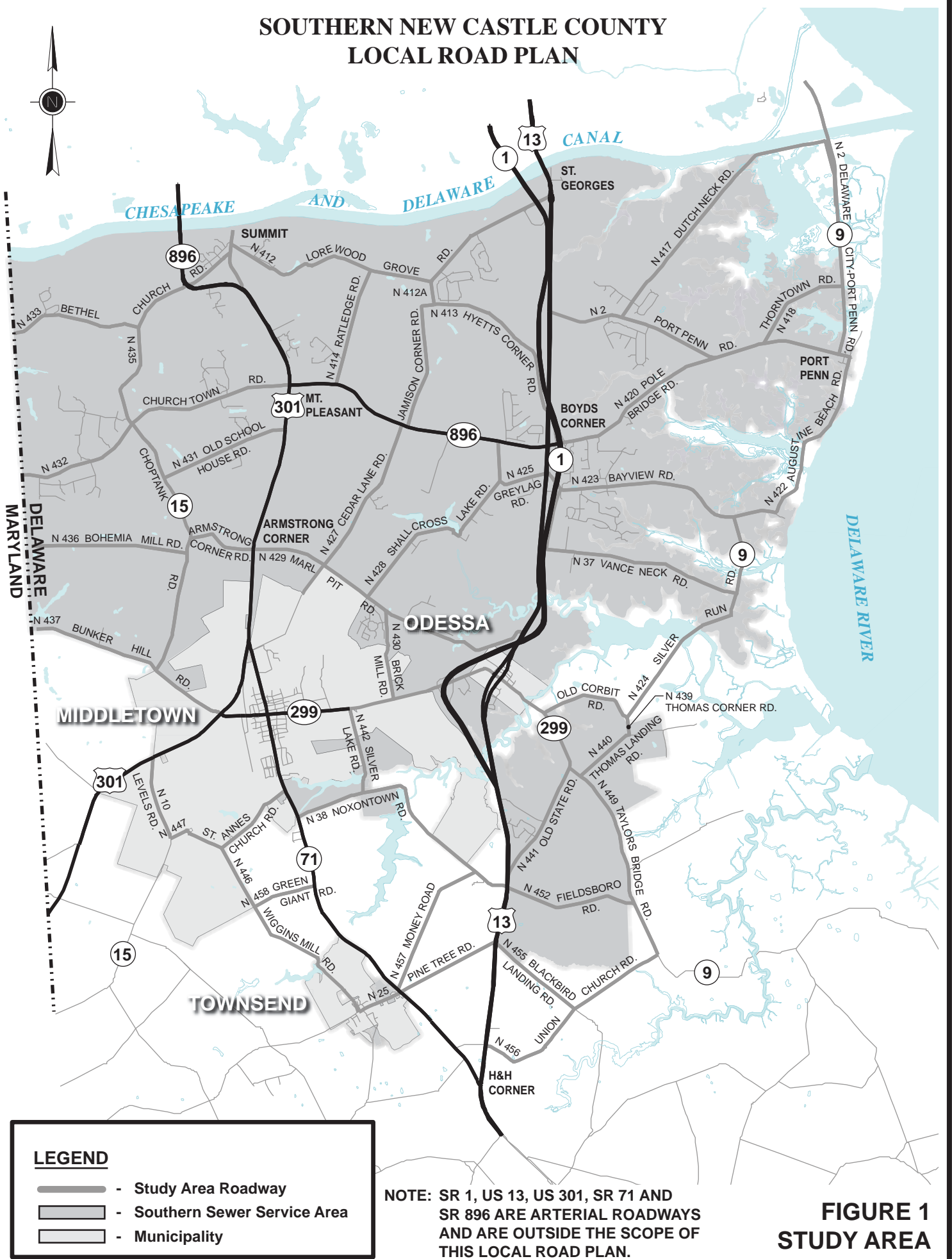
Scope of the Study

The focus of growth in southern New Castle County is the Southern Sewer Service Area, a region established by the County in 1999 to ensure centralized wastewater collection and treatment and decreased reliance on individual septic systems. Essentially all growth in southern New Castle County over the next 25 years is anticipated to occur in this 43,000-acre area.

The US Route 301 Major Investment Study (MIS), completed in 2000, has formed the basis for anticipated improvements to the arterial roadway system in the study area. Therefore, the scope of this study is limited to those roads that are classified by DelDOT as collector or local roadways. For simplicity, this study refers to those roads as “local” roads. All local roads within and immediately adjacent to the Southern Sewer Service Area were included. At the request of the County, SR 299 between Middletown and Odessa was also studied. Although this roadway is technically a minor arterial, it was not the subject of intense study as part of the US 301 MIS. The total scope, shown in Figure 1, includes 101 miles of roads.

Other arterial roadways in the study area, including SR 1, US 13, SR 896, and SR 71 were excluded from the study. In addition, some local roads in the study area are currently undergoing improvement and so have not been studied as part of this report. These include Choptank Road (SR 15) and Fieldsboro Road. Minor widening to provide five-foot shoulders is being designed on Choptank Road between Bunker Hill Road and Bethel Church Road, and roundabouts will be provided at three locations in this corridor. Fieldsboro Road will receive narrow shoulders as well as horizontal curve realignments as part of the Odessa National development.

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Concurrent with this study, DelDOT has recently completed an analysis of the Boyds Corner Road area, bounded by US 13, US 301, Drawyers Creek, and the Chesapeake and Delaware Canal. The purpose of that effort was to jointly consider the anticipated traffic impacts of many of the proposed developments noted in the Land Use section below. Article 11 of the County's *Unified Development Code* (UDC), which deals with traffic impact, does not currently contain a provision for multiple projects that are in the development process simultaneously to consider their cumulative effect. The Boyds Corner Road study examined the cumulative effect in that area and recommended a number of improvements to both arterial and local roadways, but did not recommend means to allocate the costs of those cumulative effects to individual developers.

LAND USE

Existing Land Use

Figure 2 illustrates existing and proposed land use in the study area. For this study, land use was classified into seven general categories: residential, commercial, industrial, institutional, recreational, undeveloped, and other.

The entire study area is rural, dominated by large farms, scattered residential developments, and some residential lots along local roads. Small commercial uses are found along some portions of US 13 and US 301. Summit Airport, the only substantial non-residential use in the area, is located on the west side of US 301 north of Churchtown Road.

The Town of Middletown is surrounded by the study area, although the study includes no roads within Town limits. Recent growth in Middletown has been extremely rapid as the Town has annexed farmland from the County. Development patterns are relatively dense for a rural context, and Middletown has cemented

its role as the commercial center of southern New Castle County.

Development Activity

Table 1 lists significant developments that are recorded or planned in the study area. These developments are also identified in Figure 2. These 20 developments comprise nearly two million square feet of commercial and industrial space and over 5,000 residential units. Although not all of these development applications have been approved, they do give a sense of the level of development that may need to be accommodated in the study area over at least the next ten years.

Furthermore, the Welfare Foundation owns over 2,000 acres, known as the Whitehall Tract, located just south of the canal. An exploratory sketch plan submitted for this land in September 1999 showed development of 860,000 sf of commercial uses and nearly 4,000 residential units, as well as the employment center identified as development number 6 in Table 1. Although the residential and commercial portions of this plan have since expired and, as such, no longer have any formal standing with the County, it is clear that the property owner anticipates substantial development of the site at some future date.

As a development proposal is reviewed by New Castle County under the UDC, the developer must demonstrate the adequacy of public facilities, such as roads and sewers, that will serve that development. Major development plans are subject to the traffic impact provisions of Article 11 of the UDC and DelDOT's *Rules and Regulations for Subdivision Streets*. These regulations require that the developer determine, subject to DelDOT and County review, the anticipated traffic impact due to the development. If unacceptable levels of service are found, the developer must mitigate traffic impact by reducing the development density, phasing construction to coincide with programmed transportation improvements, or building required highway improvements himself.

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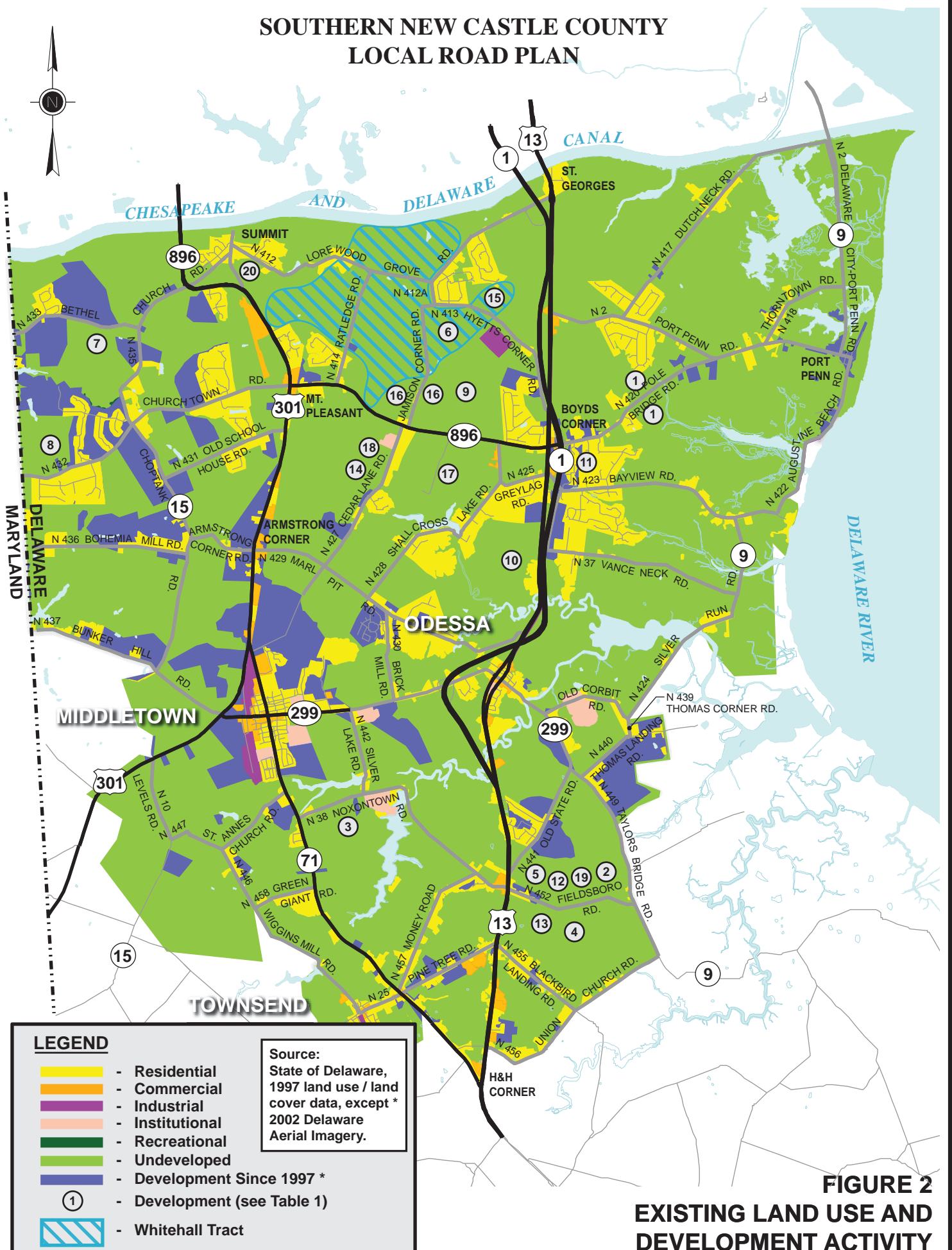


FIGURE 2
EXISTING LAND USE AND
DEVELOPMENT ACTIVITY

This process has proven particularly effective in those areas of New Castle County that are not experiencing intense development activity. However, when several plans are proposed at the same time within a similar geographic area, they are not required to consider their cumulative impact. In fact, as briefly noted in the introduction, just that situation has recently occurred in the study area. Although improvements required to

mitigate the anticipated effects of development in the Boyds Corner Road area have been identified, it has not yet been determined how responsibility for those improvements will be allocated to individual developers and the public. In the future, it would be desirable to amend the traffic impact provisions of the UDC to ensure that concurrent development activity is considered.

Table 1. Summary of Development Activity (as of June 6, 2003).

No.	Development	Description	Status
1	Augustine Creek, Phase 2	177 residential units	Approved
2	Odessa National	761 residential units, golf course	Approved
3	St. Andrews School	49,000 sf addition	Approved
4	Enclave at Odessa	205 residential units	Pending
5	Robinson Run	69 residential units	Pending
6	Scott Run Business Park	1,830,360 sf office/light industrial	Pending
7	Carter Farm	419 residential units	Pending
8	Country Club Estates	204 residential units	Pending
9	Bayberry North	768 residential units	Pending
10	Shannon Cove	410 residential units	Pending
11	Bayview Crossing	19,700 sf retail	Pending
12	Goldsborough Farm	80 residential units	Pending
13	Robinson Crossing	71 residential units	Pending
14	Cedar Lane	77 residential units	Pending
15	St. Georges Technical School	284,817 sf high school	Pending
16	Winchelsea	up to 587 residential units	Pending
17	Bayberry South	1,186 residential units	Pending
18	Churchtown Manor	381 residential units	Pending
19	Fairways at Odessa National	81 residential units	Pending
20	Rothwell Village/Goodwin Farms	145 residential units	Expired

Anticipated Future Development

WILMAPCO maintains a database of existing and projected population and employment in New Castle County. These data are available for 1998 (considered “existing” for this study), 2005, 2015, and 2025. Because the data are grouped geographically, they can be used to identify future development “hot spots” and, therefore, areas where significant infrastructure improvements may be needed.

Substantial growth is anticipated throughout the study area. For the purposes of this study, only 2025 projections were utilized. **The ultimate goal of this study is development of a program for anticipated roadway improvements, starting now and continuing for the next 25 years. As development plans are submitted, roadway improvement priorities can be shifted within the overall program to ensure that adequate roadways will serve that development.**

SAFETY

One of the key components of the Southern New Castle County Circulation Plan is an analysis of accidents along the study area roadways. This analysis will assist in determining appropriate strategies to improve safety in the study area. This approach is important not only in the short term, but in the future as increasing traffic exacerbates existing safety concerns.

To make the analysis of over 100 miles of roadway manageable, a two-phase approach was used. First, summaries were obtained from the Delaware Department of Transportation (DelDOT) for three years of accidents, from September 1997 through August 2000. During that time period, 308 reported accidents occurred on study area roadways, including 108 injuries and four fatalities. The accidents were plotted by milepost to determine locations of accident clusters. Furthermore, using roadway lengths and average daily traffic (ADT) provided by DelDOT's 1999 Traffic Summary, accident rates (number of accidents per million vehicle miles traveled) were calculated.

To prioritize detailed analyses, both clusters and overall roadways were ranked. Clusters were ranked based on a scoring system assigning one "point" for a property-damage-only (PDO) accident, three "points" for an injury accident, and ten "points" for a fatality. Roadways were sorted by accident rate and compared to the statewide average accident rate of 2.6 for rural collectors. To limit the analysis to a manageable number of clusters and roadway segments, the County and DelDOT agreed to the following cutoffs for detailed analyses:

- Approximately half of the clusters, including those with the highest number of "points."
- Roadways with greater than twice the statewide average accident rate.

Furthermore, Choptank Road between Bunker Hill Road and Bethel Church Road was removed from consideration because it is being addressed by a current DelDOT study. The resulting clusters and roadways selected for further study are listed below and illustrated in Figure 3.

Clusters

1. Cedar Lane Road, US 301 to north of Marl Pit Road
2. SR 299 at Brick Mill Road
3. Silver Lake Road at SR 299*
4. Lorewood Grove Road at SR 1 and US 13
5. SR 299 at US 13, Odessa
6. Cedar Lane Road near Chestnut Way
7. Old State Road north of US 13
8. Delaware City-Port Penn Road at and north of Thorntown Road
9. US 301 at Churchtown Road
10. US 301 at Bethel Church Road**
11. US 13 at SR 1 northbound ramp

Roadways

1. Fieldsboro Road
2. Vance Neck Road
3. Union Church Road
4. Money Road
5. Main Street / Old State Road
6. Bethel Church Road

* A new signal was installed at this location in 2001.

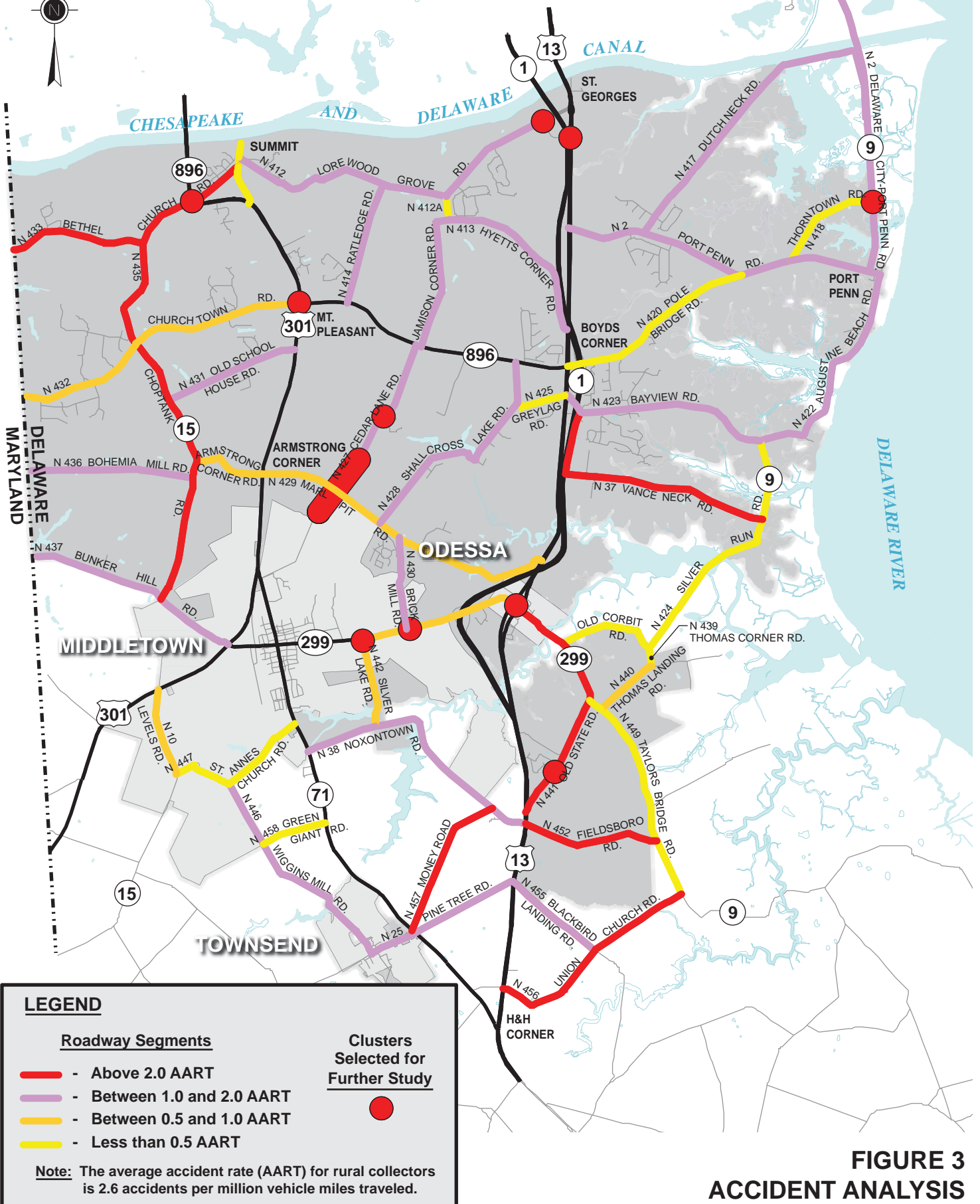
** A new signal was installed at this location in February 2003.

General Findings

The results of detailed accident analyses at the prioritized locations are detailed in a technical memorandum, "Summary of Accident Analysis," dated May 7, 2002. Generalized findings that may influence the recommendations of this study are noted below.

- Fixed-object accidents were prevalent, reflecting narrow pavement widths, lack of shoulders, substandard horizontal curves and superelevation, and minimal clear zones.

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**FIGURE 3
ACCIDENT ANALYSIS**

- Truck traffic, particularly farm vehicles, should be considered when determining appropriate roadway cross sections.
- Reduction or elimination of edge drop-offs should be studied.
- Sidewalks may be appropriate in areas where strip residential development fronts on study area roadways.

ROADWAY SUFFICIENCY

Design speed, cross section elements, and horizontal and vertical alignment were analyzed to determine the sufficiency of roadways in the study corridor. This long-term plan did not examine detailed criteria such as traffic control devices, lighting, and drainage. It is assumed that ultimate construction along the study area roadways would address those issues.

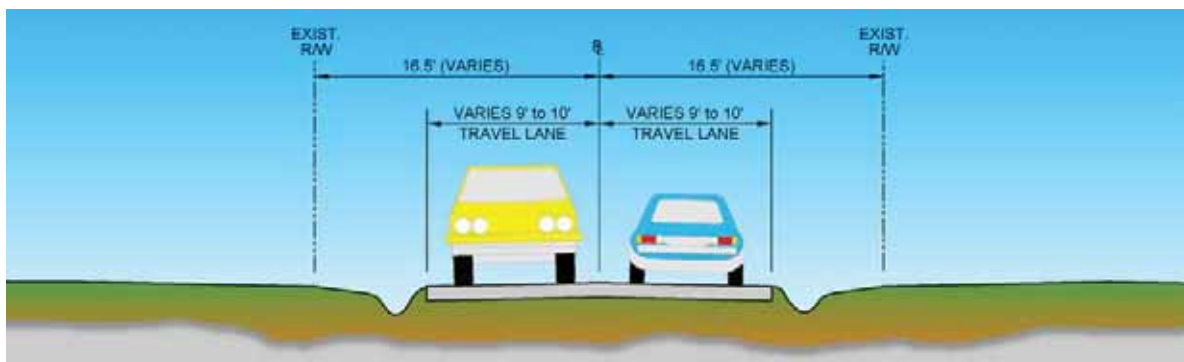
Design speed: As shown in Figure 5, the functional classifications of study area roadways include local roads, collectors, and minor arterials. DeIDOT's *Road Design Manual* determines design speed for two-lane roads in rural areas based on these classifications as well as average daily traffic (ADT). For reconstruction projects, all two-lane rural roads with a projected ADT greater than 400 have a recommended design speed of 50 mph. Local roads with an ADT of 100 to 400 may have a design speed of 40 mph, while 30 mph may be used as a design speed for roadways carrying less than 100 vehicles per day. The design speed of existing roadways

cannot be measured; rather, an evaluation of cross section elements, horizontal and vertical alignment, and clear zone can help determine safe operating speeds for these roads.

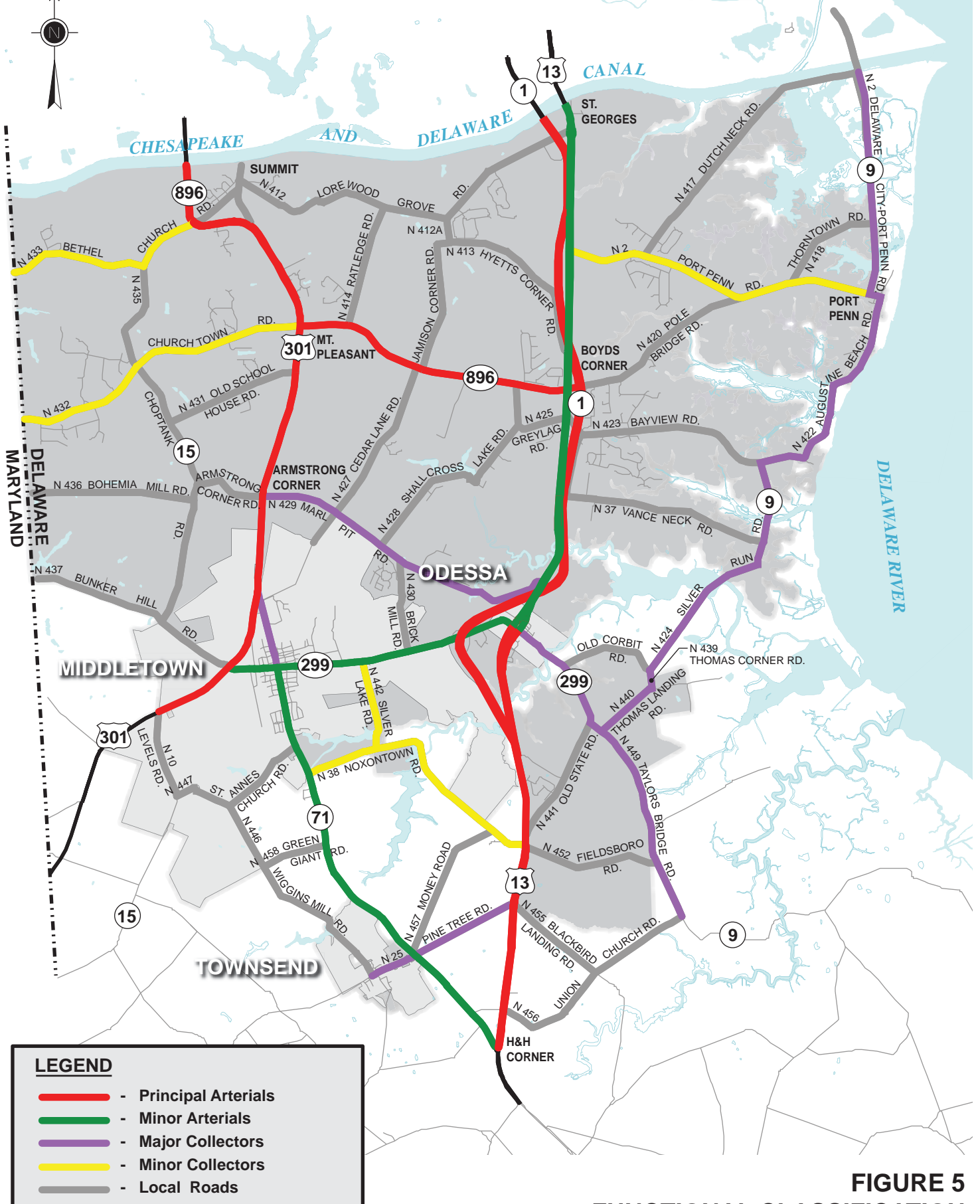
Cross section elements: Required cross section elements were established in accordance with the *Road Design Manual* and AASHTO's *Policy on the Geometric Design of Highways and Streets*, 2001. Table 2 shows the design standards for specific elements based on functional classification and ADT. Although a detailed survey was not performed as a part of this study, approximate field measurements and observations were used to determine general compliance with these criteria. As measured in the field, most study area roads have ten-foot travel lanes, which are substandard for all but the lowest volume roadways. A number of roads have even narrower lanes. Essentially none of the roads have paved shoulders, and more often than not, drainage ditches immediately adjacent to the pavement do not even provide an effective unpaved shoulder area. As such, nearly the entire study area local road system is currently deficient with respect to travel lane and shoulder widths.

Horizontal and vertical alignment: The *Road Design Manual* was used to identify substandard horizontal and vertical curves based on the design speed appropriate to each roadway. Based solely on field observations and USGS-level topographic data, 39 substandard horizontal curves and six substandard vertical curves were identified as shown in Figure 6.

Figure 4. Typical existing local road section.



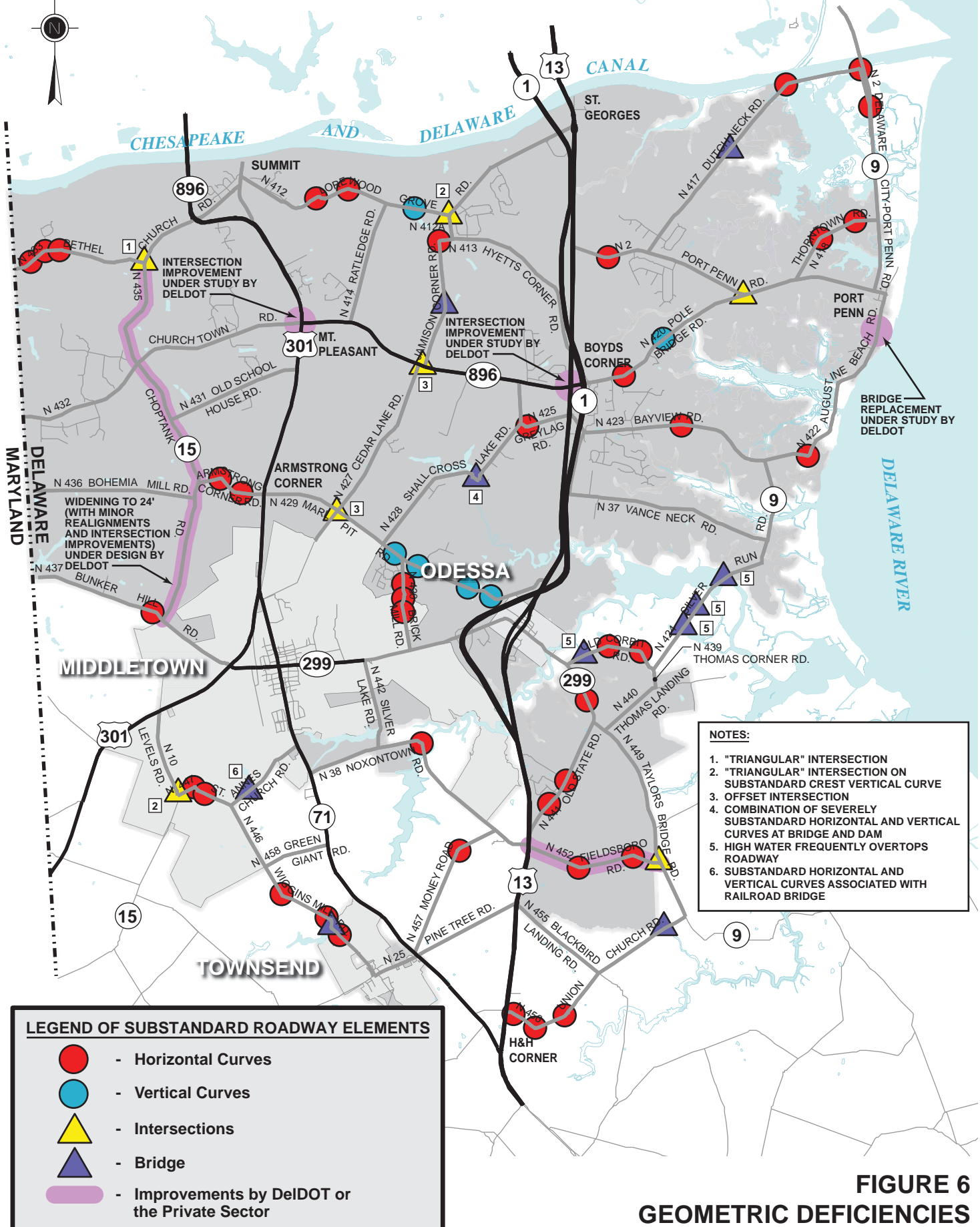
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Source: DelDOT Roadway Classification Map (2000)

**FIGURE 5
FUNCTIONAL CLASSIFICATION**

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**FIGURE 6
GEOMETRIC DEFICIENCIES**

Table 2. Design Standards for Cross Section Elements.

Design criterion	Arterial highways	Collector roads		Local roads		
		Over 2000 ADT	Under 2000 ADT	Over 400 ADT	100-400 ADT	Under 100 ADT
Minimum design speed (mph)	60	50	50	50	40	30
Maximum gradient (%)	5	6	6	8	9	10
Lane width (ft)	12	12	12	11	10	10
Shoulder width (ft)	10	8	6	6	4	4

Source: DelDOT Road Design Manual.

Three additional locations also have more complex geometric deficiencies, as detailed below.

- *Shallcross Lake dam* - The dam on Shallcross Lake Road and its southern approach have an extreme combination of horizontal and vertical curve deficiencies, as well as a roadway width of approximately 16 feet between guardrails. Although there was no significant occurrence of accidents at this location during the study period, increasing traffic by 2025 is likely to create more significant problems.
- *Lorewood Grove Road* - This roadway has a number of horizontal and vertical curve deficiencies, especially west of Ratledge Road. Recent development plans for the Micucio property explored realignment of this portion of Lorewood Grove Road to maintain a 50-mph design speed.
- *St. Anne's Church Road bridge* - The bridge over the Norfolk Southern tracks has one effective lane (approximately 14 feet wide) and suffers from extremely limited sight distance due to deficient horizontal and vertical curves.

TRAFFIC

Existing Conditions

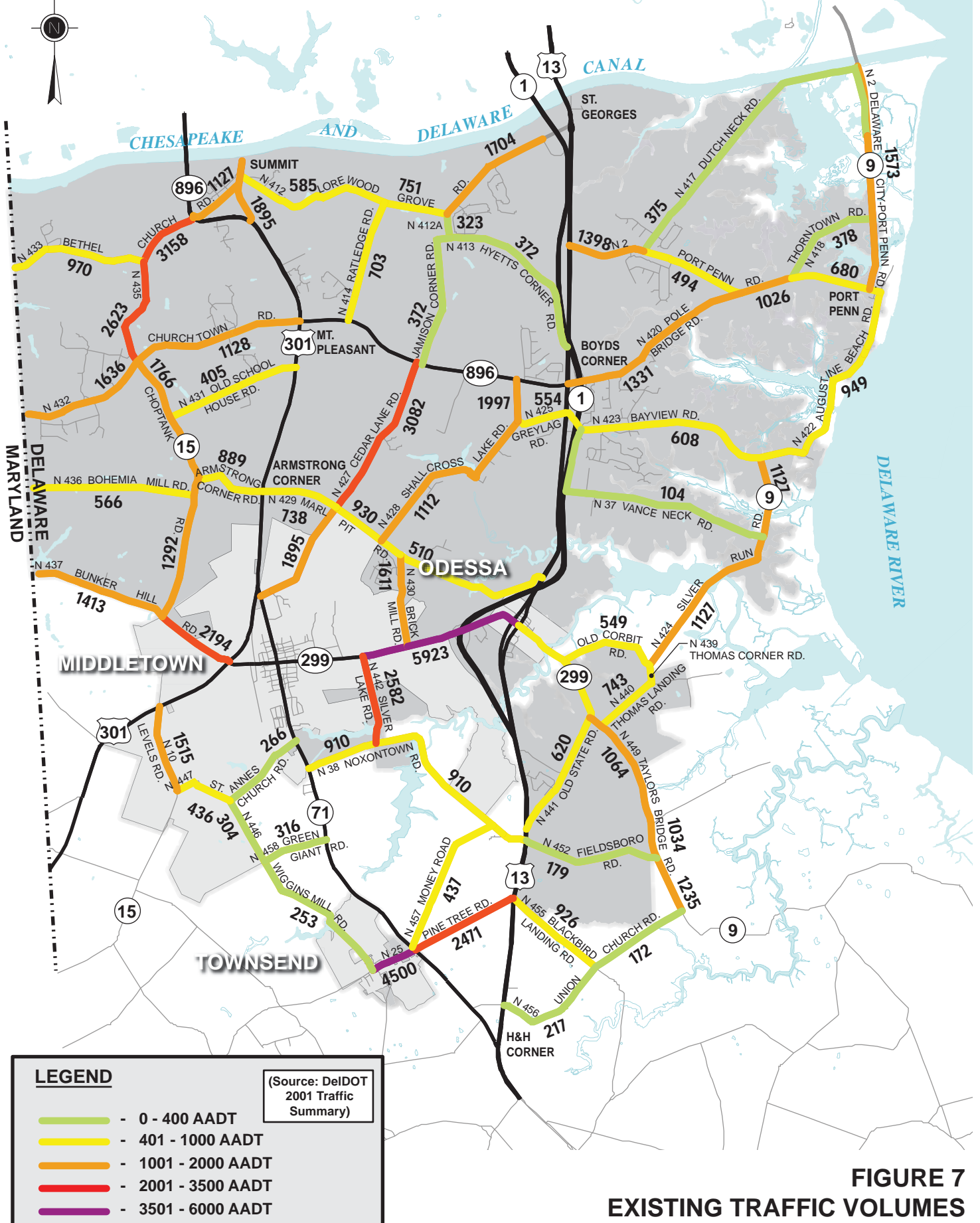
The existing traffic conditions evaluated for this project are based on published sources.

AADT, or the annual average daily traffic on a highway segment, is published by DelDOT in its annual Traffic Summary. The Traffic Summary cited in this report is from 2001. The existing AADTs in the study area are shown in Figure 7. Although detailed peak-hour turning movement volumes at some intersections were available from traffic impact studies (TISs) submitted by developers, analysis of link AADTs was determined to be more appropriate for this planning-level study.

The measure used to describe congestion is "level of service," or "LOS," which can be measured in terms of speed, travel time, or delay. Levels of service can range from A (free-flow, uncongested condition) to F (stop-and-go condition). Generally, New Castle County has established LOS D as the limit of acceptable congestion in sewer service areas. In areas without sewers, developments must not cause LOS to fall below existing levels, and in all cases LOS C or better must be maintained.

LOS for roadway segments may be defined as the percentage of the roadway's capacity being used by traffic. The higher the ratio, the closer the roadway is to LOS F. In general, traffic volumes in the study area are very low. Existing AADTs range from 100 to 5,500 vehicles per day, which indicates that all study area roadways currently function better than LOS D.

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Future Traffic

To estimate future traffic, DelDOT uses a travel demand model, a forecasting tool that uses anticipated growth in population and employment and determines its impact on traffic. For this study, DelDOT provided estimated AADTs for the study horizon year, 2025. This corresponds with the anticipated timeline for implementation of all future transportation projects adopted in the *Regional Transportation Plan* (RTP) published by the Wilmington Area Planning Council (WILMAPCO), the designated metropolitan planning organization for New Castle County. The projected traffic volumes shown in Figure 8 assume the major transportation system improvements noted in the RTP are in place.

The most substantial project anticipated by the RTP in the study area is the aforementioned US 301 MIS. Both build alternatives in the MIS assume a limited- or controlled-access roadway from US 301 at the Maryland state line to SR 1 just south of the C&D Canal. Because the completion date for this new roadway is unknown, future AADTs were developed both with and without the roadway in place. These two analyses account for the range of future AADTs shown in Figure 8.

Based on anticipated demographic trends and the RTP transportation system improvements, traffic is expected to substantially increase along study area roadways. This is expected to occur regardless of the chosen US 301 MIS alternative. However, in no case is this increase uniform throughout the study area. The travel demand model indicates that some roadways will have minimal increases in traffic, while traffic on others is expected to increase tenfold.

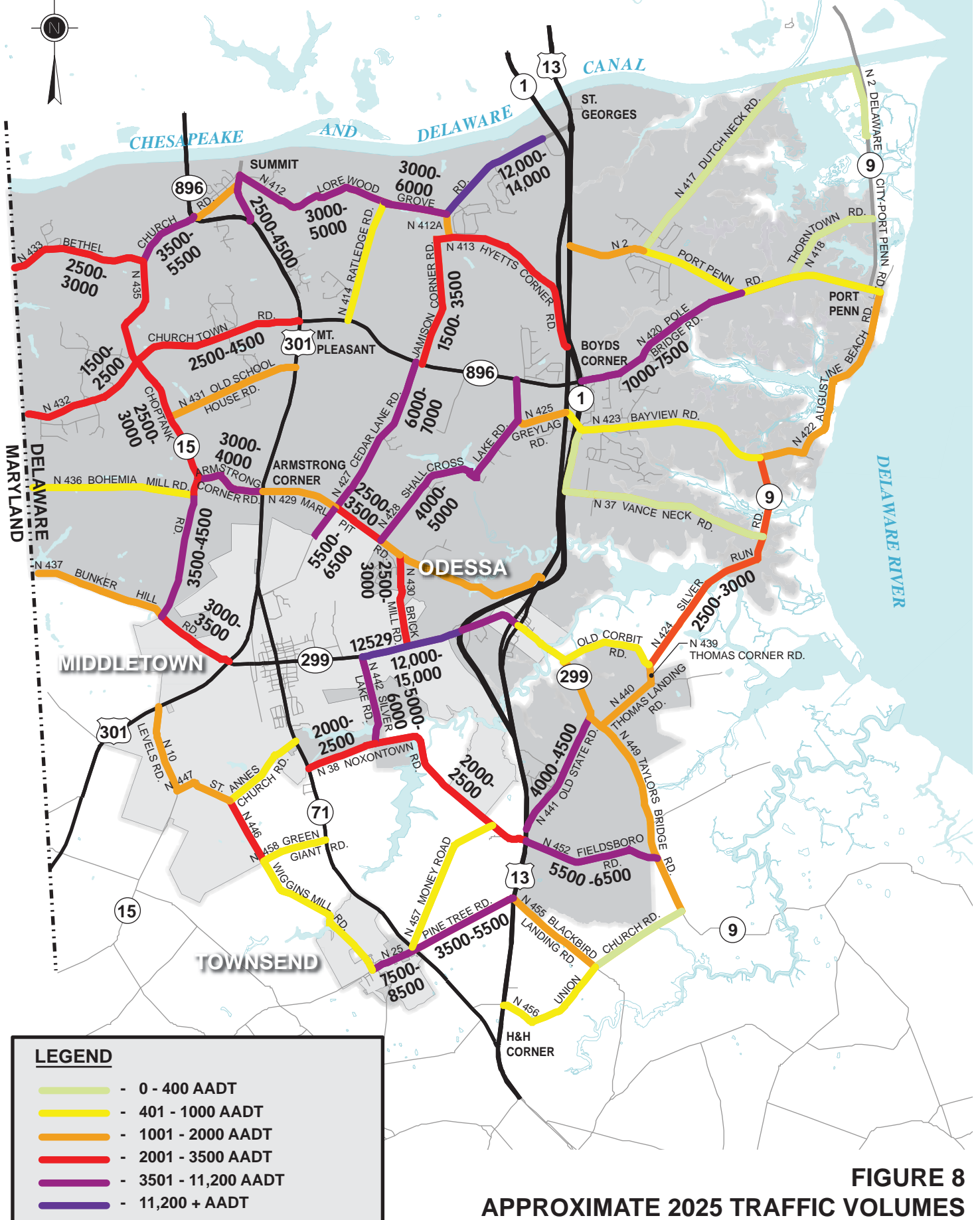
Although travel demand is expected to increase substantially, the low amount of existing traffic means that, even with extensive development, local roads in the study area will generally operate at acceptable levels of service.

Rather than the Transportation Research Board's *Highway Capacity Manual* level-of-service calculations, which tend to be more appropriate in an operations setting, a more basic planning-level system of screening criteria was used to ascertain the future adequacy of the roadway network. Based on criteria in the *Transportation Planning Handbook*, published by the Institute of Transportation Engineers, a typical two-lane roadway with appropriate lane widths and shoulders becomes congested (LOS E) at an AADT of approximately 11,200. This is not to say that all two-lane roadways operate unacceptably at this traffic level; in fact, some two-lane roadways in Delaware carry twice that traffic without significant breakdowns in traffic flow. However, maintenance of acceptable traffic flow in such circumstances is dependent on reducing side friction, such as turning traffic, which can slow through traffic. For this reason, study area roadways with projected AADTs of greater than 11,200 are recommended for consideration of a three-lane section, separating left-turning traffic from the through traffic stream. Full shoulders should also be considered to separate right-turning traffic as well.

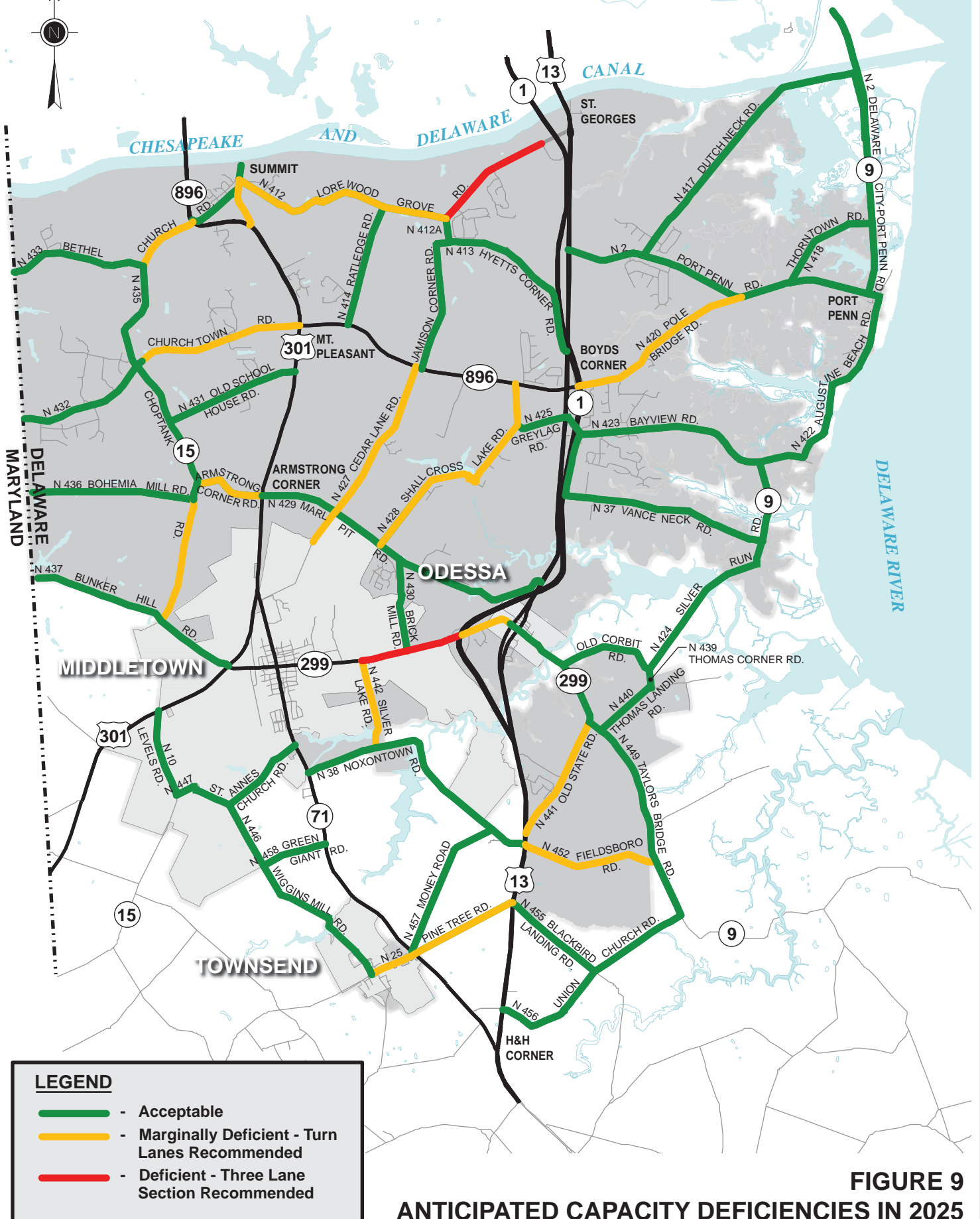
The volume warrants for left-turn lanes found in DelDOT's *Standards and Regulations for Access to State Highways* were used to determine where such turn lanes might be appropriate. Generally, conditions where left turn lanes are warranted do not occur below AADTs of approximately 3,500. Therefore, this threshold was chosen as a conservative estimate for the future need for turn lanes. Below an AADT of 3,500, two-lane local roadways operate acceptably without provision of turn lanes.

Figure 9 illustrates anticipated capacity deficiencies in 2025 based on the assumptions noted above. This figure also assumes that all roadways in the study area are upgraded to basic lane width and shoulder width standards. If appropriate lane and shoulder widths are not provided, the capacity of each roadway will be substantially reduced.

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MOBILITY OPTIONS

Reducing reliance on the automobile for travel has many benefits, including improved air quality, reduced roadway congestion, and public health. For these reasons, WILMAPCO has established a clear emphasis on reducing vehicle miles of automobile travel. Although this is an important goal in the development of a local road plan for southern New Castle County, a number of challenges exist.

Outside the municipal boundaries of Middletown, Odessa, and Townsend, existing and proposed development in the study area is of very low density. Overall development density is not expected to exceed one dwelling unit per gross acre in the entire Southern Sewer Service Area. This development pattern, in conjunction with the widely-spaced network of local roads in the study area, means that non-automobile travel is infeasible for all but the shortest trips, generally within individual residential subdivisions. Furthermore, lack of diverse land uses also contributes to auto dependence. Therefore, means to increase mobility are somewhat limited. However, those opportunities that do exist to encourage non-automobile trips are examined below, as are potential strategies to reduce vehicle miles of automobile travel.

Multimodal Facilities

DelDOT policies on bicycle and pedestrian facilities mandate accommodation of those modes of travel on roadway construction projects within urban and suburban areas. However, the rural nature of the study area and low anticipated development densities make the need for such facilities less compelling in southern New Castle County. This does not obviate their need entirely, but indicates the need to focus the limited funds available for bicycle and pedestrian facilities in the areas of greatest demand.

For example, as developments are proposed adjacent to higher-density areas such as the Town of Middletown, sidewalks should be

required to facilitate access to those areas. The cluster development option of the UDC also enhances the desirability of sidewalks within communities. In other areas, the provision of shoulders in accordance with the *Road Design Manual* adequately accommodates bicyclists and allows clean, dry passage for pedestrians without the expense of a sidewalk that may receive little use.

Because development patterns and demand for multimodal facilities may change in the future, right of way should be provided in all cases for full bicycle lanes and sidewalks.

The only transit service in the study area is DART route 301, which provides service between northern New Castle County and Dover. Park-and-ride lots for the 301 are provided in Boyds Corner, Odessa, and Middletown. Ten round trips are provided each weekday, although two of these are expresses with no stops between Christiana Mall and Dover.

Existing and anticipated development densities are far too low to support bus service throughout the study area. However, there is some hope for transit ridership given the success of the 301. Alternative 301 routes may be considered in the future to better serve developing areas west of US 13, where the service currently runs. For example, the 301 could be split between its current route and an additional one between Christiana Mall and Smyrna via US 40, US 301, and SR 71. This alternate routing could be tested by moving two of the existing ten daily round trips to the new corridor and gauging ridership.

As the study area develops further, realignment of the 301 off major highways could provide better access to new residential communities and employment centers, including the Whitehall and Fieldsboro Road areas. These routes are not likely to generate substantial discretionary ridership, but provide an important service for those area residents who are unable to drive or do not have access to a car.

Roadway Network Density

Use of modes other than the automobile is not the only means to reduce vehicle miles of travel. When a roadway network is too scattered, travelers have to go out of their way to make indirect trips. This study uses the term “roadway network density” to denote the relative distance between roadways and its impact on mobility. If roadways are too far apart, new local roads may be considered to augment the existing network and reduce travel times and distances.

There is limited research on the subject of roadway network density. Reid Ewing, in *Best Development Practices* and subsequent research, addresses the topic indirectly by indicating a desirable spacing between collector roadways. In Ewing’s example, the appropriate spacing is approximately one half mile. However, that analysis was for more highly developed areas, with an average density in Ewing’s case studies of about five dwelling units per acre. This contrasts to the anticipated density of one unit per acre in the Southern Sewer Service Area.

To apply this standard in the study area, roadway network density can be considered as a function of block size rather than distance between roads. For example, Ewing’s half-mile spacing would result in blocks of 160 acres, which would accommodate about 800 dwelling units. Therefore, it is reasonable to use block sizes of 800 ultimate dwelling units as a standard in southern New Castle County. This would result in an average roadway spacing of just over 1.1 miles.

As an alternative, blocks in the study area were examined to approximate the number of dwelling units anticipated at buildout. This was accomplished simply by measuring the amount of developable land and assuming one dwelling unit per acre. The resulting roadway

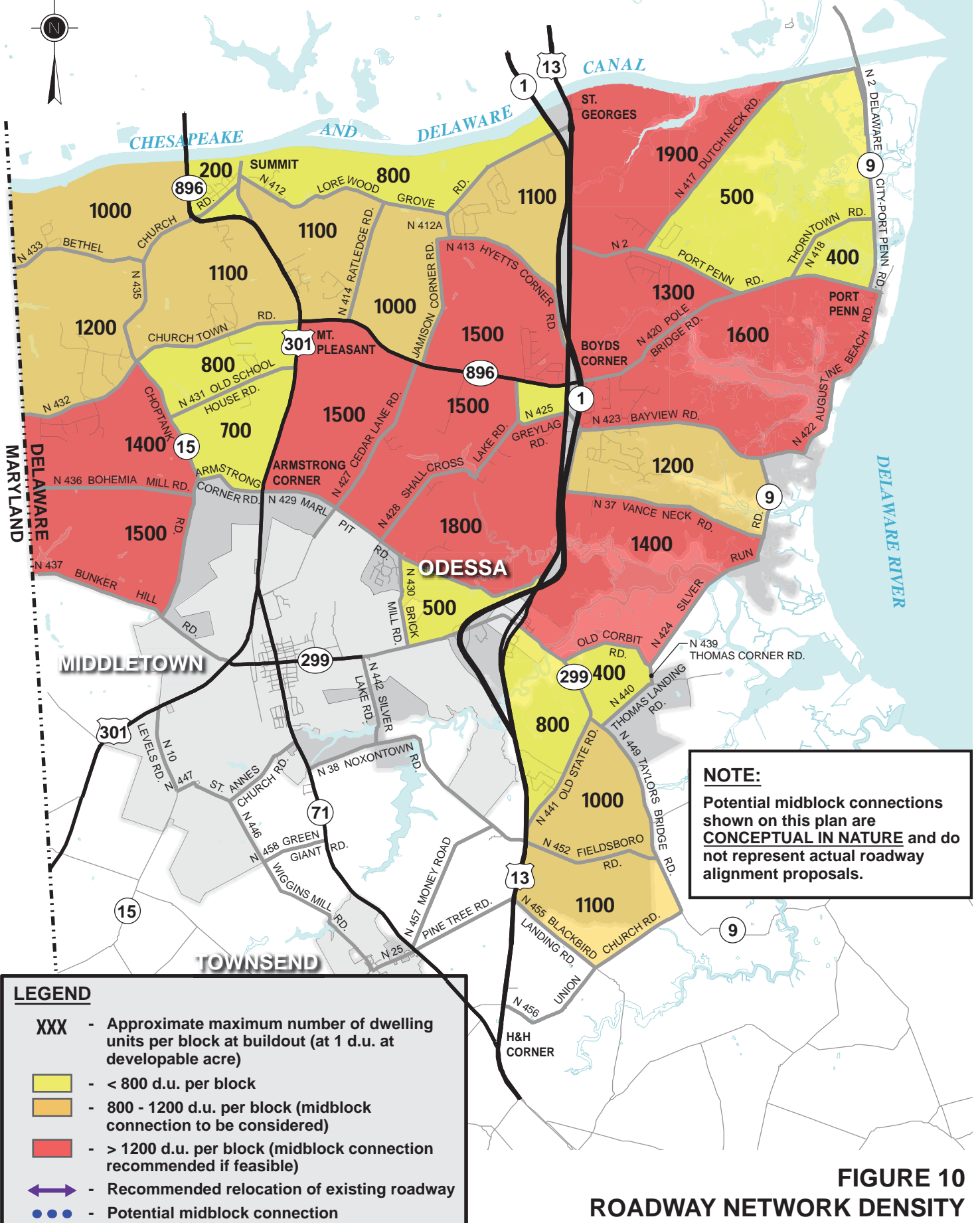
network density, expressed in dwelling units per block, is illustrated in Figure 10. Blocks including significant portions of the Town of Middletown were not included due to uncertainty regarding ultimate development density and hardship in building connector roads through largely developed areas.

Based on the standard of 800 units per block, about 20 blocks in the study area would benefit from additional connector roadways. Priority areas would include those blocks with, say, 1.5 times the standard number of units, or 1200. Using this criterion, ten blocks could be considered in the short-term for feasibility of building connector roads or reserving right of way for their eventual construction.

Development of specific recommendations for additional connectors is beyond the scope of this study. However, Figure 10 shows in an illustrative manner the types of connections that might be recommended based on more detailed study. In the Fieldsboro Road area, these lines represent an actual Local Circulation Plan developed under the UDC’s provisions and currently used by the County to guide the actions of area developers. The connectors shown in Figure 10 in the vicinity of the Bayberry developments are based in large part on proposals made by developers; a Local Circulation Plan for this area is under review.

It is recommended that the County and DelDOT utilize the Local Circulation Plan provision noted above to map appropriate locations for connectors in the remaining portions of the study area. As has been demonstrated in the Fieldsboro Road example, Local Circulation Plans can be used during the development review process to denote areas where these direct connections would need to be provided by developers.

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**FIGURE 10
ROADWAY NETWORK DENSITY**

RECOMMENDATIONS

Previous sections of this report identified existing and anticipated future transportation system deficiencies in the study area. Potential improvements to address those deficiencies are summarized below. Note that this report is a summary of New Castle County recommendations to DelDOT. As a formal implementation plan is developed jointly by the two agencies, stakeholder involvement with the public at large and with the development community in particular is strongly recommended.

To produce a conservative estimate of cost for anticipated improvements to nearly 90 miles of local roads, it was assumed that all roadways will be reconstructed and widened to the full section recommended by DelDOT's *Road Design Manual*. The proposed section was assumed to vary from two 11-foot lanes and two four-foot shoulders, for lightly-traveled local roads, to two 12-foot lanes and two eight-foot shoulders for more heavily used collector roadways. Due to the rural nature of the study area and sensitivity to the context of adjacent historic, natural, and aesthetic resources, DelDOT is encouraged to consider reduced roadway sections in some locations during the project development process.

Recommended Improvements

- Reconstruct the entire length of Lorewood Grove Road between Summit and the SR 1 interchange at South St. Georges. Between Summit and Road 412A, realign 5500 feet of the roadway to provide preferably a 50-mph design speed (40-mph minimum) and reconstruct the crossing of the Norfolk Southern tracks west of Ratledge Road. Turn lanes or roundabouts should be provided at intersections and development entrances in this section. Between Road 412A and SR 1, provide a three-lane typical section, either with dedicated left turn lanes and a median, or with a two-way left-turn lane (TWLTL) for roadside access.
- Realign existing Road 412A to the west between Lorewood Grove Road and Hyetts Corner/Jamison Corner Road. It is anticipated that the new Road 412A would serve as a direct connection from the eastern leg of Lorewood Grove Road to Jamison Corner Road so that no turns would be required between the SR 1 interchange and Boyds Corner Road.
- Realign the southernmost 1-1/4 miles of Jamison Corner Road to the west, tying into Boyds Corner Road opposite Cedar Lane Road. A potential corridor for this realignment is shown on the proposed plans for Scott Run Business Park and Winchelsea.
- Reconstruct SR 299 between Silver Lake Road and SR 1 with a three-lane typical section. It may be desirable to extend this improvement west into Middletown, although that area was not included in this study. Although not explicitly called for by projected traffic volumes, more detailed studies should consider a four-lane section on SR 299 for consistency with recent improvements at the SR 1 interchange.
- Realign approximately 0.6 miles at the west end of Armstrong Corner Road to eliminate substandard horizontal curves and align the roadway with Bohemia Mill Road. Right of way for this realignment has been acquired.
- Raise approximately 0.3 miles of Old Corbit Road just east of SR 299 to reduce the occurrence of flooding.
- Rebuild the existing substandard railroad bridge on St. Anne's Church Road and its approaches. Given the low projected ADT on this roadway, it appears appropriate to consider an at-grade crossing in lieu of a new bridge, or simply closure of the crossing and provision of culs-de-sac at either side. If closure is considered, access for emergency service

vehicles, bicycles, and pedestrians should be addressed.

- Reconstruct all other collector and local roadways in the study area to at least minimum DelDOT standards for two-lane rural roadways (see Table 2). Each roadway reconstruction would include realignment of all substandard horizontal and vertical curves to comply with a 50-mph design speed and retrofit or replacement of all substandard bridges and culverts.
- Provide turn lanes or roundabouts at intersections and development entrances on the following roads, where future volumes are expected to exceed 3,500 AADT. These improvements should be provided when the roads are improved to the DelDOT standard typical section.
 - Pole Bridge Road between the SR 1 interchange and Port Penn Road.
 - Bethel Church Road between Choptank Road and US 301.
 - Churchtown Road between Choptank Road and US 301.
 - Armstrong Corner Road between Choptank Road and US 301.
 - Cedar Lane Road between the Middletown town line and Boyds Corner Road.
 - Silver Lake Road between the Middletown town line and Noxontown Road.
 - SR 299 between the SR 1 interchange and US 13.
 - Old State Road between US 13 and SR 299.
 - Pine Tree Road between the Townsend town line and US 13.
 - Shallcross Lake Road from north of the Shallcross Lake dam to Boyds Corner Road.
- As the adjoining roadway segments are reconstructed, improve the following substandard intersections to meet DelDOT

standards, either by realigning one or more legs or by installing roundabouts.

- Cedar Lane Road at Marl Pit Road.
- Port Penn Road at Pole Bridge Road.
- Levels Road at Saint Anne's Church Road.
- Taylors Bridge Road at Fieldsboro Road.
- Reconstructing severe horizontal and vertical curve deficiencies at the Shallcross Lake dam has the potential for adverse impacts to natural and cultural resources. As an alternative, consider a new connector between the entrance to Drawyers Creek and Cedar Lane Road, paralleling the south side of Shallcross Lake. Future developments along the portion of Shallcross Lake Road south of the dam should have entrances on other roadways if possible to minimize traffic across the dam.

It is anticipated that the cost of these improvements will be between \$70 and \$90 million, excluding right of way requirements.

Other Recommendations

- Initiate funding and project development immediately in areas where the first phases of sewer development are anticipated. Construction of the roadway improvements concurrently with sewers is likely to result in cost savings for both the County and DelDOT, and is consistent with both agencies' philosophy of building projects right the first time. Based on current sewer system planning, the following roadway segments would fall into this category:
 - Marl Pit Road between the Norfolk Southern crossing and Cedar Lane Road.
 - Cedar Lane Road between Marl Pit Road and Boyds Corner Road.
 - The entire length of Jamison Corner Road (see realignment recommendation above).

- Hyetts Corner Road between Jamison Corner Road and Scott Run.
- Consider a transportation impact fee assessment district in southern New Castle County. In such a district, the costs of local road improvements would be borne equally by all residential and commercial developers in the district on a proportionate share basis. Under this system, traffic impact studies prepared by developers could be limited in appropriate ways or, at the County's and DelDOT's discretion, eliminated entirely. Developers may be supportive of the impact assessment concept if it provides a higher level of certainty and less time spent in the development process.
- Modify the UDC to require that traffic impact studies for development proposals submitted concurrently consider the cumulative effect of those developments.
- Develop Local Circulation Plans for the entire study area, with emphasis on those

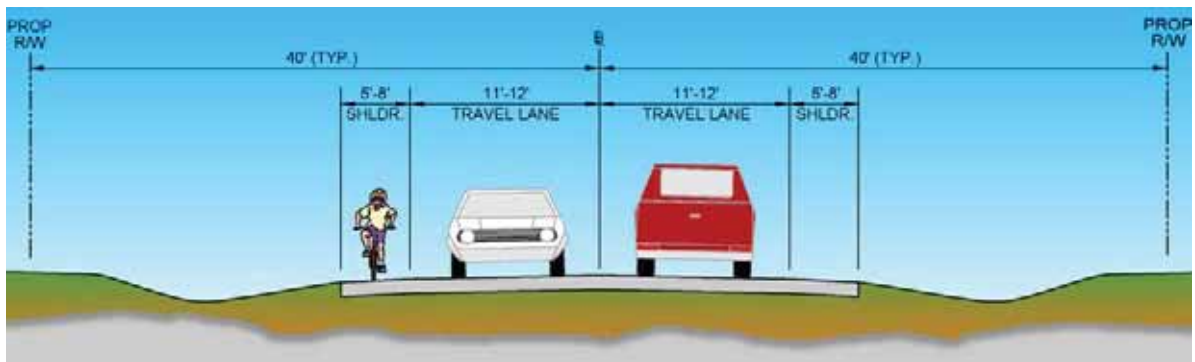
blocks shown in Figure 10 where additional connectors would reduce demand on adjoining roadways.

- Implement access management guidelines to encourage shared access and/or cross access, particularly where non-residential uses access collector and arterial roadways.
- Provide for an ongoing monitoring process so that transportation improvements are implemented in conjunction with development.

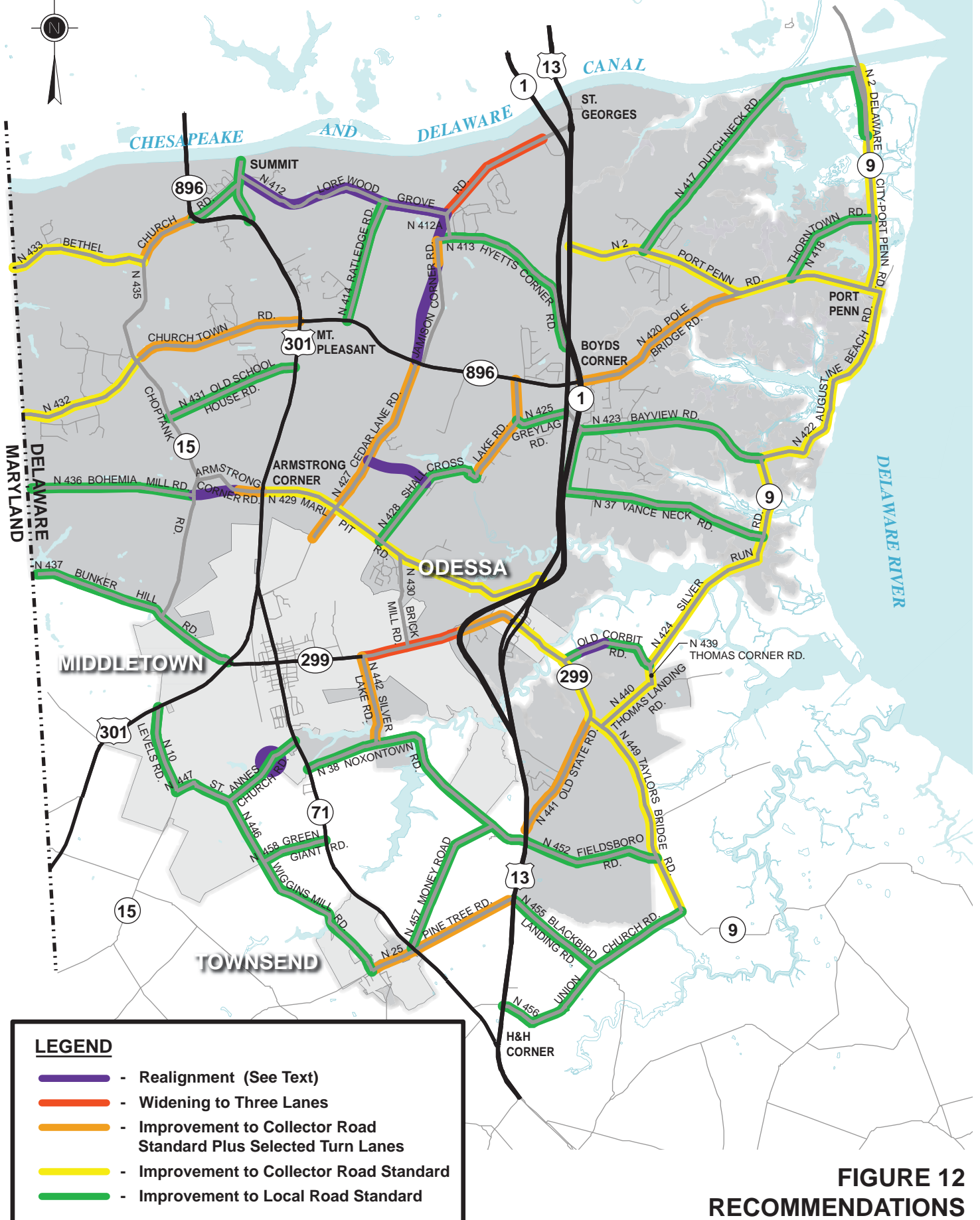
Summary

This study recommends improvements to address current and future local roadway system deficiencies in southern New Castle County and policy considerations for effective implementation of those improvements. These recommendations should serve as the basis for a master plan that addresses specific issues with respect to scope of individual projects, cost, timing, and responsibility for implementation.

Figure 11. Recommended local road section.



SOUTHERN NEW CASTLE COUNTY LOCAL ROAD PLAN



**FIGURE 12
RECOMMENDATIONS**