System-wide Congestion Assessment & Performance Measures

Synopsis:

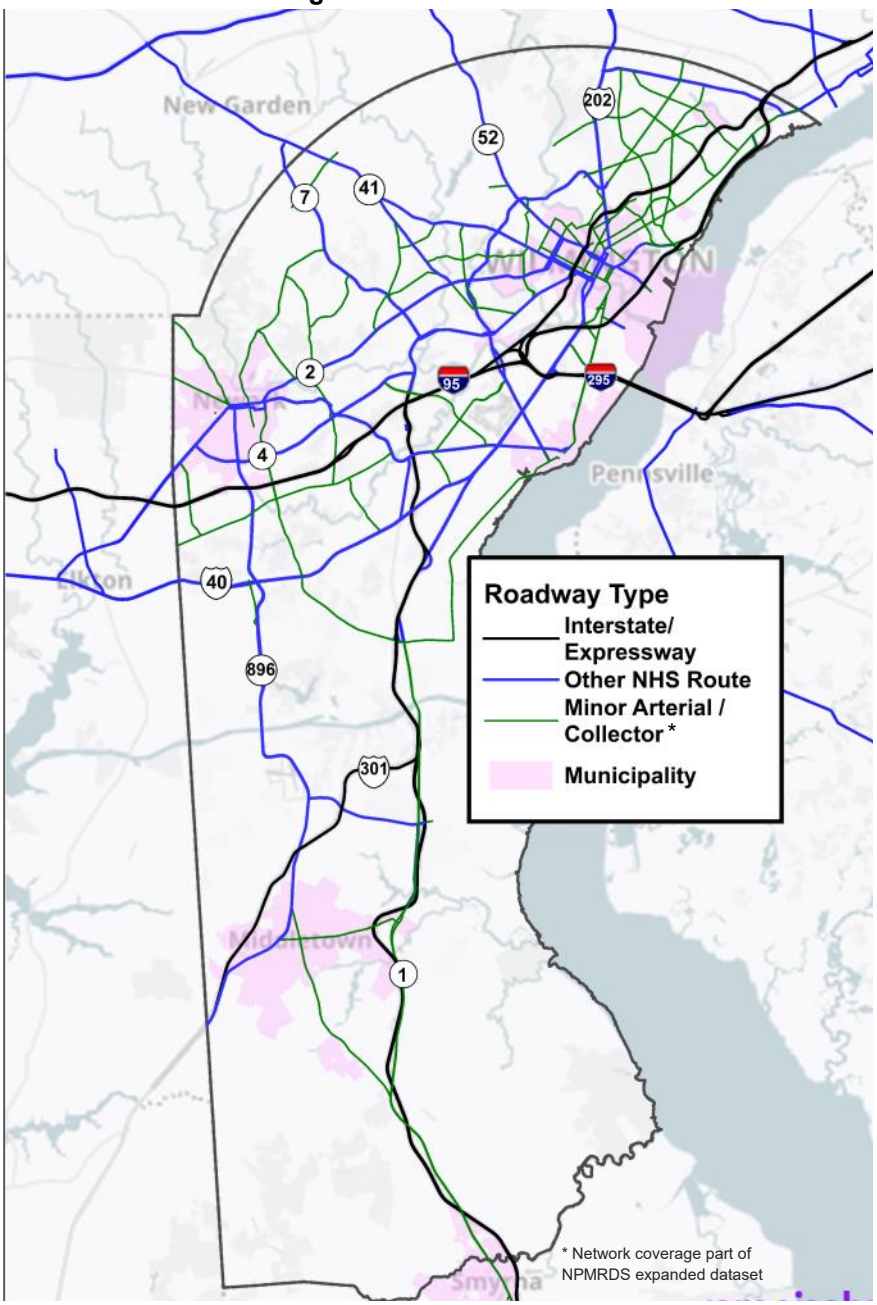
This section details the data sources used in the evaluation of the overall transportation network performance. Measures were selected to evaluate existing conditions based on data availability and their ability to help create a system-wide picture of mobility along the network. The road network evaluated was selected partly on FHWA guidelines and partly on data available at lower classifications. The network includes all roadways classified as Principal Arterial and above (NHS System) and additional lower roadway classifications. Data on select Minor Arterials and Major Collectors was available as part of the NPMRDS expanded dataset which was purchased by WILMAPCO to assess travel conditions at a greater level of detail.

CMP Congestion Measures

Multiple data sources were used to perform a system-wide performance analysis to identify recurring and non-recurring congested locations. In addition to travel–based measures, elements which measure safety conditions and intersection functionality were also included in the hotspot identification process. Included in the effort is the incorporation of the results from the DelDOT Traffic Operations Management Plan[1], or TOMP for short. These periodic plans are developed for each County in Delaware which use DelDOT's multiple robust data sources using modern technology that enables DelDOT to monitor and understand traffic mobility across the State.

Using the combination of the results from the DelDOT TOMP, coupled with other reliable data sources has allowed for a more comprehensive congestion assessment. In addition, this effort provided another level of coordination between DelDOT, land use agencies, transit providers and others in understanding the main areas of concern regarding congestion in the region. Table 1 summarizes each of the data sources used in the identification of the top congested locations and associated definition on metrics used.

Figure 1: CMP Network



[1] https://deldot.gov/Programs/itms/index.shtml?dc=tomp

Table 1: CMP Network Performance Metrics

Criteria	Definition
Severe Congestion Status from Traffic Operation Management Plan (TOMP)	Road segments with deficient Travel Time Reliability (TTR) from DelDOT Traffic Operations Management Plan (TOMP) for AM Weekday peak (7-9am) and PM Weekday peak (4-6pm) and Summer Weekend Day (10am-6pm). Breakdowns are as follows: - Severe Recurring: TTR (95th percentile/uncongested travel time) >= 2.5 and TTI (50th percentile/uncongested travel time) >= 1.5 - Severe Non-recurring: TTR >= 2.5 and TTI < 1.5 - Not Severe: TTR < 2.5 Source: Data collected from permanent Bluetooth detectors deployed by DelDOT
Intersection Level of Service—Critical Movement Summation	Critical Movement Summation (CMS): A measurement which focuses on the raw intersection capacity and the ability for an intersection to process a given traffic demand (volume) with a given lane use configuration and given phase sequence. Level of Service (LOS) is determined by the peak hour volumes for the AM and PM periods. Breakdowns are as follows: - LOS A: Less than 1,000 vehicles/hour - LOS B: 1,000 to 1,150 vehicles/hour - LOS C: 1,151 to 1,300 vehicles/hour - LOS D: 1,301 to 1,450 vehicles/hour - LOS E: 1,451 to 1,600 vehicles/hour - LOS F: More than 1,600 vehicles/hour Source: Multiple sources
Statewide Intersection Crash Assessment & Rankings	Combines the use of three crash criteria: frequency, severity, and manner of impact at each intersection. Methodology based on research performed at University of Delaware[1]. Analysis includes a 3-year average of crashes (2019-2021) at signalized and non-signalized intersections that average 10 or more crashes per year. - Crash Frequency: Total reported crashes within intersection “sphere of influence” - Crash Severity Index: The severity weights for each crash by type. Intersections are then ranked by the total scoring. *Crash Severity Index= (Number of Fatal Crashes * 40) + (Number of Injury Crashes * 4.5) + (Number of Property Damage Only Crashes * 1)* - Crashes by Manner of Impact: Total crash cost applied to each accident for each intersection based on the following values per impact types: Not a collision between two vehicles $59,248 Front to rear $12,163 Front to Front $81,100 Angle $34,477 Sideswipe, same direction $8,817 Sideswipe, opposite direction $17,141 Rear to side & Rear to Rear $3,151 Other & Unknown $38,868 Source: WILMAPCO, DelDOT. Univ. of Delaware
Travel Time Index (TTI) from NPMRDS Expanded Dataset	TTI on Road segments based on average AM peak (7-9am) and PM peak (4-6pm) time periods. Measurement is based on average speeds during AM/PM peaks versus the overnight average speed (measured from 11pm-5am) Source: National Performance Management Research Data Set (NPMRDS)
Total Daily Hours of Person Delay (PHED) from TPM (PM 3) Performance Measure	Performance metric from § 490.707—National performance management measures for traffic congestion. Measured in Total Person-Hours of Peak Hour Excessive Delay (PHED) measured along the NHS in Urbanized Areas within the hours of 6-10am and 3-7pm. Source: National Performance Management Research Data Set (NPMRDS)

[1] Duryea, Anna (2015). *Development and Analysis of an Intersection Safety Prioritization Method for the State of Delaware* (Master’s Thesis). University of Delaware.

Figure 2: AM Weekday Peak Congestion Levels From DelDOT TOMP

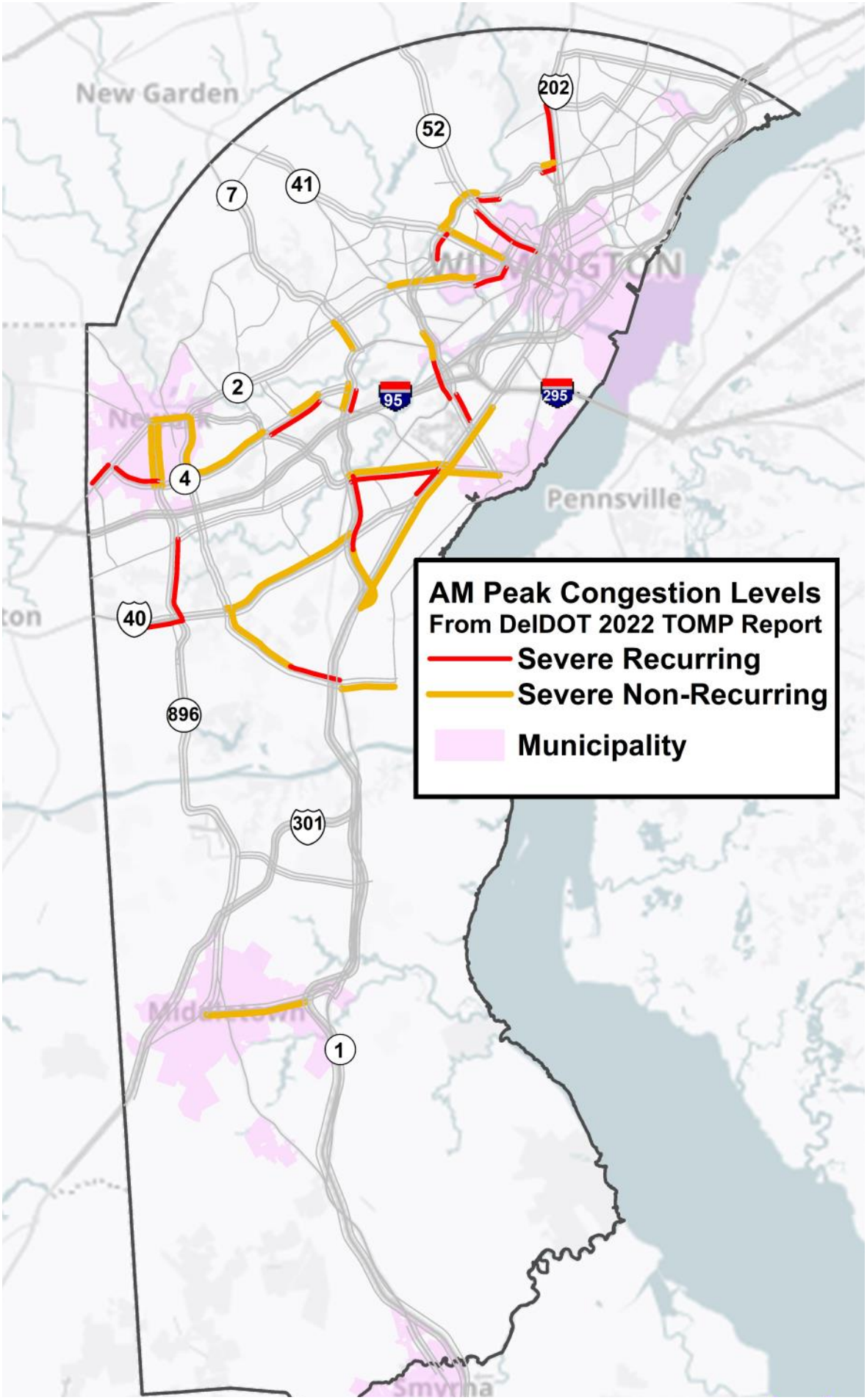


Figure 3: PM Weekday Peak Congestion Levels From DelDOT TOMP

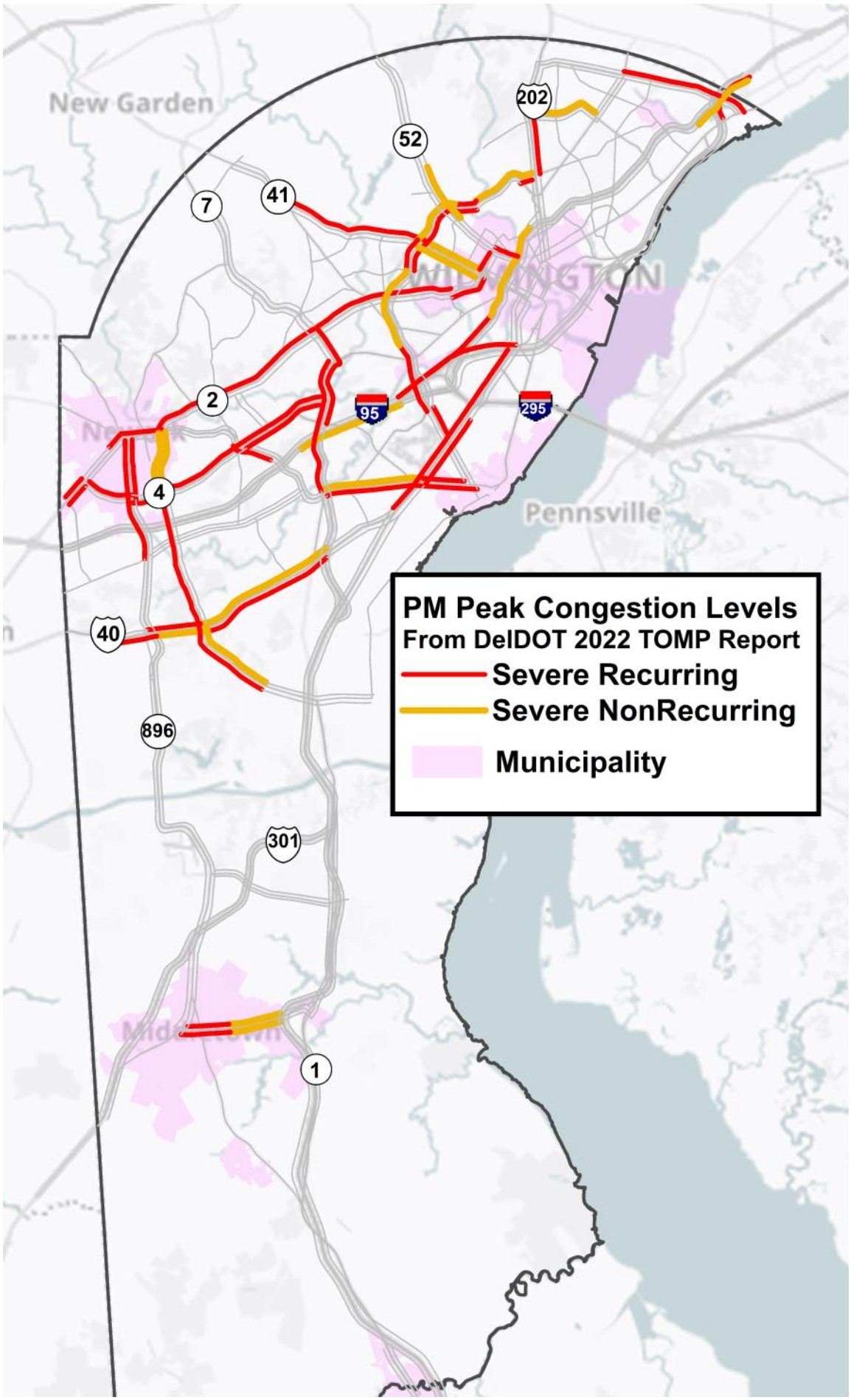


Figure 4: Summer Daytime Congestion Levels From DelDOT TOMP

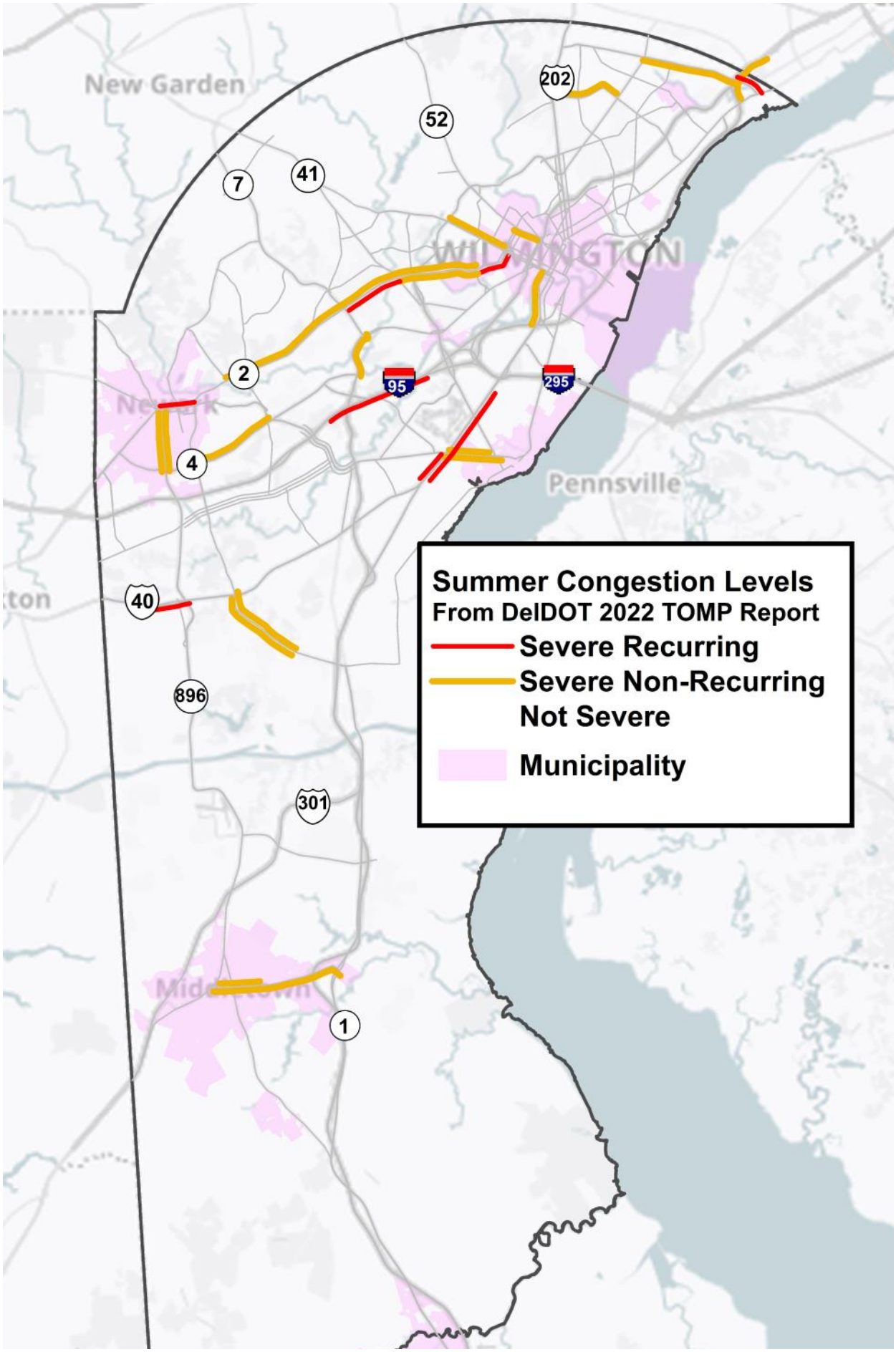


Table 5: AM Weekday Peak Travel Time Index (TTI) from NPMRDS dataset

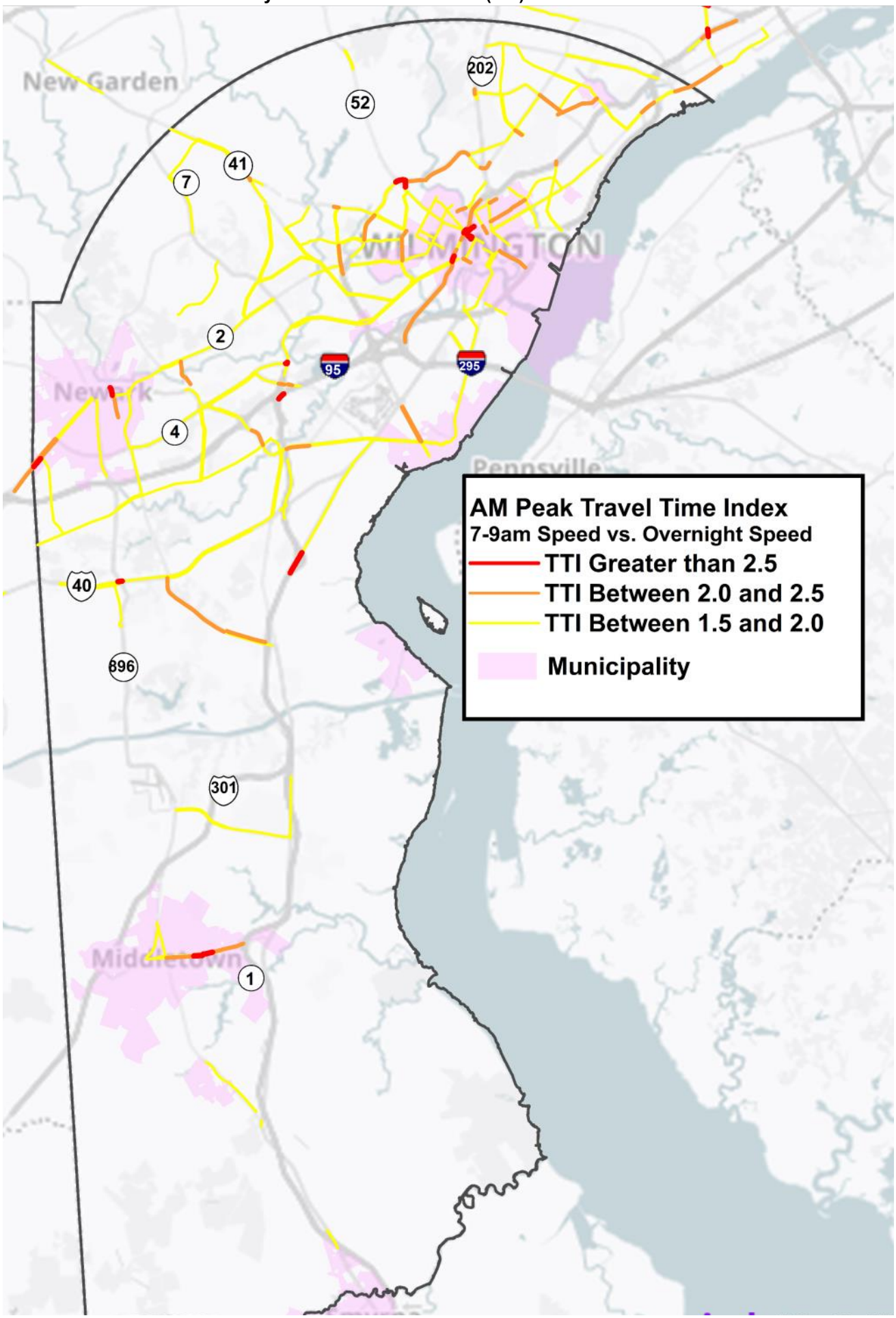


Table 6: AM Weekday Peak Travel Time Index (TTI) from NPMRDS dataset

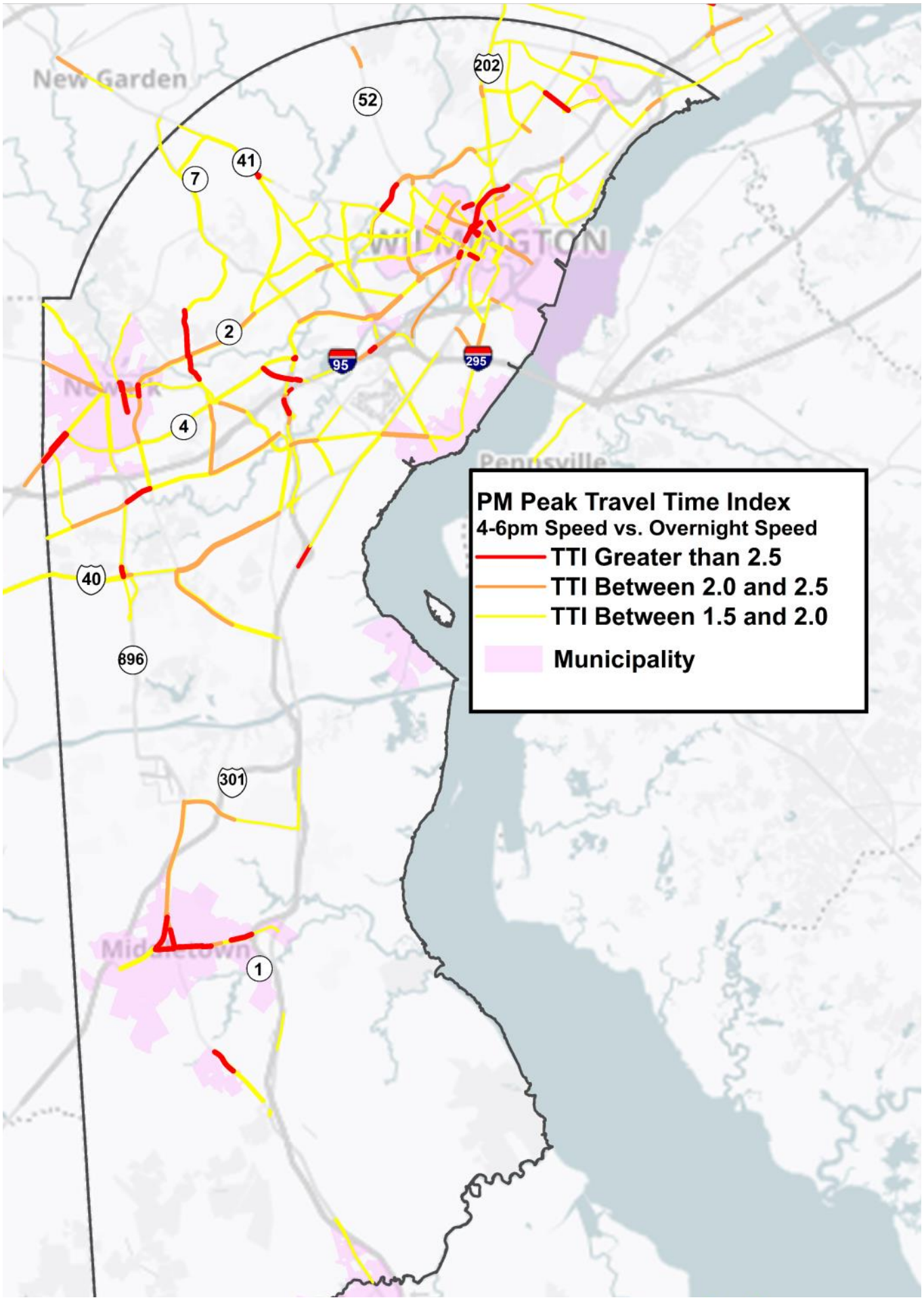


Figure 7: Statewide Intersection Crash Rankings—New Castle County Portion

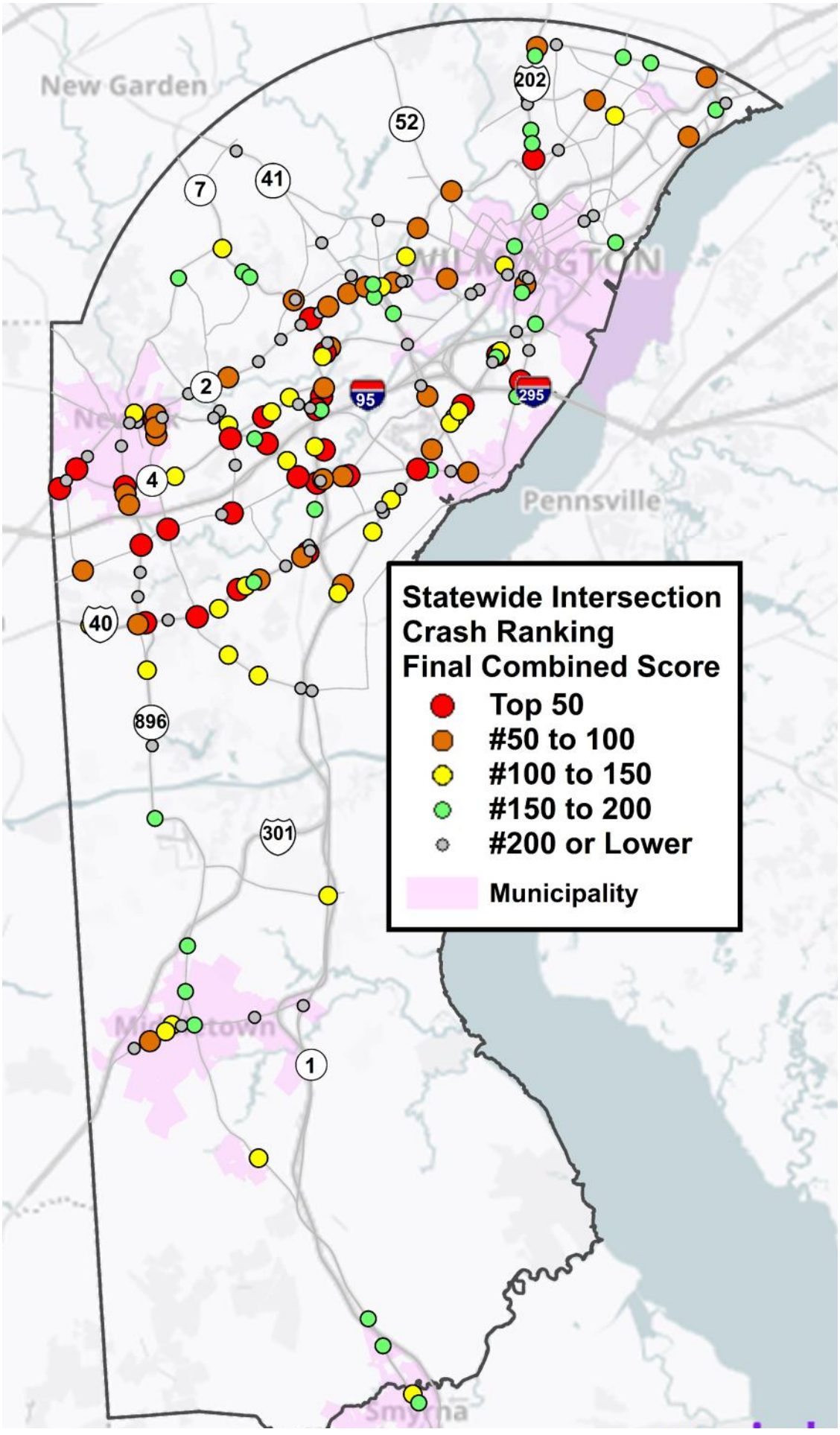


Figure 8: Intersection Level of Service—AM Peak

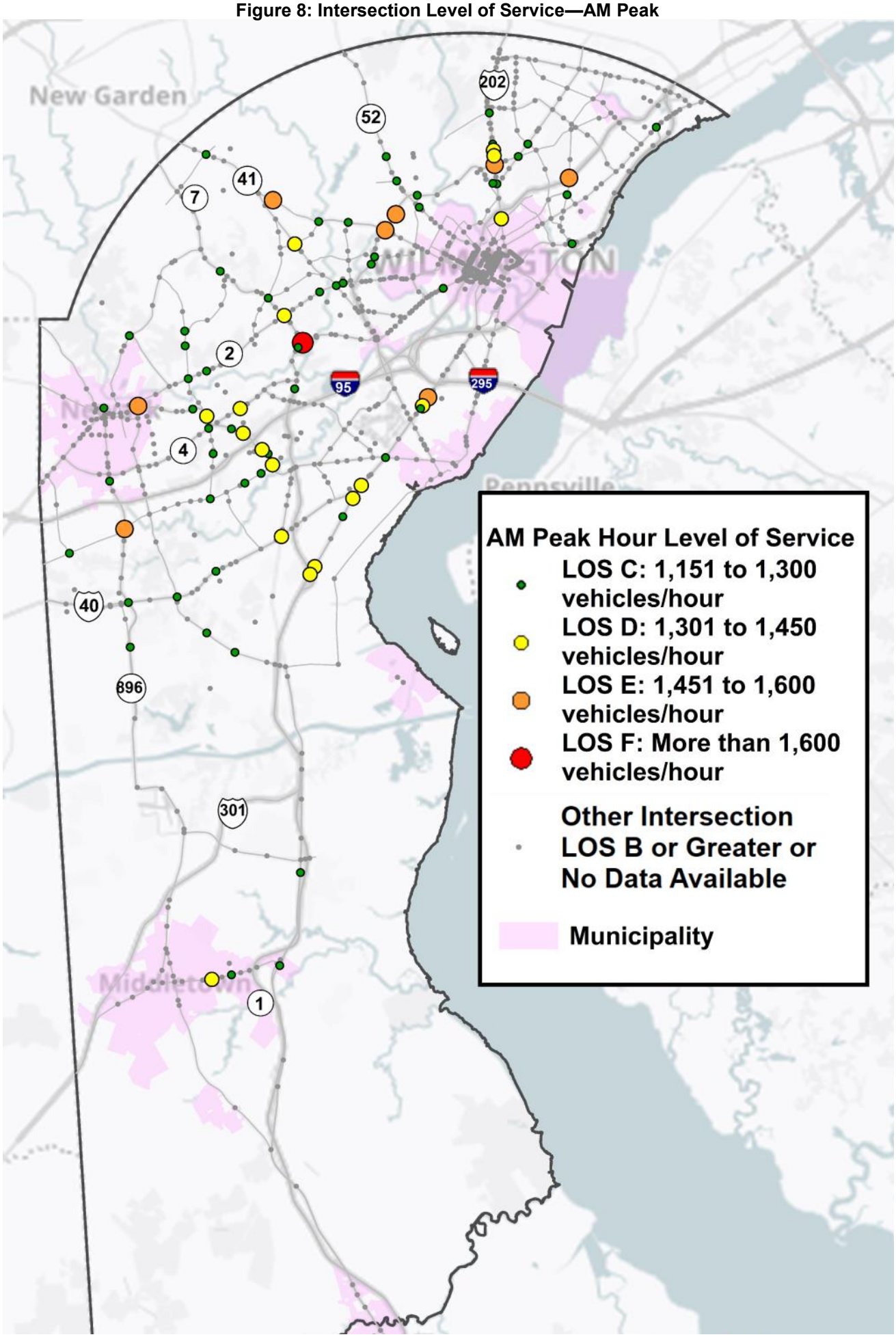


Figure 9: Intersection Level of Service—PM Peak

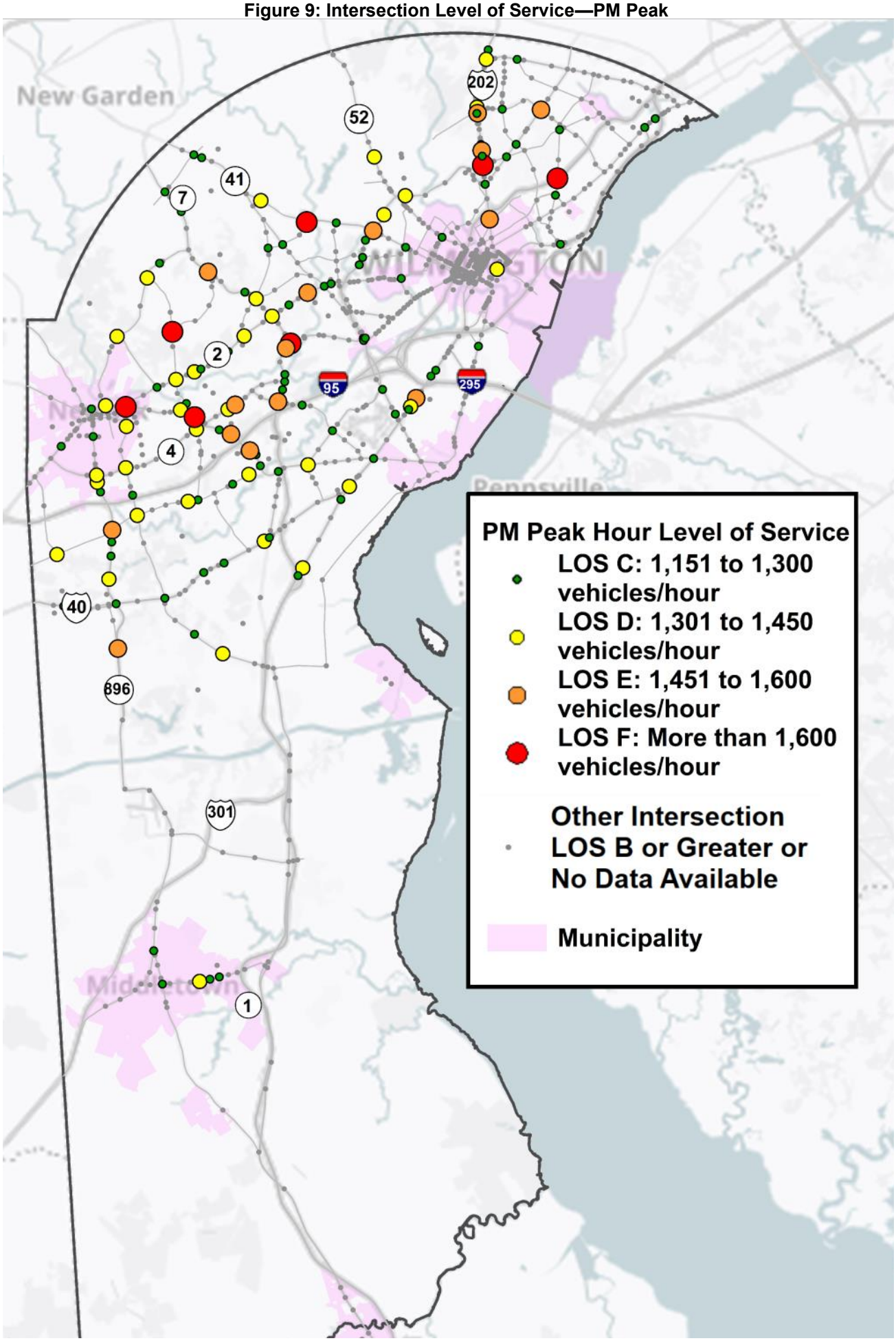


Figure 10: Identified CMP Hot Spots