

US 9 Corridor Study Managing and Accommodating Growth in Lakewood and Toms River, Ocean County



REPORT SUBMITTED TO:

REPORT PREPARED BY:



N|V|5 December 2016



The NJTPA is the federally authorized Metropolitan Planning Organization for 6.7 million people in the 13-county northern New Jersey region. Each year, the NJTPA oversees more than \$2 billion in transportation improvement projects and provides a forum for interagency cooperation and public input. It also sponsors and conducts studies, assists county planning agencies and monitors compliance with national air quality goals.

The preparation of this report has been financed in part by the U.S. Department of Transportation, North Jersey Transportation Planning Authority, Inc., Federal Transit Administration and the Federal Highway Administration. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or its use thereof.

Abstract

U.S. Route 9 between Indian Head Road (CR 571) in Toms River and Main Street (Route 88) in Lakewood is currently a two lane roadway (one lane per direction) and is highly congested and overburdened from a traffic perspective. It has a crash rate that exceeds the statewide average for similar roadways by two to three times and a high driveway density that impacts both safety and mobility due to frequent turning movements at access points amid congestion. The New Jersey Department of Transportation (NJDOT) Access Code stipulates that the desired design for this segment is a four lane roadway with shoulders, a median barrier, and jug handle ramps at intersections. This study, which was funded and managed by the North Jersey Transportation Planning Authority (NJTPA), forecast future development and traffic volumes, analyzed crash data, and took inventory of right of way, sidewalks and bus stops. A working group consisting of local, regional, and state stakeholders guided the study. Outreach included meetings with municipal elected officials and the general public. This study identifies a new long-term vision for the roadway that incorporates a two-way left turn lane, shoulders and sidewalks, in a three- or five-lane section within a desired right of way width of 92 feet. This study addresses current traffic safety and roadway capacity issues by recommending implementation of eight site specific low-cost, high-impact improvements, adoption of an Access Management Plan, modifications to bus stops, improvements to traffic signalization, and completion of parallel road networks.

Executive Summary

The U.S. Route 9 Corridor Study analyzed a seven-mile segment of U.S. Route 9 between Indian Head Road (CR 571) in Toms River and Main Street (State Route 88) in Lakewood. A two-way left turn lane is recommended for the corridor, as this will improve safety and traffic operations. As well, an Access Management Plan for this corridor has been developed that would reduce the number of conflict points from approximately 50 per mile to approximately 30 per mile. These two changes combined are estimated to reduce the existing high crash rate for the corridor (which is approximately triple the statewide average for similar roadways) by up to 30 percent. In addition, a package of eight low-cost, high-impact improvements, combined with traffic signal optimization and other area improvements that are part of the Garden State Parkway Interchange 83 improvements were found to further reduce crash rates and provide short term congestion relief at key locations along the study corridor. The study benefited from extensive input from local elected officials and engineers through a formal working group, as well as from a series of well attended public meetings in both Lakewood and Toms River.

Multi-modal travel safety was another emphasis that guided the study. Several clusters of pedestrian and bicycle crashes were identified in the corridor. Most notably, the corridor's incomplete sidewalk network was identified as an area for improvement. Residents of both towns walk and bicycle, as well as commute by bus, which necessitates walking to and from bus stops along Route 9.

Proposed low-cost, high-impact improvements for the corridor included the following specific spot locations, along with recommendations regarding implementation of a two-way left turn lane, implementing traffic signal coordination, and implementing bus stop relocations:

- U.S. Route 9 and Main Street/Central Avenue/Hurley Avenue
- U.S. Route 9 and John Street
- U.S. Route 9 and James Street/Pine Street
- U.S. Route 9 and Oak Street – Chateau Drive/Broadway
- U.S. Route 9 and Cross Street/Chestnut Street
- U.S. Route 9 and Locust Street
- U.S. Route 9 and Whitty Road
- U.S. Route 9 and Church Road (including Stevens Road signal)

In summary, specific recommendations from this study were as follows:

- Implement low-cost, high-impact improvements in the near term
- Add a two-way left turn lane to U.S. Route 9 in the near term
- Adopt the bus stop relocation plan for U.S. Route 9 in the near term
- Add additional traffic signals and traffic signal coordination in the near term
- Modify the NJDOT Access Code to reflect the changes described above in the near term
- Adopt an Access Management Plan for the section of U.S. Route 9 included in this study in the near to mid-term
- Seek opportunities to complete the sidewalk network on U.S. Route 9
- As new developments come on line, ensure that shoulders are widened and right of way dedicated in accordance with the Access Management Plan
- Construct the missing links and parallel routes presented within this study in the near to mid-term
- Convert the roadway to a five lane section with shoulders in the long term when warranted by traffic growth

This study process was guided by a working group chaired by the New Jersey Department of Transportation

U.S. Route 9 Corridor Study – Managing and Accommodating Growth in Lakewood and Toms River, Ocean Co.

(NJDOT), and comprised of representatives from the North Jersey Transportation Planning Authority (NJTPA), Ocean County, the Township of Toms River, the Township of Lakewood, NJ TRANSIT, Greater Mercer Transportation Management Association (GMTMA), and the New Jersey Office of Planning Advocacy (OPA). The purpose and need for this study was to identify spot improvements and corridor-wide design treatments within a limited right-of-way. The study also sought to establish access management standards for U.S. Route 9 in Toms River and Lakewood that address existing operational deficiencies and a high crash rate, anticipate future development, and optimizes safety, mobility and access for motorized vehicles, transit users, pedestrians and bicyclists. While the working group analyzed data and developed access management recommendations for the entire study corridor, this report divides the Toms River and Lakewood sections into distinct chapters so that each municipality can independently use the study's findings to pursue formal adoption of an Access Management Plan.

Two rounds of meetings were held with local officials and the public in each municipality and additional focused outreach was held as needed. The first round of meetings asked the public to identify their key concerns with the corridor, while the second round presented draft solutions. In total, over 500 local residents and business people attended at least one of these meetings.

Technical analyses relied on estimates of existing and future traffic volumes for the U.S. Route 9 corridor and an extensive review of land development applications and current absorption rates (i.e. the rate at which available land is developed). Traffic counts were conducted between May 30 and June 20, 2015 to estimate total volume, average speed, and through traffic percentages. Land use analyses helped to estimate pending and prospective development as well as estimated changes in traffic due to background growth.

Existing traffic volumes for the corridor are summarized in table format and graphically (Tables E-1 and E-2, Figures E-1 and E-2). As shown, traffic volumes remain high through the day.

Table E-1 – Summary of Daily Volumes on U.S. Route 9 in Toms River

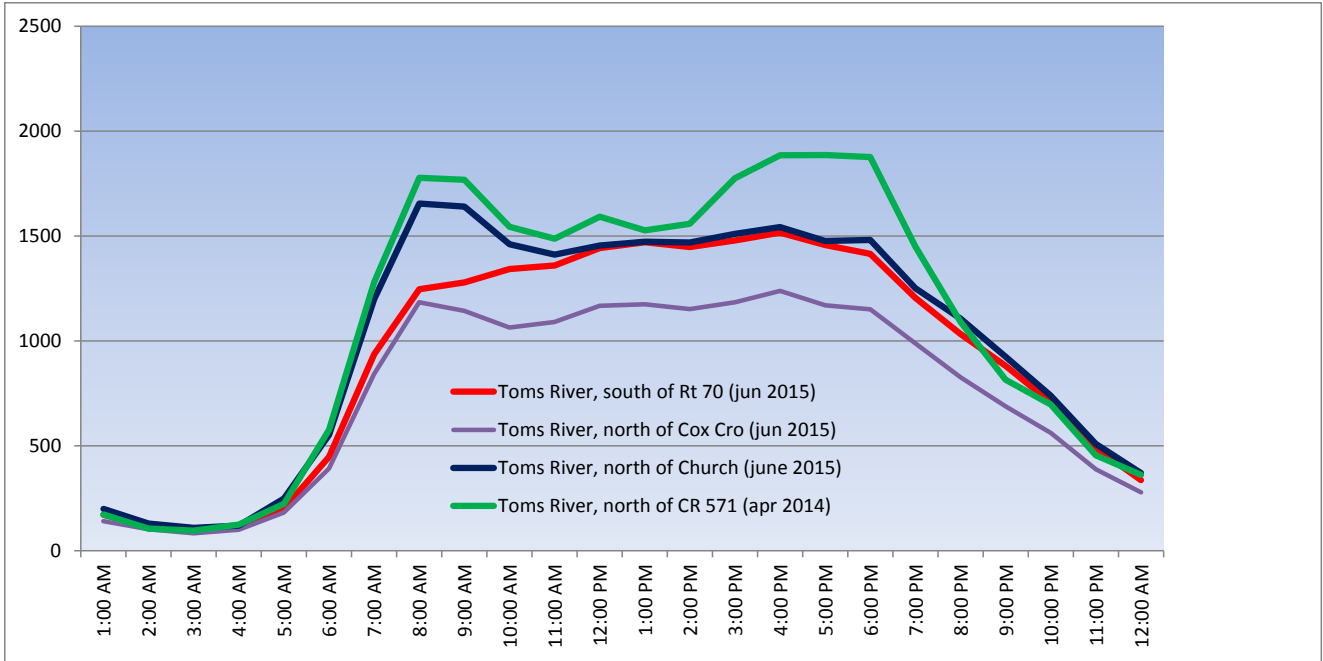
Location	Weekday	Saturday	Sunday
South of Route 70	22,200	20,100	17,200
North of Cox Cro Road	18,300	17,300	14,000
North of Church Road	24,000	21,900	17,800
North of Indian Head Road	26,100	27,400	20,900

Source: Traffic counts conducted for study

Table E-2 – Summary of Daily Volumes on U.S. Route 9 in Township of Lakewood

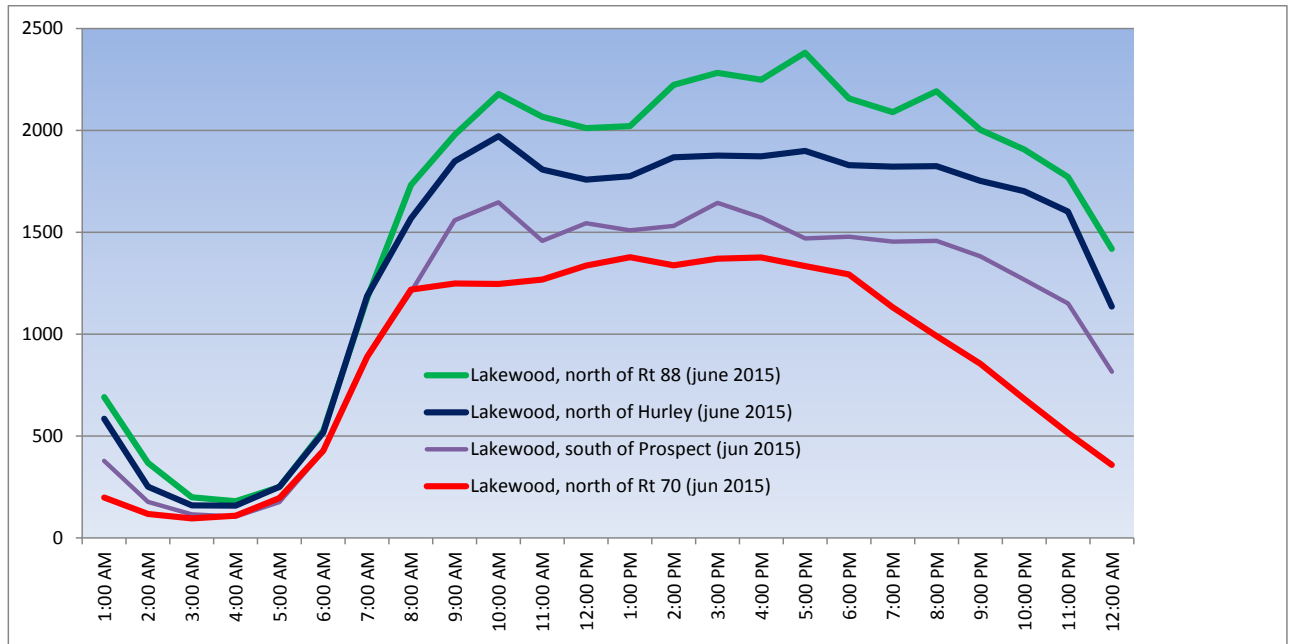
Location	Weekday	Saturday	Sunday
North of Route 88 (Main Street)	38,000	22,500	35,100
North of Central Avenue-Hurley Avenue	33,000	18,300	30,600
South of Prospect Street	26,400	14,700	23,400
North of Honey Locust Street-Locust Street	21,000	18,500	17,700

Source: Traffic counts conducted for study



Source: Traffic counts conducted for study

Figure E-1 - Weekday Volumes on U.S. Route 9 in Toms River



Source: Traffic counts conducted for study

Figure E-2 - Weekday Volumes on U.S. Route 9 in Township of Lakewood

Existing travel speeds throughout the day are low in the Township of Lakewood in particular and Toms River to some extent, as shown below (Tables E-3 and E-4).

Table E-3 – Average Travel Speed on U.S. Route 9 in Toms River

Time of Day	Northbound	Southbound
Weekdays, 7-9 am	28 mph	29 mph
Weekdays, 12-2 pm	28 mph	34 mph
Weekdays, 4-6 pm	30 mph	27 mph
Saturdays, 12-2 pm	29 mph	27 mph

Source: Traffic data collected for study

Table E-4 – Average Travel Speed on U.S. Route 9 in Township of Lakewood

Time of Day	Northbound	Southbound
Weekdays, 7-9 am	20 mph	23 mph
Weekdays, 9-10:30 am	12 mph	22 mph
Weekdays, 12-2 pm	22 mph	20 mph
Weekdays, 2:30-4 pm	13 mph	12 mph
Weekdays, 4-6 pm	15 mph	19 mph
Saturdays, 12-2 pm	26 mph	28 mph

Source: Traffic data collected for study

Future development within the U.S. Route 9 corridor was summarized for each community. Pending applications refers to projects somewhere in the development process that haven't yet been constructed, and prospective are projects that can be anticipated based on land availability and current development trends (Tables E-5 and E-6).

Table E-5 – Land Development Forecast for Township of Toms River

Land Use	Pending	Prospective	Total
Single Family or Duplex	56 units	83 units	139 units
Multifamily	840 units	81 units	921 units
Retail	216,900 sf	80,000 sf	296,900 sf
Office	18,000 sf	10,000 sf	28,000 sf
Industrial Park	16,800 sf	0 sf	16,800 sf
Institutional	41,200 sf	0 sf	41,200 sf

Source: Land Use and development data collected for study

Table E-6 – Land Development Forecast for Township of Lakewood

Land Use	Pending	Prospective	Total
Single Family or Duplex	153 units	314 units	467 units
Multifamily	114 units	185 units	299 units
Retail	7,960 sf	69,000 sf	76,960 sf
Office	15,965 sf	81,000 sf	96,965 sf
Industrial Park	0 sf	0 sf	0 sf
Institutional	4,242 sf	0 sf	4,242 sf

Source: Land Use and development data collected for study

A bottleneck analysis was conducted to determine the degree to which improvements can handle the existing and future traffic volumes (Tables E-5 and E-6, Figures E-3 and E-4). As shown, improvements can handle approximately 90 percent of future need.

Table E-5 – Future (2035) Bottleneck Analysis for Toms River

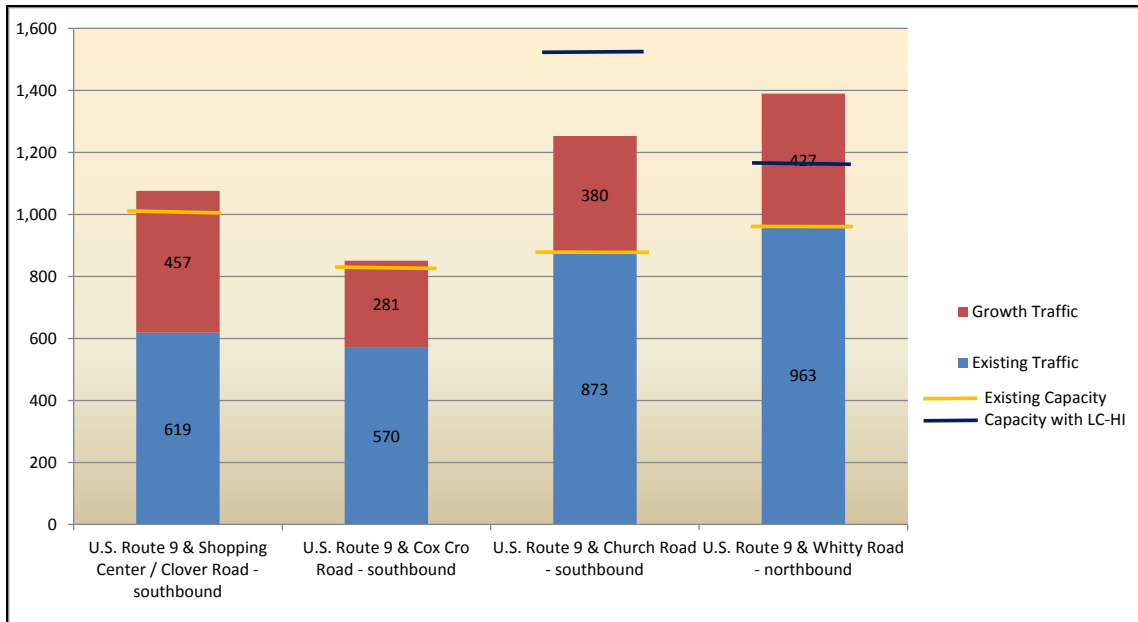
Location	Existing Traffic	Growth Traffic	Total	Existing Capacity	Volume / Capacity Ratio	Expanded Capacity	Expanded Volume / Capacity Ratio
U.S. Route 9 & Shopping Center / Clover Road - southbound	619	457	1,076	1,000	1.08	n/a	n/a
U.S. Route 9 & Cox Cro Road - southbound	570	281	851	830	1.03	n/a	n/a
U.S. Route 9 & Church Road - southbound	873	380	1,253	873	1.44	1,470	0.85
U.S. Route 9 & Whitty Road - northbound	963	427	1,390	963	1.44	1,180	1.18

Source: Analysis developed for study

Table E-6 – Future (2035) Bottleneck Analysis for the Township of Lakewood

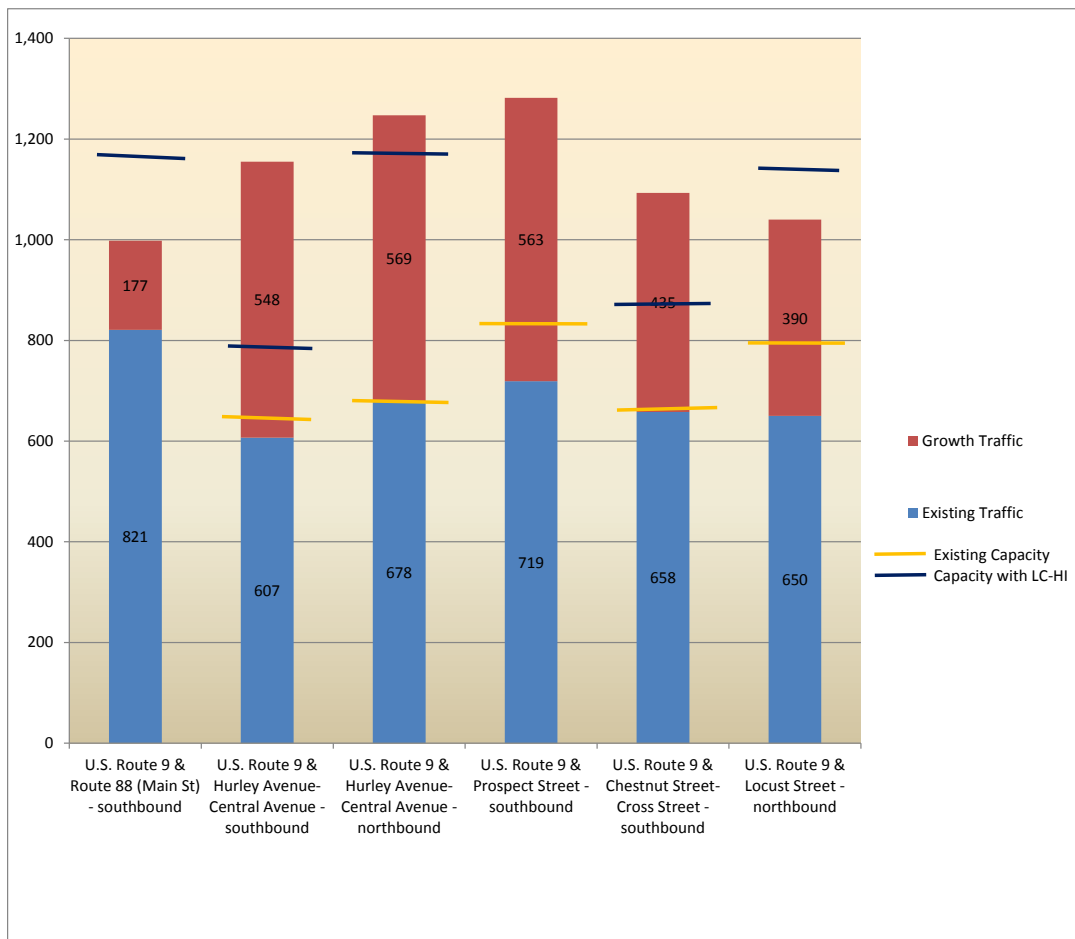
Location	Existing Traffic	Growth Traffic	Total	Existing Capacity	Volume / Capacity Ratio	Expanded Capacity	Expanded Volume / Capacity Ratio
U.S. Route 9 & Route 88 (Main St) - southbound	821	177	998	821	1.22	1,350	0.74
U.S. Route 9 & Hurley Avenue-Central Avenue - southbound	607	548	1,155	750	1.54	950	1.22
U.S. Route 9 & Hurley Avenue-Central Avenue - northbound	678	569	1,247	678	1.84	1,350	0.92
U.S. Route 9 & Prospect Street - southbound	719	563	1,282	970	1.32	n/a	n/a
U.S. Route 9 & Chestnut Street-Cross Street - southbound	658	435	1,093	740	1.48	1,000	1.09
U.S. Route 9 & Locust Street - northbound	650	390	1,040	915	1.14	1,330	0.78

Source: Analysis developed for study



Source: Analysis developed for study

Figure E-3 - Future (2035) Bottleneck Analysis for Toms River



Source: Analysis developed for study

Figure E-4 - Future (2035) Bottleneck Analysis for the Township of Lakewood

TABLE OF CONTENTS

PART A - Introduction..... 11

PART B – Access Management Plan for the Township of Toms River 15

1. Existing Conditions15

 Roadway Geometry and Cross-Section 15

 Roadway Volumes 18

 Transit Service 20

 Existing Crash Data 20

 Existing Level of Service..... 21

 Land Use 23

 NJDOT Access Management Code Analysis..... 24

 Social and Economic Disparities/Demographics 24

2. Future Baseline Conditions.....27

 Planned Geometric Changes 27

 Anticipated Growth in the Township of Toms River portion of the Corridor 27

 Background Traffic Growth 28

 Future (2035) Traffic Volumes..... 28

 Future Traffic Signals 28

 Future (2035) Level of Service 30

3. Low Cost – High Impact Improvements.....30

 Recommended Improvements 30

 Cost Estimates 31

 Bottleneck and Level of Service Analysis..... 31

 Safety Benefits..... 35

4. U.S. Route 9 Cross-Section and Access Management Plan36

 U.S. Route 9 Cross Section Recommendation 36

 Access Management Plan..... 37

5. Complementary Strategies.....39

 Bus Stop Relocation Plan 39

 Missing Roadway Links / Parallel Road Network..... 39

 Ordinance Changes / Zoning Controls..... 39

6. Working Group / Public Outreach41

 Working Group Meetings 41

 NJDOT Subject Matter Experts 41

 Local Officials Meetings/Briefings 41

 Public Outreach Meetings 42

PART C – Access Management Plan for Township of Lakewood 43

1. Existing Conditions43

 Roadway Geometry and Cross-Section 43

 Roadway Volumes 46

 Transit Service 48

 Existing Crash Data 48

 Existing Level of Service..... 49

 Land Use 51



NJDOT Access Management Code Analysis.....	52
Social and Economic Disparities/Demographics	52
2. Future Baseline Conditions.....	55
Planned Geometric Changes	55
Anticipated Growth in Corridor.....	55
Background Traffic Growth	56
Future (2035) Traffic Volumes.....	56
Future Traffic Signals	56
Future (2035) Level of Service	57
3. Low Cost – High Impact Improvements	59
Recommended Improvements.....	59
Cost Estimates	60
Bottleneck and Level of Service Analysis.....	60
Safety Benefits.....	69
3. U.S. Route 9 Cross-Section and Access Management Plan	70
U.S. Route 9 Cross Section Options.....	70
Access Management Plan.....	71
4. Complementary Strategies.....	73
Bus Stop Relocation Plan	73
Missing Roadway Links / Parallel Road Network.....	73
Ordinance Changes/Zoning Controls.....	73
5. Working Groups / Public Outreach	75
Working Group Meetings	75
NJDOT Subject Matter Experts	75
Local Officials Meetings/Briefings	75
Public Outreach Meetings	76
PART D – Recommendations / Next Steps	77
Vision for U.S. Route 9	77
Implement the Low-Cost High Impact Improvements, including Two-Way Left Turn Lane	78
Modify the Access Level and Desired Typical Section for U.S. Route 9 in the Study Area	79
Adopt Access Management Plans.....	79
Next Steps.....	79
APPENDIX A – Existing Traffic Volume Flow Maps	A-2
APPENDIX B – Crash Histograms by mile Post	A-6
APPENDIX C – Existing Land Uses in Corridor	A-8
APPENDIX D – Pending and Prospective New Developments	A-11
APPENDIX E – Future (2035) Traffic Volume Flow Maps	A-18
APPENDIX F – Order of Magnitude Cost Estimates for Low-Cost, High-Impact Improvements	A-22
APPENDIX G – Access Management Plan for Toms River	A-34
APPENDIX H – Access Management Plan for Lakewood	A-42
APPENDIX I – Bus Stop Relocation Plans	A-49
APPENDIX J – Work Group Reports to Commissioner	A-53
APPENDIX K – Public Outreach Summaries and Survey Results for Toms River	A-65
APPENDIX L – Public Outreach Summaries and Survey Results for Lakewood	A-73

PART A - Introduction

The U.S. Route 9 corridor in Lakewood and Toms River in Ocean County experiences ongoing congestion, safety issues, and multi-modal travel challenges. With both townships projected to grow through 2035, congestion is only anticipated to increase. Access Management Plans (AMP) are designed to avert uncoordinated planning and granting of access permits, which can lead to a high number of direct access points and cause deterioration of roadway operations. Potential intelligent transportation systems (ITS) enhancements, bicycle and pedestrian facilities consistent with NJDOT's Complete Street Policy, existing and planned transit, and use of parallel streets for local trips can be evaluated during development of an AMP. Additionally, recommendations for low-cost, high-impact spot improvements can be identified during the study process.

The North Jersey Transportation Planning Authority (NJTPA) coordinated with representatives from Ocean County, the townships of Lakewood and Toms River, Greater Mercer TMA, and NJDOT to conduct an access management study and develop a planning framework that addresses current and future U.S. Route 9 corridor capacity and safety. This study of U.S. Route 9 from Mile Post 94.86 to 101.71, (including a 1,000 foot band around the centerline in each direction) explores potential solutions to the challenges of the roadway's physical and operational constraints through both access management planning principles and low cost, high-impact infrastructure improvements (Figure 1).

The section of U.S. Route 9 studied is a two lane roadway with shoulders of variable width, and with auxiliary lanes at intersections. The roadway width varies substantially. Sidewalks along most of the corridor are in isolated segments and there are 32 bus stops. The speed limit varies from 35 to 50 miles per hour. Land use along the corridor is a combination of residential, commercial industrial and institutional.

In 1992, the NJDOT Access Management Code (AMC) established the desired typical section (DTS) for U.S. Route 9 as a four lane roadway with shoulders and median barrier, with left turns via jughandles. The DTS represents a significant deviation from the existing character of the roadway, and also implies a significant investment in right of way (ROW) acquisition to meet the lane width and jughandle requirements. Specifically, the AMC calls for a right of way width of 114 feet, versus an existing right of way width of 49.5 to 80 feet. A preliminary investigation before evaluating the creation of jughandle ramps revealed that property acquisition to obtain 114 feet would have significant impacts (i.e. would impact buildings or on-site parking and circulation) on 93 properties, including 15 single family homes. A 1999 conceptual study by Jacobs contemplated a right of way width of 147 feet, with a wide median island and double left turn and U-turn lanes at intersections in lieu of jughandle ramps. That plan was preliminarily found to have significant impacts on 147 properties, including 32 single-family residential properties.

This section of U.S. Route 9 has a crash rate that is triple that of state roadways elsewhere with similar geometries and traffic volumes. The frequency of traffic signals, more than 50 access points per mile, and rapid population growth in Lakewood contribute to constant congestion of the portion of U.S. Route 9 covered by this study.

This study was guided by a working group chaired by the New Jersey Department of Transportation (NJDOT), and comprised of representatives from the North Jersey Transportation Planning Authority (NJTPA), Ocean County, the Township of Toms River, the Township of Lakewood, NJ TRANSIT, Greater Mercer Transportation Management Association (GMTMA), and the New Jersey Office of Planning Advocacy (OPA). The purpose and need for this study was to identify spot improvements, corridor-wide design treatments within a limited right of way, and access management standards for U.S. Route 9 in Toms River and Lakewood that address existing operational deficiencies and a high crash rate, anticipate future development, and optimize safety, mobility and access for motorized vehicles, transit users, pedestrians and bicyclists. The goals of the study were as follows:

U.S. Route 9 Corridor Study – Managing and Accommodating Growth in Lakewood and Toms River, Ocean Co.


1. Establish a long-term conceptual design and vision for U.S. Route 9 and county and local roads as appropriate. Establish a long-term vision for developable land in the study area.
2. Define the desired design for U.S. Route 9 that supports the needs of all users (including motorists [cars, trucks, buses], transit users, pedestrians, and bicyclists), and provides for an appropriate balance of safety, mobility and access.
3. Develop a package of low-cost, high-impact spot improvements for the corridor that, in the short term, address safety and operational issues, and the needs of all users.
4. Identify and make recommendations to address any traffic signal operational or locational deficiencies.
5. Develop a formal Access Management Plan proposal that NJDOT can advance toward adoption.
6. Develop recommendations for amendments to municipal master plans and zoning ordinances that municipalities can advance toward adoption.
7. Proactively engage all stakeholders in the planning process.

The outcome of this study is a package of low-cost, high-impact improvements, recommendations regarding the future footprint and design of U.S. Route 9 within the study area, and a proposed access management plan to improve safety by reducing access conflicts. While the working group analyzed data and developed access management recommendations for the entire study corridor, this report divides the Toms River and Lakewood sections into distinct chapters so that each municipality can independently use the study's findings to pursue formal adoption of an Access Management Plan.

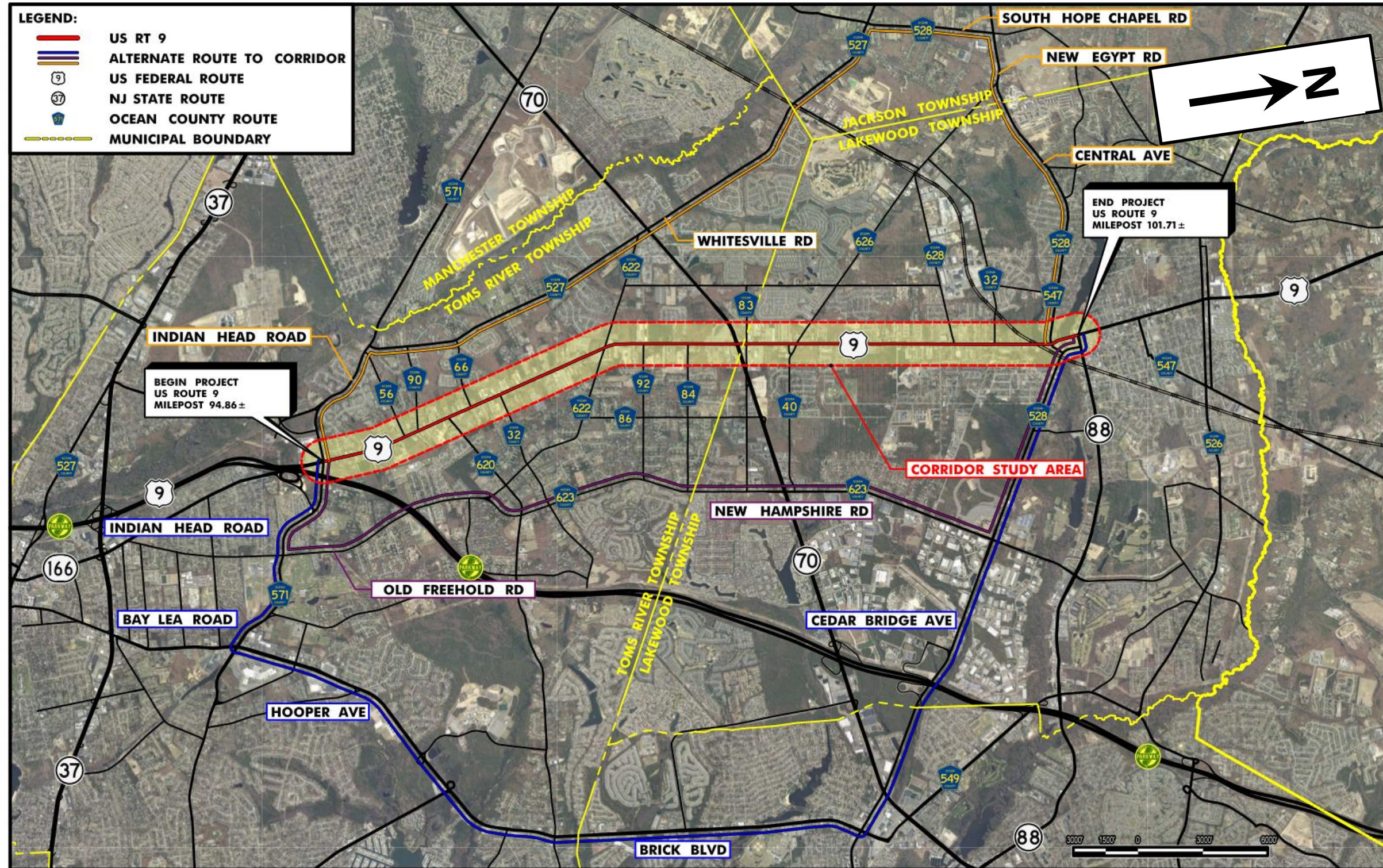
In general, the concept of access management involves the consolidation of access points for development, and the minimization of turning conflicts. By applying access management, through traffic volumes are generally improved to the point where a four lane roadway with access management can handle the same traffic volumes as a six lane roadway without access management (i.e. doing more with less). By reducing potential conflict points for vehicles, access management improves traffic safety substantially. It also benefits pedestrians and cyclists by reducing conflict points with turning vehicles.

A review of previous studies and work efforts included the following:

- Along the study corridor
 - Garden State Parkway Interchange 83 Improvements by Greenman Pedersen, Inc for Ocean County and North Jersey Transportation Planning Authority (NJTPA) preliminary information
 - Township of Lakewood Capital Improvement Plan for Transportation Infrastructure, Transportation Improvement Districts 1 & 2, prepared for the Township of Lakewood by T&M Associates (August 2014)
 - Feasibility Study of 3-Lane Section Report, Swain Avenue to John Street, MP 94.95 to MP 101.3, prepared for the New Jersey Department of Transportation by Parsons Brinckerhoff and Advantage Engineering (August 2014)
 - U.S. Route 9 Dover/Lakewood Corridor Smart Growth & Mobility Study, prepared for the New Jersey Department of Transportation by Jacobs Engineering (Spring 2009)
 - Conceptual designs for the widening and dualization of U.S. Route 9, prepared for the New Jersey Department of Transportation by Jacobs Engineering (Spring 1999)
- Other Access Management Plan documents:
 - Route 94 Access Management Plan
 - Route 34, Colts Neck Highway Access Management Plan



The remainder of this report is broken into three parts. Part B addresses an Access Management Plan and information for Toms River. Part C addresses an Access Management Plan and information for Lakewood. Part D contains recommendations and next steps. Additional detailed information can be found in the appendices.



Source: NJDEP Aerial Photo with project specific enhancements

Figure 1 - Study Area

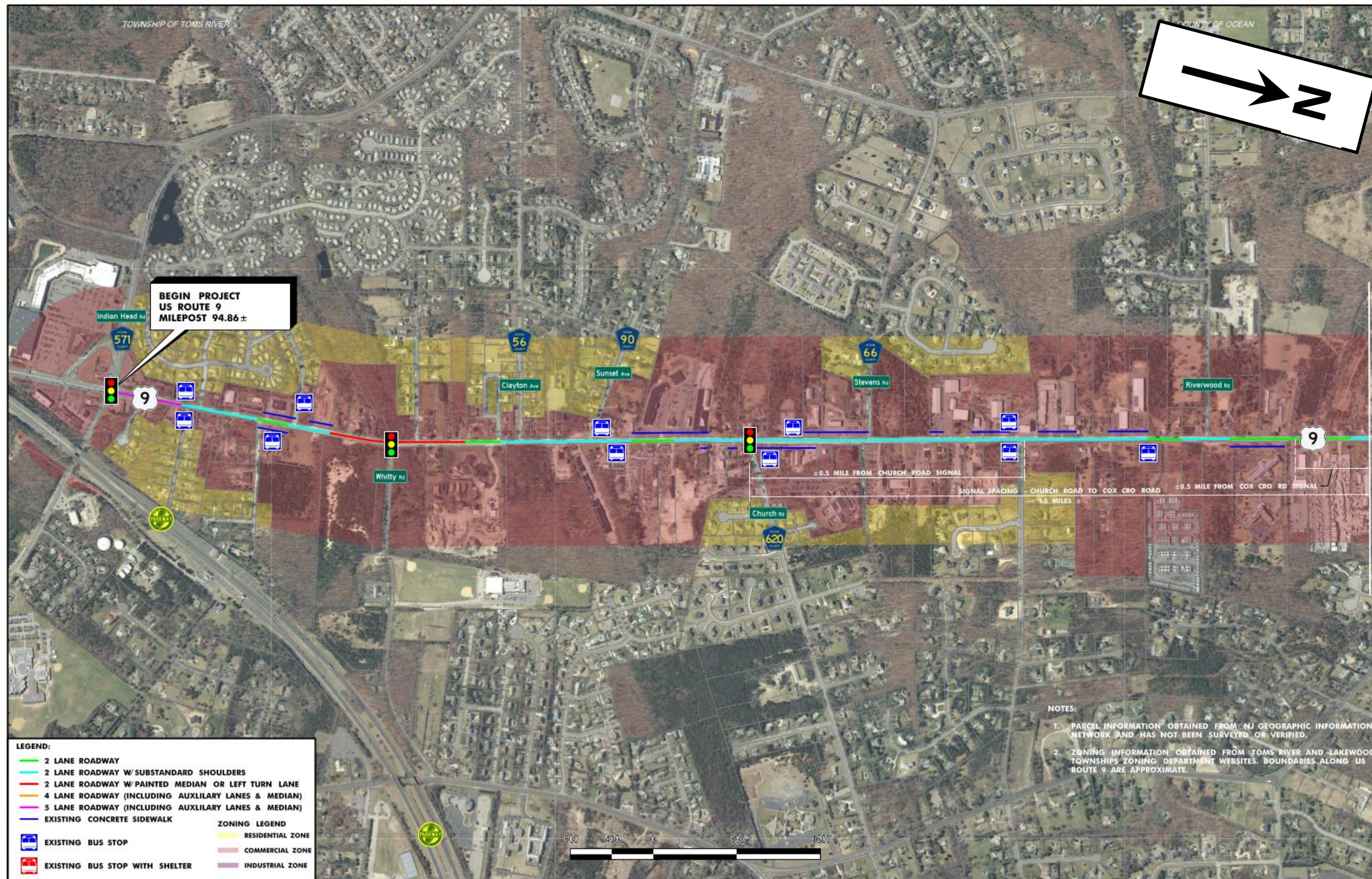
PART B – Access Management Plan for the Township of Toms River

1. Existing Conditions

Roadway Geometry and Cross-Section

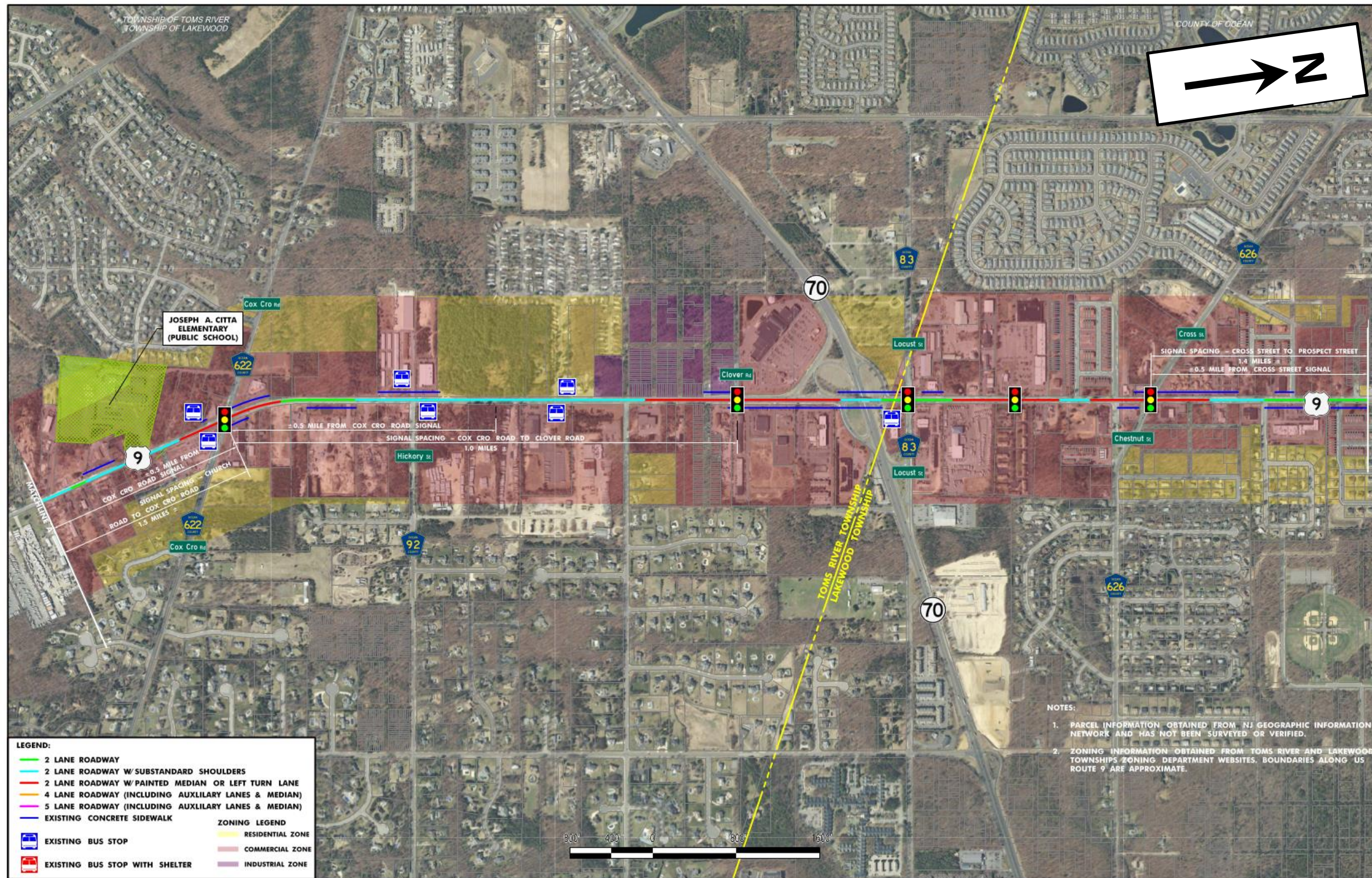
The portion of U.S. Route 9 studied within the Township of Toms River is 3.9 miles long and extends from Indian Head Road (CR 571) at mile post 94.86 to the municipal line at mile post 98.75 near NJ Route 70. It consists of two lanes (one lane per direction), with shoulders. Existing right of way width varies from 49.5 feet to 70 feet. The posted speed limit is 50 miles per hour. There are several isolated segments of sidewalks, typically along the frontage of new development. There are five intersections with traffic signals within the corridor and sixteen stop controlled T-intersections with streets (on with a flashing signal for emergency vehicles). All but one signalized intersection (at the intersection of Church Road) has left turn lanes on U.S. Route 9 at the signals. The existing roadway within Toms River is characterized by the following features, some of which are summarized below (Figures 2A and 2B):

- Narrow shoulders (i.e. less than 6 feet wide) for approximately 10 percent of the corridor
- Sidewalks exist for approximately 20-25 percent of each side of the road
- Right of way is at least 66 feet wide for approximately 40 percent of the roadway
- Approximately 48 access points per mile for streets and driveways (whereas 10 access points per mile is ideal for safety, and 30 access points per mile would be more appropriate for the area in question)
- There are several areas where the roadway has been improved outside the right of way, but right of way has not been dedicated as of yet, particularly in front of new developments
- There are 19 bus stops
- The existing speed limit is 50 miles per hour, and appears to be based on statute. It does not appear to have ever been studied through “speed trials.” Existing land uses along the corridor would qualify for designation as a suburban area, which has a statutory speed limit of 35 miles per hour.



Source: NJDEP Aerial Photo with project specific enhancements

Figure 2a – Roadway Cross-Section and Sidewalk Presence in Toms River (south section)



Source: NJDEP Aerial Photo with project specific enhancements

Figure 2b - Roadway Cross-Section and Sidewalk Presence in Toms River (north section)

The following signalized intersections are located in the study area, and are not coordinated:

- U.S. Route 9 and Clover Road/Shopping Center Driveway
- U.S. Route 9 and Cox Cro Road
- U.S. Route 9 and Church Road
- U.S. Route 9 and Clayton Avenue (flasher)
- U.S. Route 9 and Whitty Road
- U.S. Route 9 and Indian Head Road

All signalized intersections have left turn lanes on U.S. Route 9 except Church Road. None of the stop controlled T-intersections have left turn lanes on U.S. Route 9.

One notable observation about the road network along U.S. Route 9 in Toms River is that most roads intersect with U.S. Route 9 as T-intersections. The only continuous east-west route in the nearly 4 miles of U.S. Route 9 in Toms River between Indian Head Road (CR 571) and N.J. Route 70 is Cox Cro Road, which runs at an approximately 45 degree angle. This leads to a situation where east-west traffic must join U.S. Route 9 traffic. This scenario also leads to far more turning movements on and off U.S. Route 9 than would otherwise be present if the east-west routes were continuous, including left turns.

Roadway Volumes

Traffic volumes were gathered between May 30, 2015 and June 20, 2015 using a combination of automatic traffic recorder (ATR) counts, intersections turning movement counts (using MioVision video imaging units), and Automatic License Plate Readers (ALPR).

Automatic Traffic Recorders (ATR) counts were used from June 8 to June 15 at the following locations:

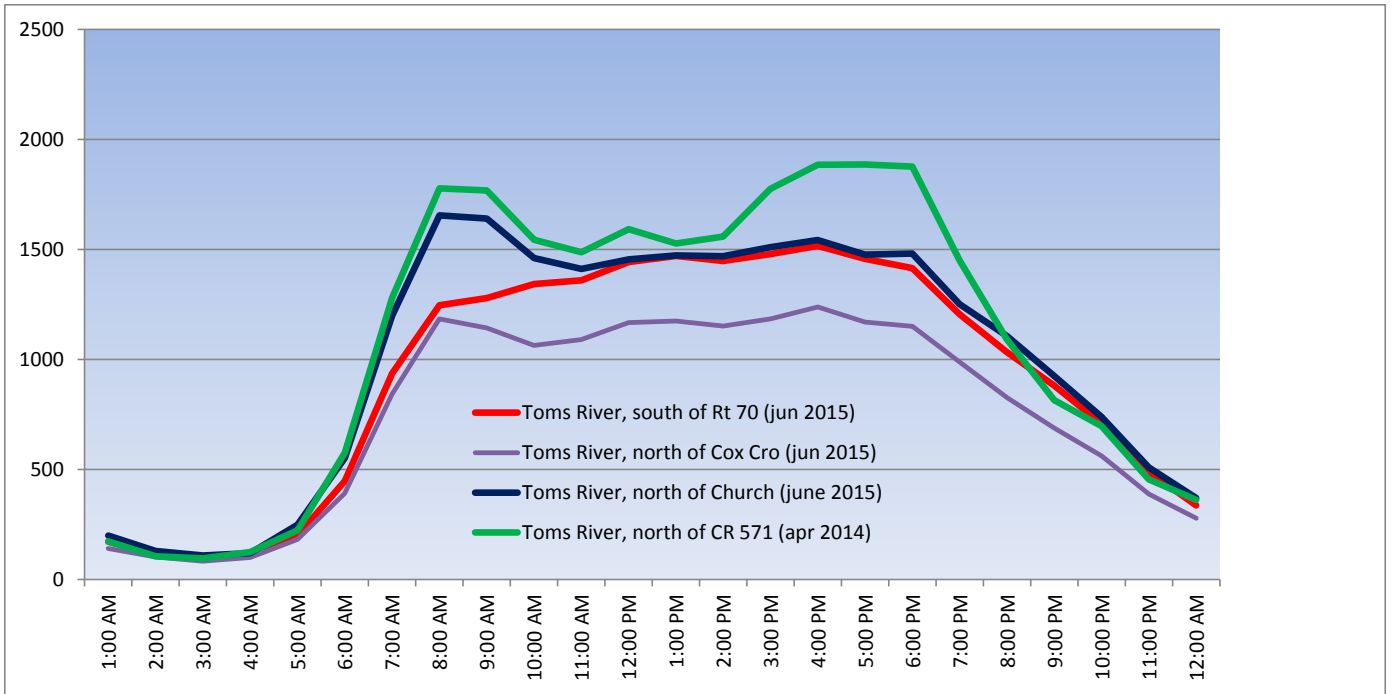
- U.S. Route 9 south of Route 70
- U.S. Route 9 north of Cox Cro Road
- U.S. Route 9 north of Church Road

An additional count for U.S. Route 9 north of Indian Head Road (CR 571) from April 2014 was available from the Garden State Parkway Interchange 83 improvements project. A summary of the daily traffic volumes found is shown below (Table 1). Also shown is a graph of hourly volumes on U.S. Route 9 (Figure 3). As shown, weekday volumes on U.S. Route 9 vary from 18,300-26,100 vehicles per day, with a high of nearly 1,900 vehicles per hour. Saturday volumes are slightly lower for the most part, but reach a high of slightly over 2,000 vehicles per hour. Traffic volumes remain high throughout the day, with minimal peaking. This pattern is indicative of a highly congested corridor, in which natural peak hour traffic demand is being suppressed in some manner, such as peak hour spreading or diversion of traffic to parallel routes

Table 1 – Summary of Daily Volumes on U.S. Route 9 in Toms River

Location	Weekday	Saturday	Sunday
South of Route 70	22,200	20,100	17,200
North of Cox Cro Road	18,300	17,300	14,000
North of Church Road	24,000	21,900	17,800
North of Indian Head Road	26,100	27,400	20,900

Source: Traffic counts conducted for study



Source: Traffic Counts conducted for study

Figure 3 – Weekday Volumes on U.S. Route 9 in Toms River

Intersection turning movement counts were conducted on Saturday, May 30, 2015 and Wednesday, June 3, 2015 or Thursday, June 4, 2015 (U.S. Route 9 and Sunset Avenue was counted on Thursday, June 18, 2015 and Saturday, June 20, 2015) at the following locations:

- U.S. Route 9 and Clover Road/Shopping Center Driveway (signalized)
- U.S. Route 9 and Hickory Street (unsignalized)
- U.S. Route 9 and Cox Cro Road (signalized)
- U.S. Route 9 and Riverwood Drive (unsignalized)
- U.S. Route 9 and Silverton Road (unsignalized)
- U.S. Route 9 and Stevens Road (unsignalized)
- U.S. Route 9 and Church Road (signalized)
- U.S. Route 9 and Sunset Avenue (unsignalized)
- U.S. Route 9 and Whitty Road (signalized)
- U.S. Route 9 and Indian Head Road (signalized)

Peak hour turning movement counts by hour are contained in Appendix A. Turning movement counts included classification of vehicles into tractor trailers, single unit trucks, buses, light utility vehicles, passenger cars, motorcycles, and bicycles. Pedestrians were also counted.

Using the automatic license plate reading (ALPR) data, it was possible to compute the percentage of through traffic between Route 70 and Indian Head Road by time of day. It also enabled the calculation of average overall travel time by time of day. The estimated share of through traffic by time of day is summarized below (Table 2). As noted, the through traffic for the entire 7 miles of U.S. Route 9 under study (i.e. Toms River and Lakewood) was only 5-8 percent of traffic, except for southbound on Saturday (which may involve the use of Route 9 to avoid shore traffic on the Garden State Parkway). The average speed through the corridor by time of day is also summarized below (Table 3).

Table 2 – Share of U.S. Route 9 Through Traffic in Toms River

Time of Day	Northbound			Southbound		
	To Route 70	To Lakewood South of Route 88	Continue North of Route 88	From Route 70	From Lakewood South of Route 88	From North of Route 88
Weekdays, 7-9 am	4%	13%	8%	7%	11%	8%
Weekdays, 12-2 pm	6%	9%	7%	6%	3%	8%
Weekdays, 4-6 pm	6%	6%	5%	6%	12%	8%
Saturdays, 12-2 pm	9%	7%	8%	8%	0%	22%

Source: Traffic data collected for study

Table 3 – Average Travel Speed on U.S. Route 9 in Toms River

Time of Day	Northbound	Southbound
Weekdays, 7-9 am	28 mph	29 mph
Weekdays, 12-2 pm	28 mph	34 mph
Weekdays, 4-6 pm	30 mph	27 mph
Saturdays, 12-2 pm	29 mph	27 mph

Source: Traffic data collected for study

The maximum number of pedestrians counted at the various signalized U.S. Route 9 intersections within Toms River was 17 per hour, combined (i.e. at all five signalized intersections).

Transit Service

The following transit services are present in the U.S. Route 9 corridor:

- *NJ Transit Route 559* – 44 buses/day, approximately 1 hour headways, 24 hours per day – Lakewood Bus Terminal to Atlantic City – local service
- *NJ Transit Route 137* – 2 buses/day in AM – to Port Authority Bus Terminal in NYC – commuter

Existing Crash Data

Crash history was obtained from the New Jersey Department of Transportation database of reportable crashes from January 1, 2011 to December 31, 2013. During that time, approximately 193 crashes per year occurred on U.S. Route 9 from Indian Head Road (CR 571) to the Toms River-Lakewood municipal line. The resultant crash rate was 6.2 crashes per million vehicle miles travelled, which is nearly 2.5 times the statewide average crash rate of 2.6 crashes per million vehicle miles travelled on roadways with similar geometries. During the three-year period, there was one fatal pedestrian crash. Approximately 29 percent of other crashes resulted in some form of injury. Approximately 45 percent of crashes occurred in the vicinity of the five signalized intersections in the corridor, while another 25 percent occurred in the vicinity of the numerous unsignalized intersections. Angle or left turn crashes accounted for 22 percent of crashes, whereas rear-end and sideswipe crashes accounted for 68 percent of crashes. The higher frequency of rear-end and sideswipe crashes may be related to the frequent turns into and out of driveways and side streets in the corridor. Crash clusters by mile-post are summarized in Appendix B. The breakdown of type of crash is detailed below (Table 4).

Table 4 – Reportable Crash Breakdown for Toms River (2011-2013)

Crash Type	Average per Year	%
Angle/Left Turn	35	18%
Rear End/Sideswipe	132	68%
Pedestrian/Cyclist	2	1%
Other	24	12%
Total	193	100%

Source: NJDOT crash database

To better understand bicycle and pedestrian crashes, the project team reviewed said crashes from 2010-2014. There were six pedestrian crashes, two of which resulted in fatalities, and four bicycle crashes. Four pedestrian crashes, including both fatal crashes, and one bicycle crash occurred in the vicinity of Clover Road and Route 70. Both fatal crashes occurred at night, and involved people crossing U.S. Route 9 either away from the signal or without the walk indication. At this intersection, it should be noted that there is a mall on one side of the road, and an addiction rehabilitation facility across the road. Another pedestrian crash in this area was at night and involved a construction worker in the road. The last pedestrian crash was in daylight and the person was in the crosswalk. The other two pedestrian crashes at other U.S. Route 9 locations involved pedestrians crossing U.S. Route 9 at unsignalized locations. There was limited circumstantial information for the four bicycle crashes, other than that they all occurred in daylight and the worst injuries were complaint of pain only.

The Highway Safety Manual, published by the Federal Highway Administration (FHWA), was used to predict estimated crash history for U.S. Route 9. Given its traffic volumes and geometry as input factors, the anticipated number of crashes for U.S. Route 9 was 89 crashes per year, approximately half the actual number. The number of non-intersection vehicular crashes matches closely to actual experience, but the predicted number of vehicular crashes at intersections tends to be less than half the actual experience. The number of bicycle and pedestrian crashes and anticipated severity from the Highway Safety Manual appears to match actual experience quite closely.

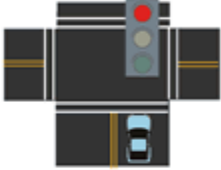
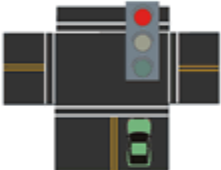
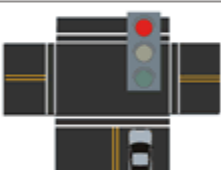
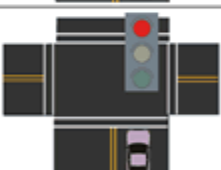
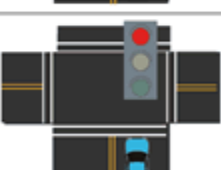
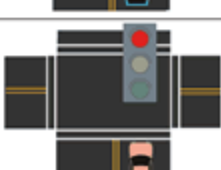
Existing Level of Service

Level of Service analysis for the various intersections under study were conducted for the weekday morning and evening peak hours and Saturday midday peak hour utilizing the methods outlined in the *Highway Capacity Manual, 2010 Edition*, published by the Transportation Research Board, using the program Synchro (using Highway Capacity Manual methodology). With this analysis, level of service (LOS) is expressed on a scale ranging from “A” to “F,” with “A” being best and “F” being worst. LOS is determined by the average delay per vehicle for a specific approach or lane group during the peak hour. For signalized intersections, LOS F refers to an average delay in excess of 80 seconds. The graphic below visually depicts level of service (Figure 4). For urbanized areas in peak hours, LOS D is generally considered the appropriate design standard, whereas LOS C or better is considered indicative of good operations. For left turn lanes and side streets, LOS E is generally considered adequate in peak hours, as the motorists making these turning movements only need to do it once before joining a traffic stream on an arterial roadway. Level of service results for each overall intersection are summarized below, along with notations of any issues evident (Table 5). As shown, the U.S. Route 9 and Indian Head Road (CR 571) intersection operates the least efficiently, with the U.S. Route 9 and Church Road intersection operating the second least efficiently. The U.S. Route 9 and Whitty Road intersection also operates poorly during peak hours. It should be noted that the analysis of U.S. Route 9 and Church Road assumes that no southbound through traffic uses the shoulder to bypass left turning traffic, whereas this occurs frequently at the location. Accordingly, the delays shown at this intersection are slightly overstated versus reality.

U.S. Route 9 Corridor Study – Managing and Accommodating Growth in Lakewood and Toms River, Ocean Co.

LEVELS OF SERVICE

for Intersections with Traffic Signals

Level of Service	Delay per Vehicle (seconds)
A	 ≤10
B	 11-20
C	 21-35
D	 36-55
E	 56-80
F	 >80

Factors Affecting LOS of Signalized Intersections

Traffic Signal Conditions:

- Signal Coordination
- Cycle Length
- Protected left turn
- Timing
- Pre-timed or traffic activated signal
- Etc.

Geometric Conditions:

- Left- and right-turn lanes
- Number of lanes
- Etc.

Traffic Conditions:

- Percent of truck traffic
- Number of pedestrians
- Etc.

Source: 2000 HCM, Exhibit 16-2, Level of Service Criteria for Signalized Intersections

Figure 4 - Level of Service Standards for Signalized Intersections

Table 5 - Existing Level of Service for Toms River

Intersection	Morning		Evening		Saturday		Comments
	LOS	Delay	LOS	Delay	LOS	Delay	
U.S. Route 9 & Shopping Center / Clover Road	C	20.9	C	33.2	C	33.0	Side streets failing
U.S. Route 9 & Cox Cro Road	C	26.1	C	29.4	C	23.5	
U.S. Route 9 & Church Road	D	53.0	E	72.0	D	46.6	Southbound delays and side streets operating at marginal levels
U.S. Route 9 & Whitty Road	C	34.8	E	55.1	C	33.2	Mainline delays and side streets failing
U.S. Route 9 & Indian Head Road	E	64.2	F	90.4	E	77.0	Failing conditions on most approaches

Source: Analysis developed for study

Land Use

Within the study area, there are 160 properties in Toms River. Many of the properties have limited frontage on U.S. Route 9, and have substantial lot depth. This pattern tends to be the opposite of what commercial developers would seek for development. Table 6 contains a summary of existing land uses within the study area. As shown, nearly 20 percent of the corridor is presently vacant. The remainder is a mixture of residential and commercial/retail, with a greater portion being commercial. Appendix C contains a map of color coded land use by category.

Table 6 - Existing Land Uses in Study Area for Toms River

Land Use	Properties	
Single Family Residential	35	22%
Residential/Commercial	13	8%
Multi-Family Residential/Assisted Living	5	3%
Hotel	1	1%
Religious/Public	4	3%
Retail	16	10%
Commercial/Industrial	56	35%
Vacant	30	19%
Total	160	

Source: Land Use and development data collected for study

Zoning within the study area is comprised of the following:

- RHB – Rural Highway Business Zone (predominant zoning)
- LI – Light Industrial (one area in north end of corridor)
- HB – Highway Business (south end of corridor)
- MHP – Mobile Home Park (one area in north end of corridor)
- MF-10AF – Multifamily Affordable Housing Zone (one area in north end of corridor)

The RHB zone permits a wide range of commercial developments from retail to service, including religious and institutional uses. Multi-family residential is permitted with or without a commercial component mixed in. Light Industrial and Highway Business zones permit similar uses, with no residential component. The Mobile Home Park allows mobile homes or single family homes. The multi-family affordable housing zone permits multi-family on 10 acre lots. Lot areas are 15,000 square feet to 6 acres, and the minimum lot frontage on U.S. Route 9 is 100-150 feet.

U.S. Route 9 Corridor Study – Managing and Accommodating Growth in Lakewood and Toms River, Ocean Co.

Front yard building set-back is 100-120 feet from U.S. Route 9, and parking areas and aisles are required to be set back by 35-60 feet from U.S. Route 9.

The following zoning regulations (from the Toms River land use code) are of interest for this study:

Section 348-5.42 Residential development connecting links.

"The Planning Board shall require, insofar as is practical, that builders of new residential major subdivisions construct connecting links between the subdivision and adjacent properties, including bicycle and walking paths as designated by the Planning Board."

Section 348-5.43 Roadways, driveways and other forms of ingress and egress.

"It is hereby prohibited for a developer to connect any roadways, driveways and other forms of ingress and egress from a development onto any jughandle or exit ramp."

Section 348-5.44 Ingress/egress from multifamily housing projects.

"The Planning Board shall require at least two separate means of ingress/egress from all multifamily housing projects."

NJDOT Access Management Code Analysis

Based on the speed limit of 50 miles per hour, the NJDOT AMC calls for average lot spacing between non-single family residential lots to be a minimum of 275 feet. Note that this is not consistent with municipal zoning, which calls for minimum lot frontages of 100-150 feet. Of the 78 percent non-single family residential lots in the corridor, 82 percent of them (i.e. 64 percent of total lots) are not in conformity with NJDOT AMC lot spacing criteria. Consequently, these lots are subject to limitations on traffic generation. Specifically, the NJDOT AMC incorporates safety by limiting the size of development in areas with more densely spaced driveways than desirable through a trip limit computation. However, lot area is part of the calculation of trip limits. As most of the lots in Toms River are narrow but very deep, the calculations do not limit trips substantially versus what could be otherwise developed.

Social and Economic Disparities/Demographics

This study examined a variety of demographic variables to address potential equity and inclusion issues associated with both existing conditions and proposed solutions. Below is comparative information for Census block groups within the study area, as well as the overall municipality, Ocean County, and the State of New Jersey, based on the 2010 Census (Table 7). As indicated, the study area is similar to the entire municipality of Toms River. Within the study area for Toms River, the share of rental units is lower than the overall municipality by approximately one third. The share of households with no vehicles available (and consequently captive to transit, bicycling or walking) is approximately 7 percent for study area, which closely reflects that of the entire municipality.

Table 7 - Various Demographic Characteristics for Toms River

Parameter	Study Area (Toms River)	Entire Municipality (Toms River)	Ocean County	NJ statewide
2000 Population	not avail	89,710	510,916	8,414,350
2010 Population	10,195	91,260	576,567	8,791,894
2040 NJTPA population Forecast	not avail	117,430	801,600	10,410,535
2000 Employment	not avail	35,440	137,658	3,881,226
2010 Employment	not avail	39,670	149,200	3,970,640
2040 NJTPA employment Forecast	not avail	52,200	223,000	5,033,080
2010 Resident Workers	5,043	43,620	237,250	4,122,554
2010 Households	3,852	34,789	221,111	3,553,562
Owner Occupied	87%	81%	81%	65%
Renter Occupied	13%	19%	19%	34%
Avg Household Size	2.65	2.64	2.58	2.68
Share with No Vehicles	7%	5%	7%	12%

Source: U.S. Census survey and NJTPA 2040 demographic forecasts (dated 4/26/2013)

The chart below summarizes the racial and ethnic profile for Census block groups within the study area, as well as the overall municipality, Ocean County, and the State of New Jersey, based on the 2013 American Community Survey, 5-year estimate (Table 8). As shown, the racial profile of the study area Census block groups are similar to overall Toms River and Ocean County.

Table 8 - Racial Profile for Toms River

Race	Study Area	Entire Municipality	Ocean County	NJ statewide
White alone	74%	84%	86%	59%
Black or African American alone	4%	2%	3%	13%
American Indian and Alaska Native alone	0%	0%	0%	0%
Asian alone	8%	4%	2%	9%
Native Hawaiian and Other Pacific Islander alone	0%	0%	0%	0%
Some other race alone	1%	0%	0%	0%
Two or more races	4%	1%	1%	1%
Hispanic or Latino	10%	8%	8%	18%

Source: 2013 American Community Survey, 5-year estimate

The chart below summarizes the income levels for Census block groups within the Toms River part of the overall study area, as well as the overall municipalities, Ocean County, and the State of New Jersey, based on the 2013 American Community Survey, 5-year estimate (Table 9). As shown, the study area has an income distribution similar to the entire municipality of Toms River and Ocean County.

Table 9 - Income Profile for Toms River

2013 Household Income	Study Area	Entire Municipality	Ocean County	NJ statewide
less than \$10,000	1%	3%	4%	5%
\$10,000-\$14,999	3%	4%	5%	4%
\$15,000-\$19,999	4%	4%	5%	4%
\$20,000-\$24,999	3%	4%	5%	4%
\$25,000-\$29,999	4%	4%	5%	4%
\$30,000-\$34,999	4%	4%	5%	4%
\$35,000-\$39,999	4%	4%	4%	4%
\$40,000-\$44,999	2%	3%	4%	4%
\$45,000-\$49,999	3%	3%	4%	3%
\$50,000-\$59,999	9%	8%	7%	7%
\$60,000-\$74,999	11%	11%	10%	9%
\$75,000-\$99,999	11%	14%	14%	13%
\$100,000-\$124,999	10%	12%	10%	10%
\$125,000-\$149,999	7%	7%	6%	7%
\$150,000-\$199,999	11%	9%	6%	9%
\$200,000 or more	14%	7%	5%	9%
Median Household Income	\$81,818	\$73,209	\$61,136	\$71,629
% Low Income **	8.0%	6.3%	10.4%	10.4%
* for study area, median income was interpolated based on distribution				
** for study area, estimated using the 2013 poverty threshold and average household size				

Source: 2013 American Community Survey, 5-year estimate

The chart below summarizes the means of transportation to work for Census block groups within the study area, as well as the overall municipality, Ocean County, and the State of New Jersey, based on the 2013 American Community Survey, 5-year estimate (Table 10). As shown, the study area within Toms River has similar characteristics to the entire municipality of Toms River, Ocean County, and New Jersey.

Table 10 - Means of Transportation to Work for Toms River

Means of Transportation to Work	Study Area	Entire Municipality	Ocean County	NJ statewide
Drove Alone	84%	84%	82%	72%
Motorcycle	1%	0%	0%	0%
Car Pool	10%	8%	8%	8%
Public Transit	1%	2%	2%	11%
Walked	1%	1%	1%	3%
Bicycle	0%	1%	0%	0%
Worked at Home	3%	4%	5%	4%

Source: 2013 American Community Survey, 5-year estimate

2. Future Baseline Conditions

Planned Geometric Changes

The Garden State Parkway Interchange 83 improvement project includes the complete redesign of the intersection at U.S. Route 9 and Indian Head Road (CR 571). It is anticipated that the intersection improvement will improve both safety and operational efficiency. The project will include a new southbound off-ramp from the Garden State Parkway, which will change area traffic patterns somewhat by allowing traffic to stay on the Garden State Parkway longer. Presently, there are 6 miles on the Garden State Parkway between southbound off-ramps parallel to the study area, and Interchange 82 is somewhat congested. Consequently, some traffic that is destined for the south part of the study area uses the length of U.S. Route 9 instead of exiting and traveling north. With a new interchange, a drop in southbound traffic and an increase in northbound traffic is anticipated. Adjustments were incorporated based on the projections of the Greenman Pedersen, Inc. study of this interchange.

As part of a private development project, Hickory Street will be realigned, and a new traffic signal will be provided on U.S. Route 9 at the new Hickory Street intersection.

Anticipated Growth in the Township of Toms River portion of the Corridor

To predict the development of land within the corridor over a 20 year horizon, a two-pronged approach was taken. First, the project team conducted a thorough review of pending land development applications, followed by a forecasting of potential additional applications. Forecasting was based on the current rate of absorption of land and available vacant lots or lots that are likely to be redeveloped (e.g. properties used for residential or agricultural uses that could be assembled into a developable parcel). The anticipated growth in the U.S. Route 9 corridor in Toms River to the year 2035 is shown below (Table 11). Within Table 11, the pending column refers to developments in the approval process (i.e. approval has been granted, but the project hasn't been built yet, or an application for approval has been filed), whereas prospective refers to additional anticipated developments. Appendix D contains a map of potential development by location.

Table 11 – Land Development Forecast for Toms River¹

Land Use	Pending	Prospective	Total
Single Family or Duplex	56 units	83 units	139 units
Multifamily	840 units	81 units	921 units
Retail	216,900 sf	80,000 sf	296,900 sf
Office	18,000 sf	10,000 sf	28,000 sf
Industrial Park	16,800 sf	0 sf	16,800 sf
Institutional	41,200 sf	0 sf	41,200 sf

Source: Land Use and development data collected for study

Traffic for the new developments was projected using the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition. The results, excluding pass by traffic (i.e. traffic already in the traffic stream), are shown in below (Table 12). Trip distribution for this traffic was based on the Census journey to work survey for residential or work-related trips, and a gravity model distribution for other trips.

¹Block 171, Lots 10, 18-24, and 42 at the northwest corner of U.S. Route 9 and Riverwood Drive are assumed to be planned for open space and excluded.

Table 12 – Traffic Growth from Planned and Potential/ New Development for Toms River

Land Use	Size	Trip Generation		
		AM Peak	PM Peak	Sat Peak
Residential	1,060 units	447	620	537
Office	28 ksf	69	101	104
Industrial Park	17 ksf	16	17	4
Retail	297 ksf	<u>509</u>	<u>1,135</u>	<u>2,166</u>
Total		1,041	1,873	2,811

Source: Land Use and development data collected for study

Although many of the lots on U.S. Route 9 are subject to trip limitations under the NJDOT AMC, the study team found that the trip limits had no impact on the potential developments identified.

Background Traffic Growth

A growth rate for through traffic (neither an origin nor destination within the study area) of 1.2 percent per year for 20 years, was applied within the corridor. This growth rate factor was based on estimated total growth for Ocean County. As traffic was explicitly added for developments in the Lakewood and Toms River portions of the corridor, the through traffic portion of traffic was derived from Table 2, shown earlier (i.e. only 5-8 percent of traffic on U.S. Route 9 and only 2-6 percent of the traffic to/from Route 70).

Another factor that was added to traffic volumes was the impact of a new southbound off-ramp for the Garden State Parkway at Interchange 83. Based on the traffic projections for said project, no changes to traffic volumes are anticipated for the weekday morning or Saturday peak hours. However, for the weekday evening peak hour, southbound U.S. Route 9 traffic is anticipated to decrease by 32-68 trips, depending on location, and northbound U.S. Route 9 traffic is anticipated to increase by up to 52 trips, depending on location.

One other factor not applied in this study was the effect of widening U.S. Route 9 to four lanes continuously from Route 88 to Indian Head Road (CR 571). Such a project could draw additional traffic into the corridor from parallel routes, such as Old Freehold Road/New Hampshire Avenue to the east and Whitesville Road to the west. This increase would be due to latent demand that is presently not being served in the corridor, as demonstrated by the very low share of through traffic in it. This suggests that motorists may tend to avoid the corridor by using parallel routes. Based on traffic volumes on these parallel routes, it is estimated that a widening may increase northbound traffic volume on U.S. Route 9 by approximately 400 vehicles during the morning peak hour, and may increase southbound traffic volume by approximately 450 vehicles per hour during the evening peak hour.

Future (2035) Traffic Volumes

Traffic flows for the horizon year 2035 were developed by combining existing traffic volumes with traffic from new developments and the aforementioned changes to background traffic. Specific flows are summarized in Appendix E. The flow maps are specific to a roadway that remains two lanes (one lane per direction) for the most part. As noted earlier, a widening of the roadway to four lanes could lead to further increases in peak hour traffic volume of 400-450 vehicles per hour, through diversion from parallel routes.

Future Traffic Signals

U.S. Route 9 Corridor Study – Managing and Accommodating Growth in Lakewood and Toms River, Ocean Co.

One factor when determining potential locations of future traffic signals is spacing to existing traffic signals. For roadways with 50 mile per hour operation, the NJDOT AMC calls for a minimum spacing of 0.5 miles between traffic signals in order to maintain orderly flow of traffic. Exceptions are given where it can be demonstrated that a new signal will not interfere with the green band, which is the amount of time in seconds that a group of cars can travel Route 9 at the intended speed without having to stop at traffic signals along the corridor. Since traffic signals on U.S. Route 9 in Toms River are not coordinated, there is no green band presently. However, traffic signal coordination in the corridor could easily be implemented in the future. While such a strategy wouldn't increase capacity, it could improve level of service slightly on U.S. Route 9 by reducing the number of stops required. It should be noted that traffic signal coordination sometimes can lead to pedestrians crossing without traffic signal indications, due to longer waiting times when push buttons are pressed to cross the roadway, that lead pedestrians to believe that the buttons are malfunctioning. This trend can be easily overcome, however, by keeping traffic signal cycle lengths short, and providing indicator lights on push buttons, similar to elevator buttons.

As noted earlier, a new traffic signal is planned for the realigned Hickory Street as part of a new development. This signal does violate the NJDOT AMC spacing criteria as spacing between the traffic signal at U.S. Route 9 and Cox Cro Road would be 0.41 miles, versus the required 0.5 miles. Spacing between the intersection at U.S. Route 9 and Clover Road would be 0.53 miles, versus the required 0.5 miles. The study team is confident that the signal at Hickory Street could be designed to coordinate with the green band on U.S. Route 9 should signal timing optimization ever be implemented, especially considering how close the location is to compliance with the NJDOT signal spacing criteria.

This study identified a need for a traffic signal for at least one of the east-west roadways to the west of U.S. Route 9 at its U.S. Route 9 intersection. The streets under consideration would be Sunset Avenue, Clayton Avenue, Stevens Road, and Riverwood Drive. Silverton Road was also considered, as it is the only east-west roadway to the east of U.S. Route 9 that is not signalized. Based on input from the working group, and considering traffic volumes, Stevens Road was identified as the location for a possible future traffic signal. Stevens Road is a county roadway, it is central to the east-west routes west of U.S. Route 9, it contains the Children's Specialized Hospital, and it has the highest traffic volumes of all the unsignalized side streets along the study corridor. Sunset Avenue also has high traffic volumes and a high number of crashes. However, being situated between Whitty Road and Church Road, which are 0.65 miles apart, could impact potential traffic progression through signals. Stevens Road is only 0.22 miles from Church Road (meaning that this would involve a signal spacing violation). However, spacing to the next signal (Cox Cro Road) would be 1.27 miles. Given these parameters, a Stevens Road traffic signal could be designed in a manner to coordinate with green bandwidth on U.S. Route 9 if signal timing optimization were to be implemented.

The existing emergency signal at U.S. Route 9 and Clayton Avenue should also be upgraded to accommodate pedestrians crossing, as either a HAWK beacon (i.e. a special form of traffic signal only used by pedestrians crossing the roadway, not traffic entering the roadway) or conventional crosswalk setup.

Summary of Recommendations: Implement traffic signal coordination on U.S. Route 9 with time of day plans, add a traffic signal at U.S. Route 9 and the realigned Hickory Street intersection, add a traffic signal at U.S. Route 9 and Stevens Road intersection, modify flashing emergency signal at U.S. Route 9 and Clayton Avenue to accommodate pedestrian crossings.

Future (2035) Level of Service

Level of Service analysis for the various intersections under study were conducted for the weekday morning and evening peak hours and Saturday midday peak hour utilizing the methods outlined in the *Highway Capacity Manual, 2010 Edition*, published by the Transportation Research Board, using the program Synchro (using Highway Capacity Manual methodology). The level of service results for each overall intersection, along with notations of any issues evident, is summarized below (Table 13). As shown, the U.S. Route 9 and Indian Head Road (CR 571) intersection is anticipated to operate at generally acceptable levels of service, due to the improvements being implemented as part of Garden State Parkway Interchange 83 improvements. Other signals operate at acceptable/marginal conditions (at least for U.S. Route 9), except for the U.S. Route 9 and Church Road intersection and the U.S. Route 9 and Whitty Road intersection, which both will operate at failing conditions. As in the existing case, the delays shown for U.S. Route 9 and Church Road make no allowances for southbound through traffic using the shoulder to bypass left turning vehicles, meaning that this delay is likely overstated somewhat versus actual behavior.

Table 13 – Future (2035) Baseline Level of Service for Toms River

Intersection	Morning		Evening		Saturday		Comments
	LOS	Delay	LOS	Delay	LOS	Delay	
U.S. Route 9 & Shopping Center / Clover Road	C	24.9	D	50.8	E	68.0	side streets failing
U.S. Route 9 & Hickory Street	B	10.8	C	29.8	E	62.6	side streets marginal, southbound through failing on Saturday
U.S. Route 9 & Cox Cro Road	D	35.3	E	68.1	D	49.0	Southbound marginal, northbound left, and side streets at failing levels
U.S. Route 9 & Stevens Road	A	8.3	B	16.2	C	28.5	Side street marginal
U.S. Route 9 & Church Road	F	199.1	F	4938.4	F	7893.5	Southbound delays and side streets operating at failing levels
U.S. Route 9 & Whitty Road	D	53.6	F	131.0	F	117.9	Failing conditions on all approaches
U.S. Route 9 & Indian Head Road	C	30.2	D	46.6	D	39.8	Marginal conditions on most approaches

Source: Analysis developed for study

3. Low Cost – High Impact Improvements

Recommended Improvements

Low-cost, high-impact improvements are spot improvement projects that generally can be performed within the existing right of way, have limited environmental impacts and can consequently be supported with a Categorical Exclusion Document. Low-cost, high-impact improvements are envisioned as implementable in a short timeframe as discrete projects.

In addition to the new traffic signal at U.S. Route 9 and Stevens Road, improvement schemes were developed for two locations – the U.S. Route 9 and Whitty Road intersection (Figure 5) and the U.S. Route 9 and Church Road intersection (Figure 6). Each of these spots were selected based on their high crash history, traffic operational deficiencies, and having been identified as bottlenecks. Note that the new traffic signal at Stevens Road has been incorporated into the improvement scheme for U.S. Route 9 and Church Road.

The recommended improvement at Church Road is partially outside the existing right of way. If necessary, the improvement at Church Road can be advanced without a northbound right turn lane in order to minimize the *U.S. Route 9 Corridor Study – Managing and Accommodating Growth in Lakewood and Toms River, Ocean Co.*

potential for right of way acquisition needs. Note that the existing U.S. Route 9 roadway is partially located outside the existing right of way at this location.

Analysis of one corridor-wide treatment (i.e. not a low-cost, high-impact spot improvement) of a two-way left turn lane configuration for the full corridor found that such an improvement would yield safety and operational benefits.

Summary of Recommendations: Implement two-way left turn lane, improve the intersection of U.S. Route 9 and Whitty Road, improve the intersection of U.S. Route 9 and Church Road.

Cost Estimates

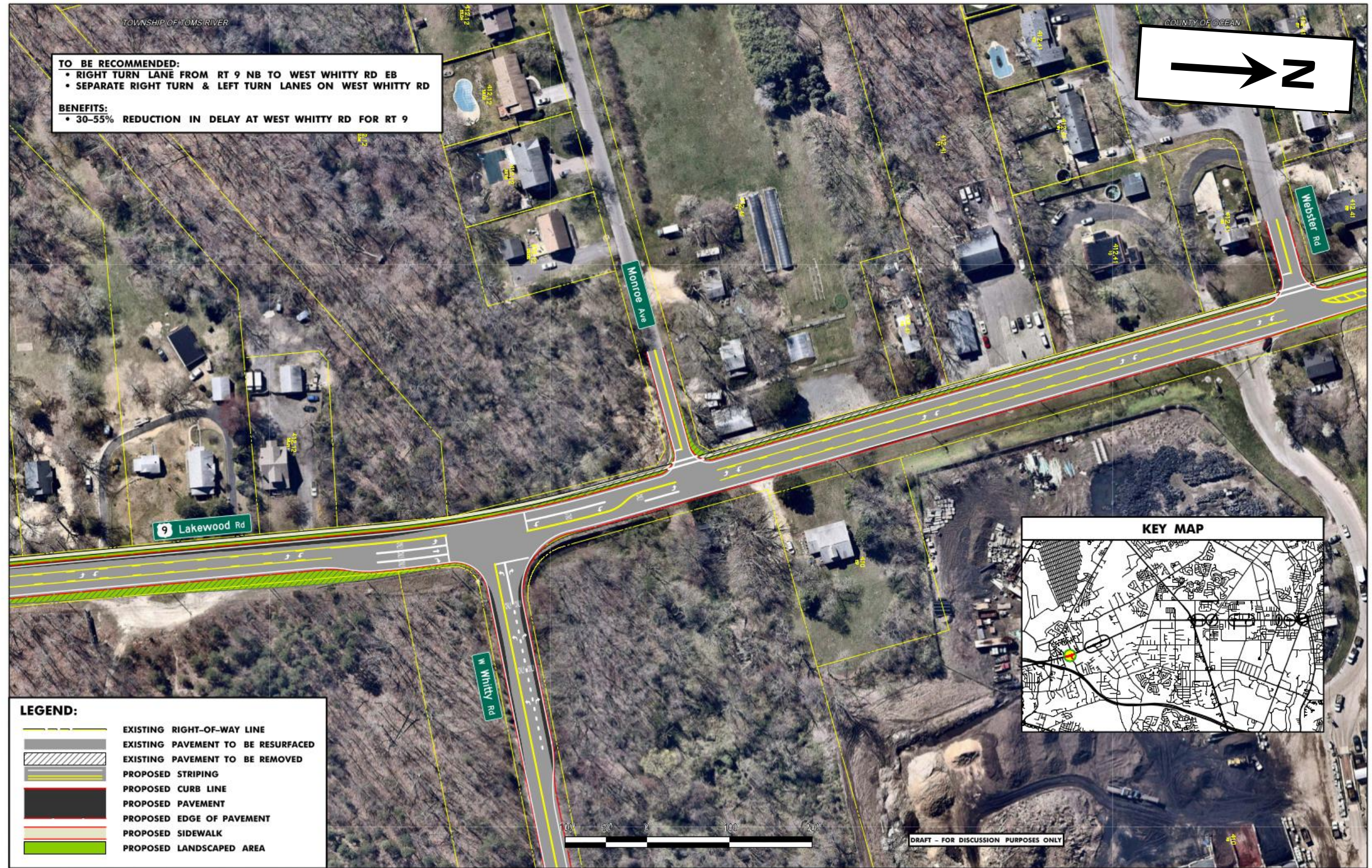
The following order of magnitude cost estimates were developed for improvement schemes. Full resurfacing of U.S. Route 9 within the project limits is included in these costs, as well as implementation of a two-way left turn lane within the area of work. Full replacement of existing traffic signals was also assumed. The cost estimates do not include utility relocation. A detailed breakdown of costs is contained in Appendix F.

U.S. Route 9 and Whitty Road	- \$1,330,000.00
U.S. Route 9 and Church Road (including Stevens Road signal)	- \$1,270,000.00

Bottleneck and Level of Service Analysis

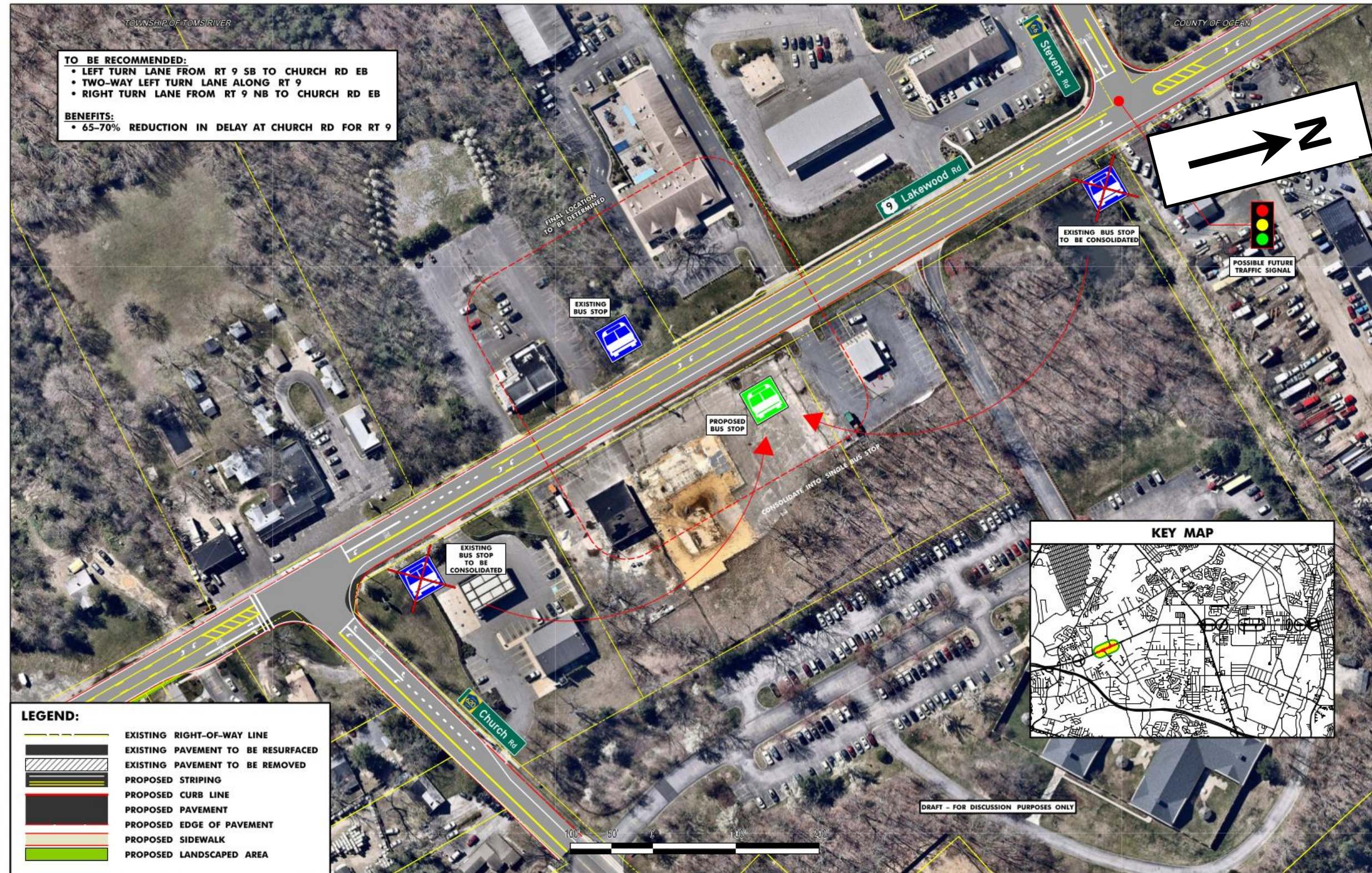
An analysis was conducted of projected future volume in the corridor combined with existing and expanded capacity (i.e. capacity with low cost-high impact improvements) at key bottlenecks to determine the potential effectiveness of the two improvements and assess traffic operations in the corridor. Level of service (LOS) analysis for U.S. Route 9 and Whitty Road indicated that the overall intersection would operate at a marginal LOS E in peak hours, with a few turns operating at a failing LOS F (although just slightly over LOS E). Similar analysis for U.S. Route 9 and Church Road indicated that the overall intersection would operate at a good LOS C in peak hours, with a few turns operating at a marginal LOS E. Analysis finds that with the low-cost, high-impact improvement schemes, no bottleneck will exceed capacity by more than 10 Percent (Table 14 and Figure 7). It is not uncommon for approaches to operate slightly over capacity in the peak hour, with the result being an approach that operates at a marginal LOS E.

Although a low cost-high impact improvement for U.S. Route 9 and Cox Cro Road was not developed as part of this study, it was identified that widening Cox Cro Road approaches to provide opposing left turn lanes through the U.S. Route 9 intersection would further improve future traffic operations in the corridor.



Source: NJDEP Aerial Photo with project specific enhancements

Figure 5 - Improvements to U.S. Route 9 and Whitty Road



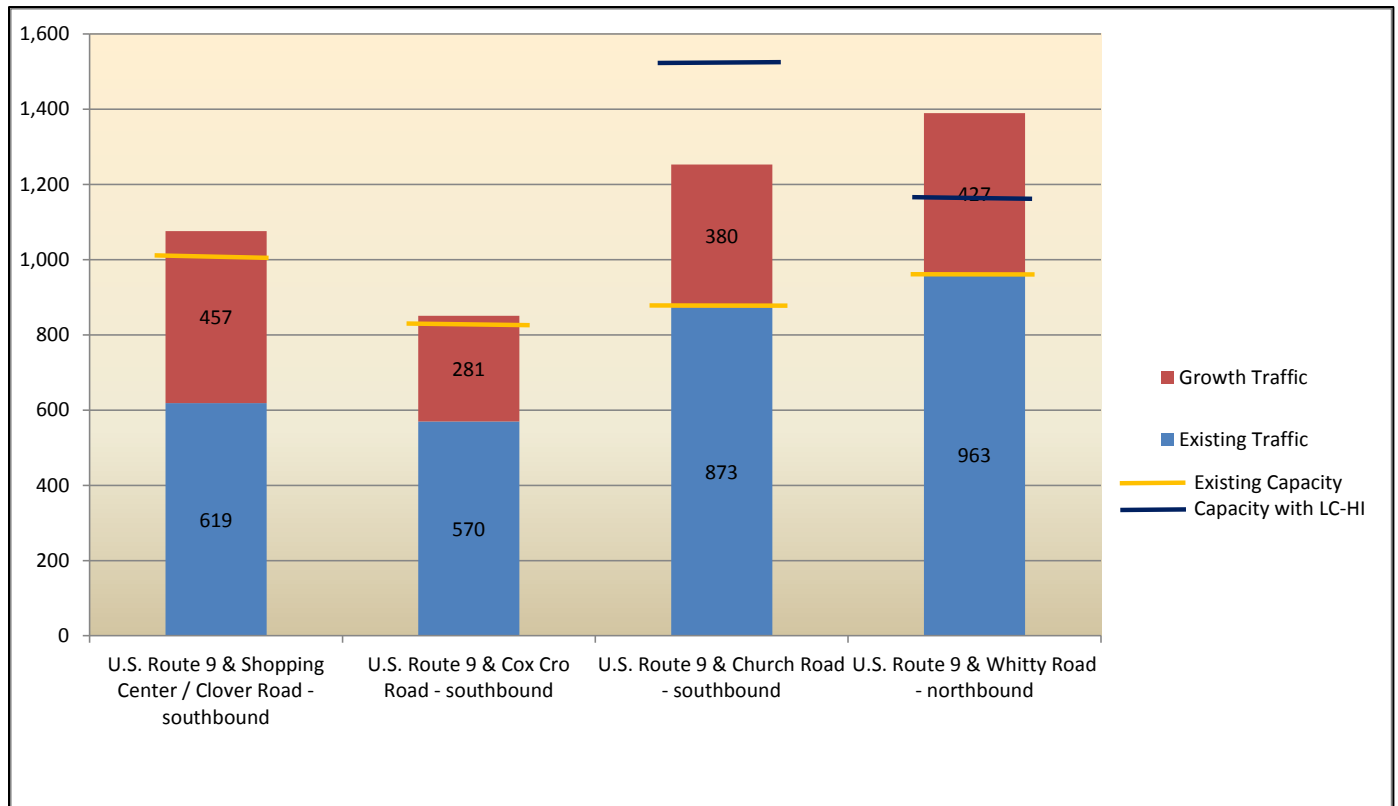
Source: NJDEP Aerial Photo with project specific enhancements

Figure 6 - Improvements to U.S. Route 9 and Church Road

Table 14 - Future (2035) Bottleneck Analysis for Toms River

Location	Existing Traffic	Growth Traffic	Total	Existing Capacity	Volume / Capacity Ratio	Expanded Capacity	Expanded Volume / Capacity Ratio
U.S. Route 9 & Shopping Center / Clover Road - southbound	619	457	1,076	1,000	1.08	n/a	n/a
U.S. Route 9 & Cox Cro Road - southbound	570	281	851	830	1.03	n/a	n/a
U.S. Route 9 & Church Road - southbound	873	380	1,253	873	1.44	1,470	0.85
U.S. Route 9 & Whitty Road - northbound	963	427	1,390	963	1.44	1,180	1.18

Source: Analysis developed for study



Source: Analysis developed for study

Figure 7 - Future (2035) Bottleneck Analysis for Toms River

Safety Benefits

Using the Highway Safety Manual (HSM), it was possible to estimate the projected reduction in crashes from the low-cost, high-impact improvements. Note that the HSM appeared to under-represent intersection crashes, possibly due to the exclusion of congestion from HSM input and the impact on calculation of rear-end crashes. Therefore, these safety improvements may be understated.

Two-way left turn lane in existing right of way + low-cost, high-impact improvements	- 13% crash reduction
Two-way left turn lane in existing right of way + low-cost, high-impact improvements + Access Management	- 22% crash reduction
Two-way left turn lane with full shoulders + low-cost, high-impact improvements	- 23% crash reduction
Two-way left turn lane with full shoulders + low-cost, high-impact improvements + Access Management	- 31% crash reduction

4. U.S. Route 9 Cross-Section and Access Management Plan

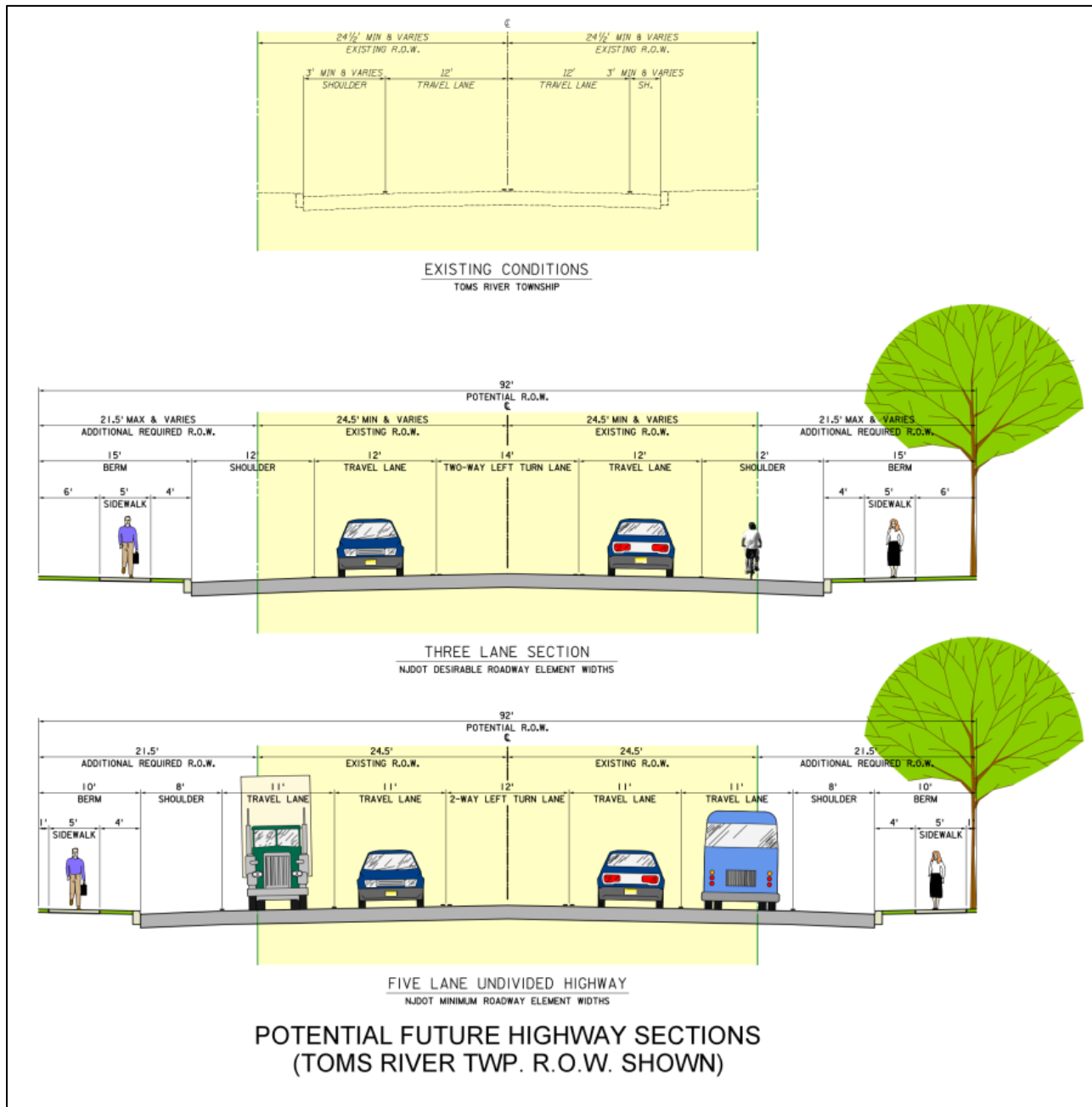
U.S. Route 9 Cross Section Recommendation

The present cross section for U.S. Route 9 in the study area is two lanes (one lane per direction), with shoulders of varying widths, and a right of way width ranging from 49.5 feet to 70 feet. Left turns are accommodated from the existing roadway. Appendix B of the NJDOT AMC stipulates that this section of U.S. Route 9 be a four lane divided roadway with left turns at jughandles only (Access Level 3), and a desired right of way width of 114 feet. The desired typical section (DTS) can be broken down as follows: four 12-foot lanes, a 12-foot median width, two 12-foot shoulders, and two 15-foot areas between the right of way and edge of pavement to accommodate sidewalks, utilities, and signage (known as border area). These widths are desirable rather than minimum acceptable widths (assuming no design exception) for each cross section element.

Given the high number of existing access points per mile (48), converting U.S. Route 9 into a divided roadway would represent a substantial deviation from the existing condition. In addition to requiring a significant amount of right of way for the roadway itself, a significant amount of land would be required to convert existing signalized intersections into jughandle ramp intersections. A preliminary review of the corridor reveals that 39 properties would have buildings or parking areas impacted by right of way acquisition to 114 feet before consideration of jughandle ramps, including four single family residential lots. Without reconstructing the roadway and many land uses on it, the section of U.S. Route 9 under study could continue to accommodate left turns directly from the existing roadway (as in the current condition which is Access Level 4) with a two-way left turn lane. These center turn lanes have a desired width of 14 feet, but a minimum acceptable width of 12 feet. Other cross-sectional elements have the following width characteristics, based on the New Jersey Roadway Design Manual and A Policy on Geometric Design, by the American Association of State Highway and Transportation Officials (AASHTO):

- Travel lanes for state highways have a desired width of 12 feet, but an acceptable width of 11 feet.
- Shoulders accommodate bicycles and buses in addition to providing stormwater storage in rain events and separating moving traffic from obstructions. Although not required for every road, shoulders become necessary to accommodate pedestrians where there is no continuous sidewalk. Shoulders, if provided, have a desired width of 12 feet, but can vary as low as 4 feet in width and still have some utility. Current NJDOT policy is to provide 4 feet minimum width if there is no continuous sidewalk, or 6 feet where posted speeds are greater than 40 miles per hour. Shoulders narrower than 8 feet require design exceptions, as the width would be less than recommended in the aforementioned AASHTO reference.
- Border areas (the area between the edge of pavement and the right of way) have a desired width of 15 feet, but can be as narrow as 8 feet before a design exception is needed (according to A Policy on Geometric Design).

Redefining U.S. Route 9 as a two-lane roadway with full width shoulders and a two-way left turn lane and sidewalk would lead to a desired right of way width of 92 feet. Using the information above, the same 92 feet (with design exceptions) could accommodate five lanes (i.e. two lanes per direction, plus a two-way left turn lane), plus 8 foot wide shoulders and 10 feet wide border areas as shown below (Figure 8). With a right of way width of 92 feet instead of 114 feet, a preliminary review indicates that only 26 properties will have buildings or parking lots impacted, versus 39 properties for a 114-foot right of way. The number of single family homes included in this total would be two, versus four with a 114-foot right of way. The overall right of way acquisition needs of 92 feet versus 114 feet is slightly over 10 acres of land, in addition to the above impacts. Other rationale for narrowing the desired roadway dimensions include about 5 fewer acres of impervious coverage and 17 percent shorter crossing distances for pedestrians with an otherwise acceptable design that provides minimal performance reductions. It is also noted that maintaining the shoulder is necessary based on both public sentiment, and to provide an offset for traffic from obstructions, to accommodate bicycles and pedestrians where there is no sidewalk, to store stormwater, to accommodate buses stopping, and to otherwise enhance safety.



Source: Project Team

Figure 8 – Potential U.S. Route 9 Cross-Sections in Toms River

Access Management Plan

An access management plan is a regulatory document that if adopted defines road widths, striping, traffic signals, and driveway locations along a section of state highway. It must be adopted by a municipality and the state to be enforceable. A process exists to amend it after adoption, if needed. All improvements to the road and redevelopment activity must conform to the plan, as adopted or amended.

The NJDOT AMC has several regulations related to driveway placement that optimize safety and preserve traffic

U.S. Route 9 Corridor Study – Managing and Accommodating Growth in Lakewood and Toms River, Ocean Co.

operational efficiency. In addition to these regulations, minimizing conflict points is a key objective of an Access Management Plan. Sharing access between properties, particularly for left turns, is paramount, as is putting as many left turns through signalized intersections as possible.

A lot by lot Access Management Plan has been developed using the philosophy above for the entire section of U.S. Route 9 that was studied. If fully implemented, the plan would reduce the number of access points from 48 per mile to 28 per mile. The safety benefits of this proposed improvement plan were quantified earlier (under section entitled Safety Benefits) in this report. Appendix G contains the proposed Access Management Plan for U.S. Route 9 in Toms River.

5. Complementary Strategies

Bus Stop Relocation Plan

All existing bus stops within the corridor were reviewed, with changes recommended to achieve the following objectives:

- Consolidate closely spaced bus stops, and relocate bus stops to cover areas not covered
- Ensure bus stops are located near shopping areas and other major attractor entrances
- Where possible, align bus stops with traffic signals to facilitate safe pedestrian crossings

The recommended bus stop relocations for the entire study area are shown in Appendix I. In summary, the study team recommends consolidating six pairs of bus stops into three, located near signals where possible; moving one set of stops to an opposite side of a signalized intersection; and adding bus stops by a shopping center.

Missing Roadway Links / Parallel Road Network

Providing better connectivity between roadways can be an important strategy for alleviating congestion. Adding parallel routes and alternative access points can help increase resiliency and flexibility to the transportation system by allowing some trips to avoid use of the state highway system for access. The following additional roadway connections were found to be beneficial in this instance. If implemented, these types of improvements can off-load U.S. Route 9 in such a way that leads to improved performance of existing bottlenecks:

- Church Road Extension west of U.S. Route 9 would allow for east-west travel without the need to turn on and off of U.S. Route 9
- Extension of Massachusetts Avenue to Whitesville Road can enhance both a parallel route as well as access to an existing intersecting route
- Realignment of Hickory Street across U.S. Route 9 is part of a current residential development and would enhance east-west travel without the need to turn on and off U.S. Route 9

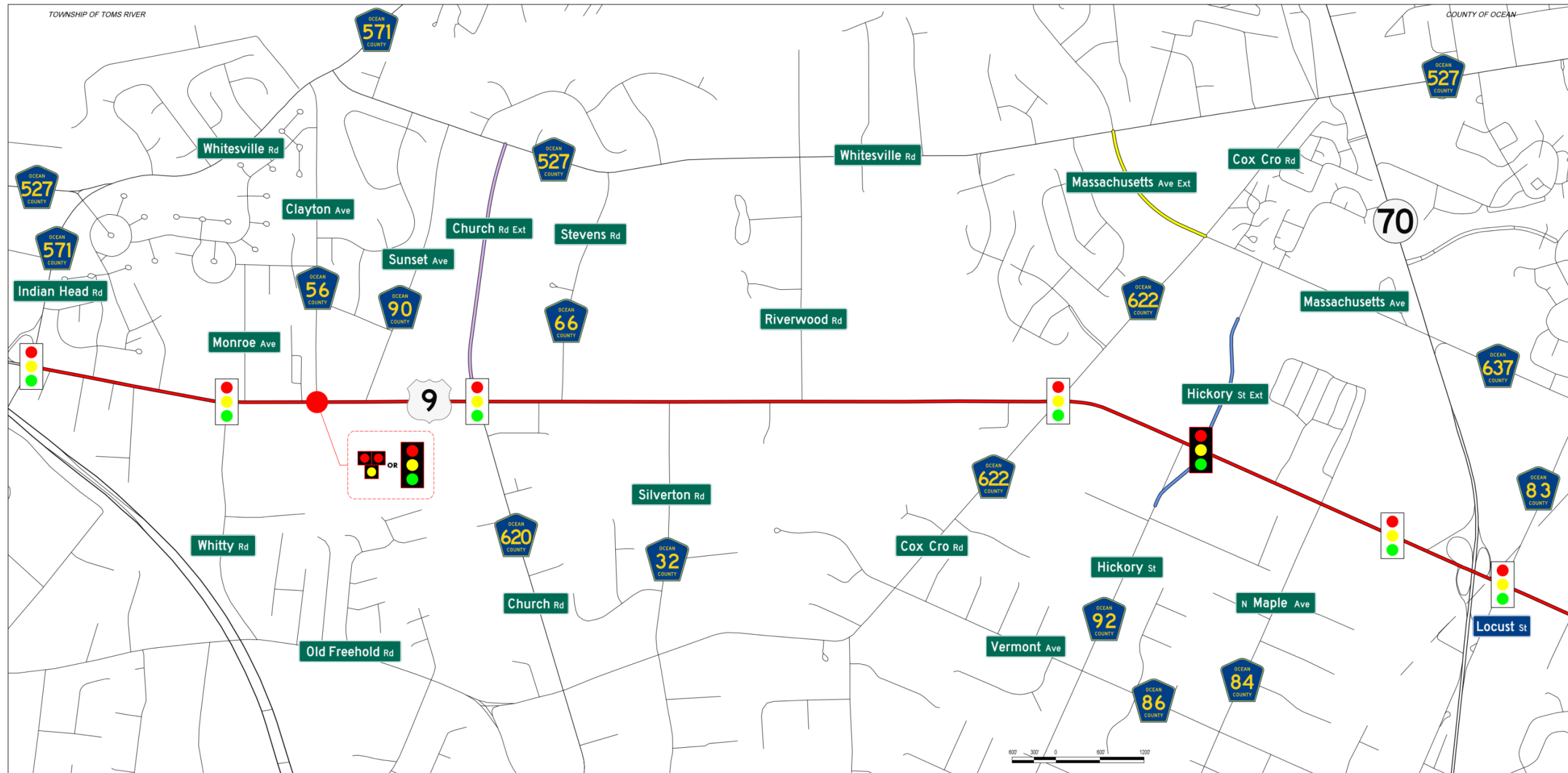
Note that although adding the above missing links/parallel routes would intuitively reduce some traffic volumes on U.S. Route 9, no credit was taken for this in analysis, in order to be appropriately conservative.

These connections are shown below (Figure 9).

Ordinance Changes / Zoning Controls

It is recommended that Toms River amend its zoning ordinance for lot frontage requirements to a minimum of 275 feet in the U.S. Route 9 corridor to be consistent with the NJDOT AMC lot conformance

During the study Toms River acquired a group of properties for open space that would have generated excessive traffic in the corridor if developed as a 200,000 square foot retail center. Therefore, no additional zoning controls are needed to meet traffic and safety operational goals along the study corridor in Toms River.



Source: Project Team

Figure 9 - Missing Link Connection Plan in Toms River

6. Working Group / Public Outreach

Working Group Meetings

Plan development was guided by a working group comprised of representatives of the following agencies:

- North Jersey Transportation Planning Authority
- New Jersey Department of Transportation
- Ocean County
- Township of Toms River
- Township of Lakewood
- New Jersey Office of Planning Advocacy
- New Jersey Transit
- Greater Mercer Transportation Management Association

It should be noted that the working group for the Toms River plan was simultaneous with the development of the Lakewood Plan discussed in Part C. The working group met in person or by conference call 11 times throughout the study period. The reports to the Commissioner regarding these meetings are contained in Appendix J.

Meetings were held on the following dates:

- May 29, 2015
- June 23, 2015 (conference call)
- July 14, 2015
- August 18, 2015
- September 18, 2015
- October 15, 2015
- November 16, 2015
- December 15, 2015
- January 12, 2016
- May 6, 2016
- October 28, 2016

NJDOT Subject Matter Experts

Four meetings were held with various subject matter experts from NJDOT at the NJDOT headquarters. Within these meetings, low-cost, high-impact plans were discussed in detail and refined, as were locations for new signals and potential cross-section elements for the plan. Some concerns were expressed regarding two-way left turn lanes on a roadway posted for 50 mile per hour operation. However, it was determined that the safety benefits outweigh the detriments.

Local Officials Meetings/Briefings

Two meetings were held to gain additional input from local officials in Toms River at critical milestones. These meetings were held on July 14, 2015 and July 25, 2016 at the Toms River Municipal Building. At the first meeting, local officials spent considerable time discussing how the lot configuration on U.S. Route 9 was the opposite of what was conducive to commercial development – the corridor has deep lots with limited frontage instead of wide frontages with shallow lots. The local officials expressed the desire to see economic development in the corridor through widening and other improvements. At the second meeting, this sentiment was repeated.

Public Outreach Meetings

Two public outreach open house meetings were held at the Ocean County Library in Toms River. The first, held on August 18, 2015, introduced the project, and gathered input through workshop style stations, a visual preference survey, and a written questionnaire. A total of 26 people signed in to the meeting. The second, held on August 23, 2016, presented preliminary findings through a presentation and feedback stations. A total of 27 signed in to the meeting. At each meeting, feedback stations were staffed by professionals ready to discuss specific topics such as traffic and circulation, low-cost, high-impact proposals, DTS options and AMP issues. During the initial meeting, a graphic board contrasting two alternatives for numerous elements was provided, and attendees were given dots to vote for their preference. A limited number of dots were provided, thus forcing people to prioritize what was important to them. A comment form was provided for attendees to submit written comments. The results of these meetings are summarized in Appendix K.

Notification for public meetings was given through a direct mailing to all property owners on U.S. Route 9 within the corridor. Press releases and flyers were also distributed through Ocean County and the Township of Toms River public information offices.

During the public process for the first meeting, some comments were made regarding existing conditions for U.S. Route 9 in Toms River. Preference surveys were also issued at public meetings, and found the following (based on eight surveys and stated preference dot survey):

- There was an overwhelming desire to maintain left turns to and from U.S. Route 9, preferably two-way left turn lanes
- Survey respondents want shoulders
- Survey respondents want sidewalks and bus stops with shelters
- The top three major concerns were (ranked on a scale of 1-5): Traffic safety (4.75 average), access to businesses and side streets (4.71 average), and travel time (4.43 average)
- Ranking concerns by most important, order was (note that only six surveys completed this portion): reducing travel time (first priority on three of six surveys, second priority on one survey), reducing crashes (second priority on three of six surveys), improving bus service (second priority on two of six surveys, third priority on one survey)

In the second public meeting, the public expressed support for the recommended improvements and the Access Management Plan. Six surveys were returned. These expressed concerns about U.S. Route 9 and Cox Cro Road, but were supportive of the recommendations.

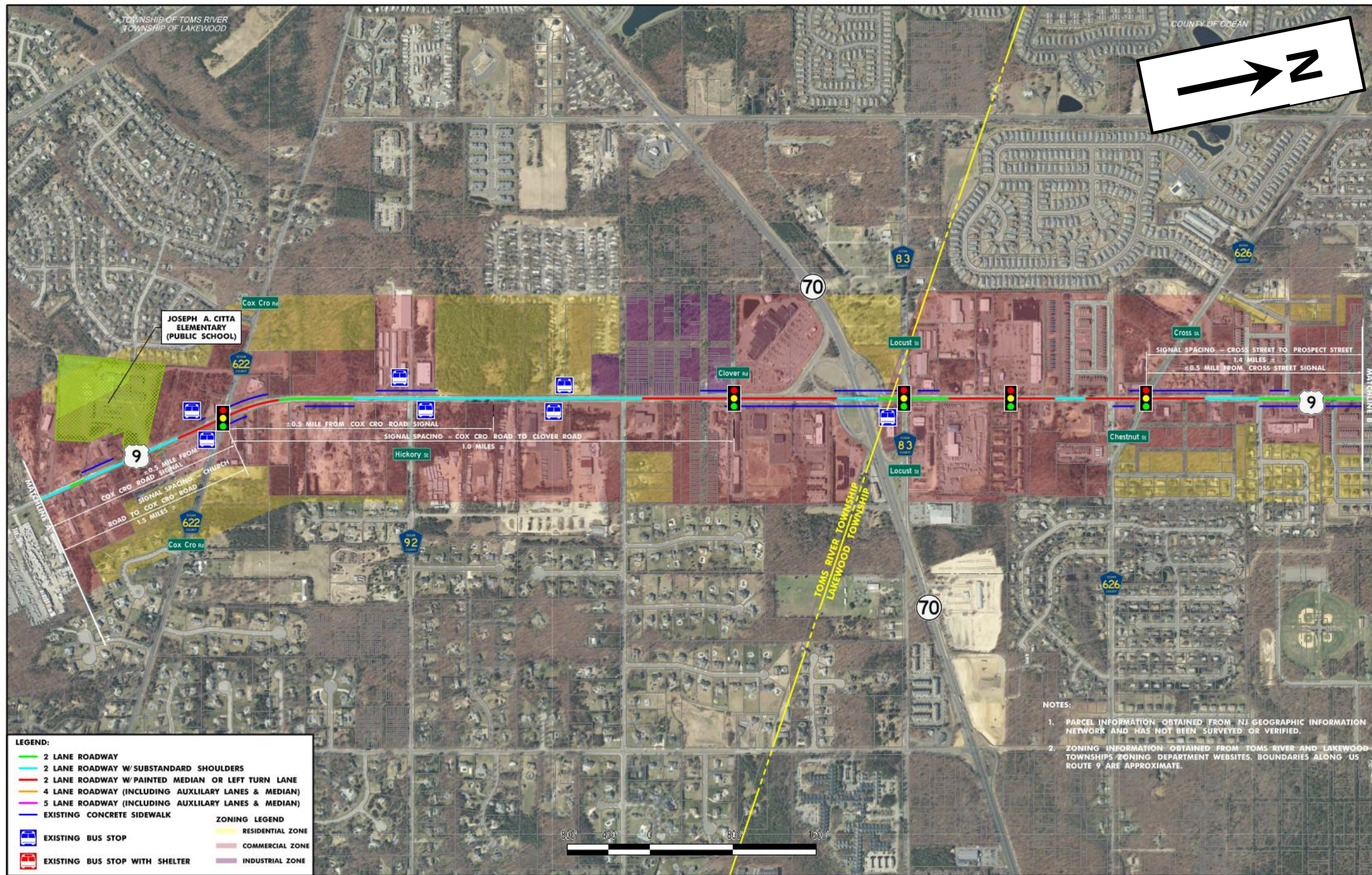
PART C – Access Management Plan for Township of Lakewood

1. Existing Conditions

Roadway Geometry and Cross-Section

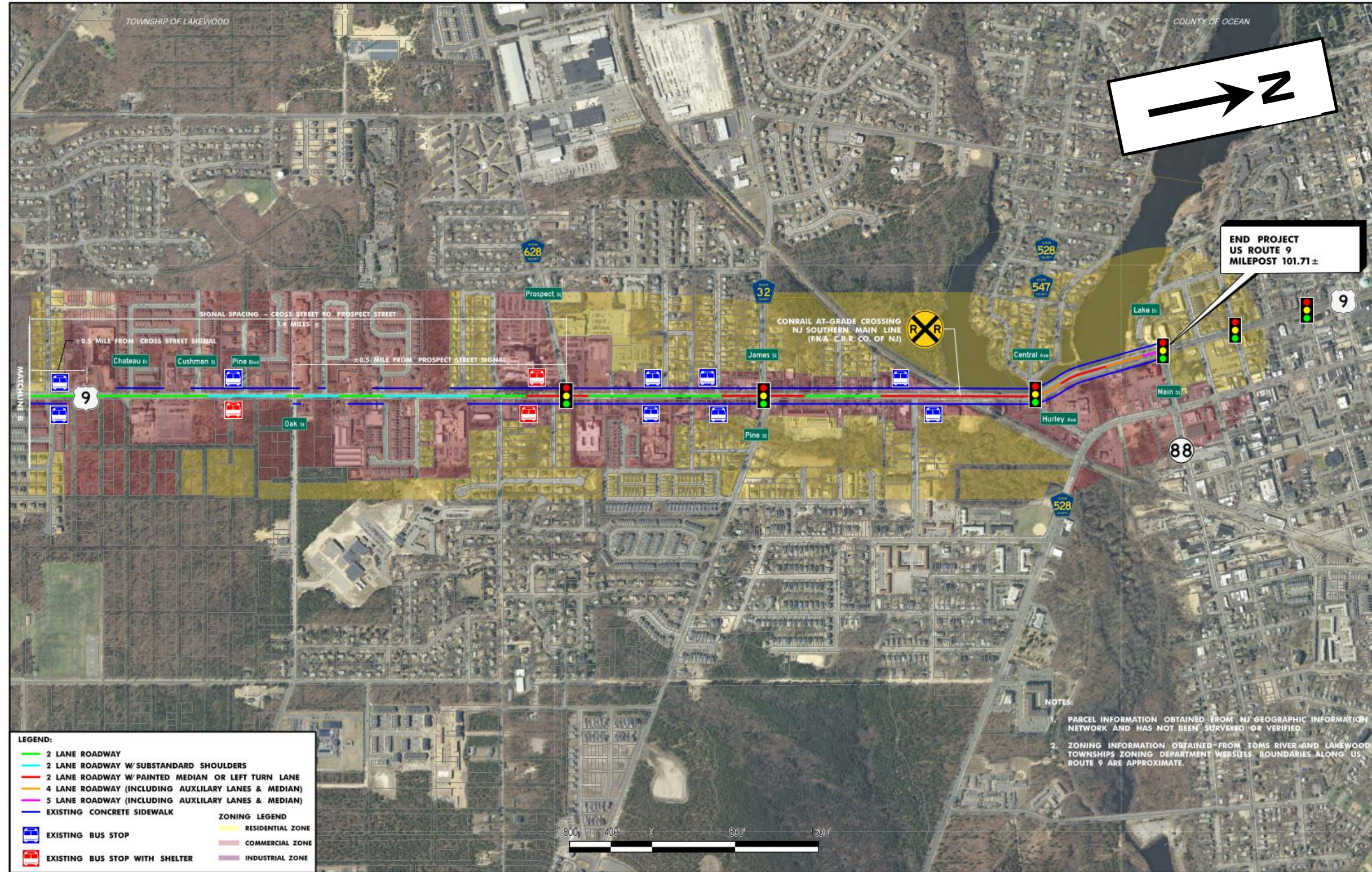
The area studied Lakewood Township consisted of U.S. Route 9 from Mile Post 98.75 to 101.71 (i.e. 2.96 miles), which extends from the municipal line approximately at NJ Route 70 to Main Street (N.J. Route 88). This section of U.S. Route 9 consists of two lanes (one lane per direction), with shoulders. The existing right of way width is 66 feet south of Central Avenue/Hurley Avenue, and 80 feet north of this point. The posted speed limit varies from 35-45 miles per hour. There are several isolated segments of sidewalks, typically along the frontages of new developments. There are seven traffic signals along U.S. Route 9 in this area, including Main Street (N.J. Route 88). All but one signal (Locust Street) has additional left turn lanes on U.S. Route 9 at the signals. These are illustrated below (Figures 10a and 10b). In summary, the existing cross-section of U.S. Route 9 has the following features:

- Approximately 30 percent of the corridor has narrow shoulders (i.e. less than 6 feet wide)
- Approximately 55-70 percent of each side of the road has sidewalks
- Approximately 55 access points per mile for streets and driveways (whereas 10 access points per mile is ideal for safety, and 30 access points per mile would be more appropriate for the area in question)
- There are 13 bus stops within the study area



Source: NJDEP Aerial Photo with project specific enhancements

Figure 10a - Roadway Cross-Section in Township of Lakewood (southern section)



Source: NJDEP Aerial Photo with project specific enhancements

Figure 10b - Roadway Cross-Section in Township of Lakewood (northern section)

The following signalized intersections are located in the study area, none of which are coordinated:

- U.S. Route 9 and Main Street (N.J. Route 88)
- U.S. Route 9 and Central Avenue/Hurley Avenue
- U.S. Route 9 and James Street/Pine Street
- U.S. Route 9 and Prospect Street
- U.S. Route 9 and Chestnut Street/Cross Street
- U.S. Route 9 and Shopping Center/Courtier Street
- U.S. Route 9 and Locust Street

There are also 17 stop-controlled intersections on U.S. Route 9 in Lakewood south of Route 88.

Roadway Volumes

Traffic volumes were gathered between May 30, 2015 and June 20, 2015 using a combination of ATR counts, intersections turning movement counts (using MioVision video imaging units), and automatic license plate readers (ALPR).

Automatic Traffic Recorder (ATR) counts were used from June 8 to June 15 at the following locations:

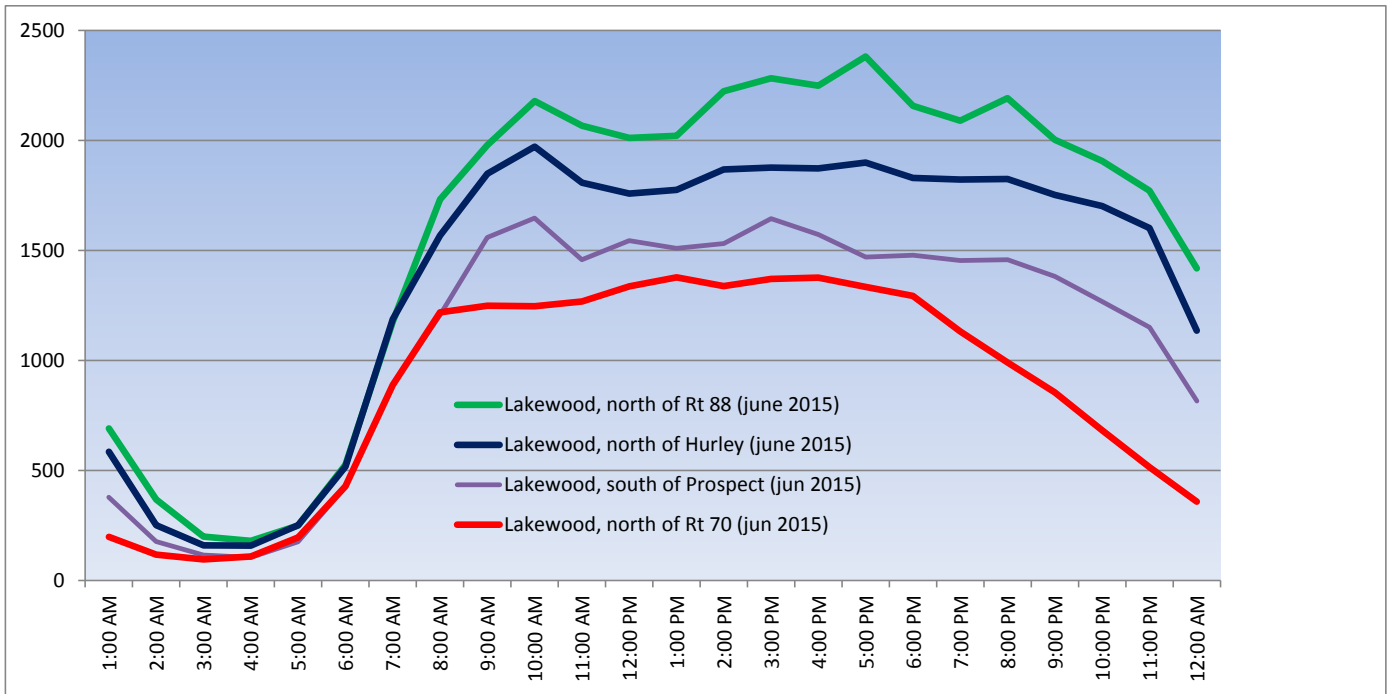
- U.S. Route 9 north of Route 70
- U.S. Route 9 south of Prospect Street
- U.S. Route 9 north of Central Avenue/Hurley Avenue
- U.S. Route 9 north of Main Street (N.J. Route 88)

A summary of the daily traffic volumes found is shown below (Table 15). Also shown is a graph of hourly volumes on U.S. Route 9 (Figure 11). As shown, weekday volumes on U.S. Route 9 south of Main Street (N.J. Route 88) vary from 21,000-33,000 vehicles per day, with a high of nearly 2,000 vehicles per hour. Saturday volumes are substantially lower. Figure 3 illustrates that traffic volumes remain high through-out the day, with minimal peaking. The shape of this graph is indicative of a highly congested corridor, where natural peak hour traffic demand is being suppressed in some manner, such as peak hour spreading or diversion of traffic to parallel routes.

Table 15 – Summary of Daily Volumes on U.S. Route 9 in Township of Lakewood

Location	Weekday	Saturday	Sunday
North of Route 88 (Main Street)	38,000	22,500	35,100
North of Central Avenue-Hurley Avenue	33,000	18,300	30,600
South of Prospect Street	26,400	14,700	23,400
North of Honey Locust Street-Locust Street	21,000	18,500	17,700

Source: Traffic Counts conducted for study



Source: Traffic Counts conducted for study

Figure 11 – Weekday Volumes on U.S. Route 9 in Township of Lakewood

Intersection turning movement counts were conducted on Saturday, May 30, 2015 and Wednesday, June 3, 2015 or Tuesday, June 16, 2015 at the following locations:

- U.S. Route 9 and Main Street (N.J. Route 88) (signalized)
- U.S. Route 9 and Central Avenue/Hurley Avenue (signalized)
- U.S. Route 9 and James Street/Pine Street (signalized)
- U.S. Route 9 and Prospect Street (signalized)
- U.S. Route 9 and Chateau Drive (unsignalized)
- U.S. Route 9 and Chestnut Street/Cross Street (signalized)
- U.S. Route 9 and Shopping Center/Courtier Street (signalized)
- U.S. Route 9 and Locust Street (signalized)

Peak hour turning movement counts by hour are contained in Appendix A. Turning movement counts included classification of vehicles into tractor trailers, single unit trucks, buses, light utility vehicles, passenger cars, motorcycles, and bicycles. Pedestrians were also counted.

Using the ALPR data, it was possible to compute the percentage of traffic that was through traffic between Route 70 and Main Street (N.J. Route 88) by time of day. It also enabled the calculation of average overall travel time by time of day. The estimated share of through traffic by time of day is summarized below (Table 16). As noted, the through traffic (neither origin nor destination in the study corridor) for the entire 7 miles of U.S. Route 9 under study (i.e. Toms River and Lakewood) was only 5-8 percent of traffic, except for southbound on Saturday (which may involve the use of Route 9 to avoid shore traffic on the Garden State Parkway). The average speed through the corridor by time of day is also summarized below (Table 17).

Table 16 – Share of U.S. Route 9 Through Traffic in Township of Lakewood

Time of Day	Northbound			Southbound		
	From Route 70	From Toms River north of Indian Head Rd	From South of Indian Head Rd	To Route 70	To Toms River north of Indian Head Rd	Continue South of Indian Head Rd
Weekdays, 7-9 am	6%	8%	8%	2%	0%	8%
Weekdays, 12-2 pm	5%	4%	7%	5%	3%	8%
Weekdays, 4-6 pm	5%	5%	5%	4%	4%	8%
Saturdays, 12-2 pm	13%	6%	8%	8%	6%	22%

Source: Traffic data collected for study

Table 17 – Average Travel Speed on U.S. Route 9 in Township of Lakewood

Time of Day	Northbound	Southbound
Weekdays, 7-9 am	20 mph	23 mph
Weekdays, 9-10:30 am	12 mph	22 mph
Weekdays, 12-2 pm	22 mph	20 mph
Weekdays, 2:30-4 pm	13 mph	12 mph
Weekdays, 4-6 pm	15 mph	19 mph
Saturdays, 12-2 pm	26 mph	28 mph

Source: Traffic data collected for study

The maximum number of pedestrians counted at the various signalized U.S. Route 9 intersections within Lakewood was 231 per hour, combined at all seven signalized intersections.

Transit Service

The following transit services are present in the corridor:

- *NJ Transit Route 559* – 44 buses/day, approximately 1 hour headways, 24 hours per day – Lakewood Bus Terminal to Atlantic City – local service
- *NJ Transit Route 137* – 2 buses/day in AM – to Port Authority Bus Terminal in NYC – commuter
- *Academy Bus* – from Pine Street north – 23 buses/day in peaks – to Wall St in NYC – commuter

Existing Crash Data

Crash history was obtained from the NJDOT database of reportable crashes from January 1, 2011 to December 31, 2013. During that time, approximately 235 crashes per year occur on U.S. Route 9 from the Toms River-Lakewood municipal line to Main Street (N.J. Route 88). The resultant crash rate was 9.4 crashes per million vehicle-miles travelled, which is more than 3.5 times the statewide average crash rate of 2.6 crashes per million vehicle-miles travelled on roadways with similar geometries. During the 3 year period, there were no pedestrian crash fatalities. Approximately 28 percent of crashes resulted in some form of injury. Approximately 46 percent of crashes occurred in the vicinity of the seven signalized intersections in the corridor, while another 40 percent occurred in the vicinity of the numerous unsignalized intersections. Angle or left turn crashes account for 22 percent of crashes, whereas rear-end and sideswipe crashes account for 68 percent of crashes. The higher frequency of rear-end and sideswipe crashes may be related to the frequent turns into and out of driveways and side streets in the corridor. Crash clusters by mile-post are summarized in Appendix B. The breakdown of type of crash is detailed below (Table 18).

Table 18 – Reportable Crash Breakdown for Township of Lakewood (2011-2013)

Crash Type	Average per Year	%
Angle/Left Turn	51	22%
Rear End/Sideswipe	159	68%
Pedestrian/Cyclist	5	2%
Other	20	9%
Total	235	100%

Source: NJDOT crash database

To better understand bicycle and pedestrian crashes, the project team reviewed these crashes from 2010-2014. There were eight pedestrian crashes and fifteen bicycle crashes. Three clusters of these crashes were identified: near Cushman Drive, at Prospect Street, and between Central Avenue/Hurley Avenue and Main Street (N.J. Route 88). Darkness appears to be a contributing factor.

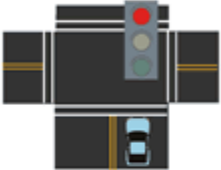
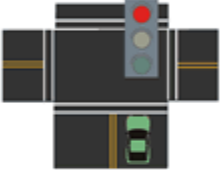
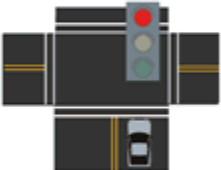
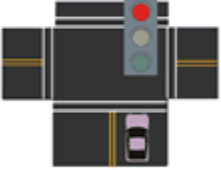
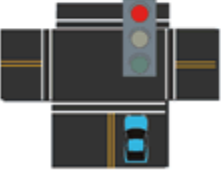
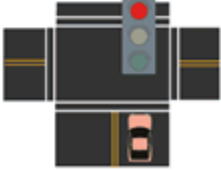
The Highway Safety Manual, published by FHWA, was used to predict estimated crash history for U.S. Route 9. Given its traffic volumes and geometry as input factors, the anticipated number of crashes for U.S. Route 9 was 88 crashes per year, approximately 40 percent of the actual number. The number of non-intersection vehicular crashes matches closely to actual experience, but the predicted number of vehicular crashes at intersections tends to be less than half actual experience. The anticipated severity from the Highway Safety Manual appears to match actual experience quite closely. The number of bicycle and pedestrian crashes is double the expectation of the Highway Safety Manual.

Existing Level of Service

Level of Service analysis for the various intersections under study were conducted for the weekday morning and evening peak hours and Saturday midday peak hour utilizing the methods outlined in the *Highway Capacity Manual, 2010 Edition*, published by the Transportation Research Board, using the program Synchro (using Highway Capacity Manual methodology). With this analysis, Level of Service (LOS) is expressed on a scale ranging from “A” to “F”, with “A” being best and “F” being worst. Level of Service is determined by the average delay per vehicle for a specific approach or lane group during the peak hour. For signalized intersections, LOS F refers to an average delay in excess of 80 seconds. The graphic below visually depicts level of service (Figure 12). For urbanized areas in peak hours, Level of Service D is generally considered the appropriate design standard, whereas Level of Service C or better is considered indicative of good operations. For left turn lanes and side streets, Level of Service E is generally considered adequate in peak hours, as the persons making these turning movements only need to do it once before joining a traffic stream on an arterial roadway. Level of service results for each overall intersection are summarized below, along with notations of any issues evident (Table 19). As shown, many intersections operate at failing levels of service.

LEVELS OF SERVICE

for Intersections with Traffic Signals

Level of Service	Delay per Vehicle (seconds)
A	 ≤10
B	 11-20
C	 21-35
D	 36-55
E	 56-80
F	 >80

Factors Affecting LOS of Signalized Intersections

Traffic Signal Conditions:

- Signal Coordination
- Cycle Length
- Protected left turn
- Timing
- Pre-timed or traffic activated signal
- Etc.

Geometric Conditions:

- Left- and right-turn lanes
- Number of lanes
- Etc.

Traffic Conditions:

- Percent of truck traffic
- Number of pedestrians
- Etc.

Source: 2000 HCM, Exhibit 16-2, Level of Service Criteria for Signalized Intersections

Figure 12 – Level of Service Standards for Signalized Intersections

Table 19 – Existing Level of Service for Township of Lakewood

Intersection	Morning		Evening		Saturday		Comments
	LOS	Delay	LOS	Delay	LOS	Delay	
U.S. Route 9 & Route 88 (Main St)	C	25.8	C	21.9	B	10.3	Southbound queue spillback from merge, side street operating at marginal levels
U.S. Route 9 & Hurley Avenue-Central Avenue	E	59.9	E	60.7	C	21.1	Eastbound side street failing, westbound side street marginal
U.S. Route 9 & James Street-Pine Street	D	53.0	D	42.0	B	14.3	Side streets operating at failing levels
U.S. Route 9 & Prospect Street	B	16.0	C	21.2	B	10.9	Side street marginal, queue spillback from other locations during peaks
U.S. Route 9 & Chestnut Street-Cross Street	D	43.5	E	57.2	C	23.6	Side streets failing
U.S. Route 9 & Shopping Center / Courtier Street	A	5.7	B	11.6	B	10.4	Side streets operating at marginal levels
U.S. Route 9 & Locust Street	B	16.4	C	26.4	D	52.2	Side streets failing

Source: Analysis developed for study

Land Use

Within the study area, there are 130 properties within Lakewood with frontage on U.S. Route 9. Existing land uses within the study area are summarized below (Table 20). As shown, more than 25 percent of the corridor is vacant. The remainder is a mixture of residential and commercial/retail, with a greater portion being commercial. Appendix C contains a map of color coded land use by category.

Table 20 – Existing Land Uses in Study Area for Township of Lakewood

Land Use	Properties	
SF Residential	30	23%
Residential/Commercial	2	2%
Multi-Family Residential/Assisted Living	16	12%
Hotel	0	0%
Religious/Public	8	6%
Retail	16	12%
Commercial/Industrial	24	18%
Vacant	34	26%
Total	130	

Source: Land Use and development data collected for study

Zoning within the study area is comprised of the following:

- HD-7 –Highway Development Zone (southerly)
- HD-6 –Highway Development Zone (northerly)
- B4 – Wholesale Service Zone HB (north end)
- R-10 – Single Family Residential Zone

The HD-6 and 7 zone permits a wide range of commercial developments from retail to service, medical and office, religious and institutional uses, and conditional townhouse or two family uses, hospitals, and digital billboards. The

B4 warehouse zone also permits a wide range of commercial developments from retail to service, medical and office, religious and institutional uses. The R-10 single family residential zone requires 10,000 square feet, and allows single family, two family, or religious institutions and private schools.

NJDOT Access Management Code Analysis

Based on the speed limit of 35-45 miles per hour, the NJDOT AMC looks for average lot spacing between non-single family residential lots to be a minimum of 150-230 feet. This is not consistent with municipal zoning, which calls for minimum lot frontages of 75-100 feet. Of the 77 percent non-single family residential lots in the corridor, 82 percent of them (i.e. 63 percent of total lots) do not conform with NJDOT AMC lot spacing criteria. Consequently, these lots are subject to limitations on traffic generation. Specifically, the NJDOT AMC incorporates safety by limiting the size of development in areas with more densely spaced driveways than desirable through a trip limit computation. However, the trip limits are consistent with the anticipated land use.

Social and Economic Disparities/Demographics

This study examined a variety of demographic variables to address potential equity and inclusion issues associated with both existing conditions and proposed solutions. Below is comparative information for Census block groups within the study area, as well as the overall municipality, Ocean County, and the State of New Jersey, based on the 2010 Census survey (Table 21). As indicated, the study area is similar to the entire municipality. In Lakewood, the household size tends to be nearly 50 percent larger than Ocean County overall and the share of renter occupied units (as opposed to owner occupied units) is more than double the county average. The share of households with no vehicles available (and consequently captive to transit, bicycling or walking) is approximately 11 percent for study area. This figure is equivalent to the entire municipality, but is nearly double the amount for Ocean County.

Table 21 – Various Demographic Characteristics for Township of Lakewood

Parameter	Study Area (Lakewood)	Entire Municipality (Lakewood)	Ocean County	NJ statewide
2000 Population	16,241	60,352	510,916	8,414,350
2010 Population	34,174	92,843	576,567	8,791,894
2040 NJTPA population Forecast	not avail	133,730	801,600	10,410,535
2000 Employment	not avail	24,900	137,658	3,881,226
2010 Employment	not avail	28,700	149,200	3,970,640
2040 NJTPA employment Forecast	not avail	39,050	223,000	5,033,080
2010 Resident Workers	8,508	25,292	237,250	4,122,554
2010 Households	8,586	24,283	221,111	3,553,562
Owner Occupied	57%	52%	81%	65%
Renter Occupied	43%	48%	19%	34%
Avg Household Size	3.98	3.73	2.58	2.68
Share with No Vehicles	11%	12%	7%	12%

Source: U.S. Census survey and NJTPA 2040 demographic forecasts (dated 4/26/2013)

The chart below summarizes the racial and ethnic profile for Census block groups within the study area, as well as the overall municipality, Ocean County, and the State of New Jersey, based on the 2013 American Community

Survey, 5-year estimate (Table 22). Lakewood has twice as many minority groups as Ocean County overall, albeit not within the study area Census block groups.

Table 22 – Racial Profile for Township of Lakewood

Race	Study Area	Entire Municipality	Ocean County	NJ statewide
White alone	83%	77%	86%	59%
Black or African American alone	4%	6%	3%	13%
American Indian and Alaska Native alone	0%	0%	0%	0%
Asian alone	0%	0%	2%	9%
Native Hawaiian and Other Pacific Islander alone	0%	0%	0%	0%
Some other race alone	0%	0%	0%	0%
Two or more races	0%	1%	1%	1%
Hispanic or Latino	12%	16%	8%	18%

Source: 2013 American Community Survey, 5-year estimate

The chart below summarizes the income levels for Census block groups within the Lakewood part of the overall study area, as well as the overall municipalities, Ocean County, and the State of New Jersey, based on the 2013 American Community Survey, 5-year estimate (Table 23). The median income for all of Lakewood, as well as Lakewood within the study area, is substantially below those of Ocean County and New Jersey.

Table 24 summarizes the means of transportation to work for Census block groups within the study area, as well as the overall municipality, Ocean County, and the State of New Jersey, based on the 2013 American Community Survey, 5-year estimate. As shown, the shares of carpooling, public transit, and walking are all substantially higher for Lakewood and the study area within the town than for Ocean County and New Jersey.

In conclusion, the Lakewood portion of the study area contains a significant portion of low-income individuals that appear to be dependent on the ability to walk and access transit. This was taken into account in recommendations and work efforts.

Table 23 – Income Profile for Township of Lakewood

2013 Household Income	Study Area	Entire Municipality	Ocean County	NJ statewide
less than \$10,000	8%	7%	4%	5%
\$10,000-\$14,999	6%	7%	5%	4%
\$15,000-\$19,999	8%	9%	5%	4%
\$20,000-\$24,999	7%	7%	5%	4%
\$25,000-\$29,999	7%	7%	5%	4%
\$30,000-\$34,999	7%	6%	5%	4%
\$35,000-\$39,999	6%	6%	4%	4%
\$40,000-\$44,999	7%	6%	4%	4%
\$45,000-\$49,999	4%	5%	4%	3%
\$50,000-\$59,999	6%	8%	7%	7%
\$60,000-\$74,999	9%	10%	10%	9%
\$75,000-\$99,999	9%	10%	14%	13%
\$100,000-\$124,999	7%	5%	10%	10%
\$125,000-\$149,999	4%	3%	6%	7%
\$150,000-\$199,999	2%	2%	6%	9%
\$200,000 or more	2%	2%	5%	9%
Median Household Income	\$40,714	\$40,240	\$61,136	\$71,629
% Low Income **	29.0%	30.3%	10.4%	10.4%

* for study area, median income was interpolated based on distribution

** for study area, estimated using the 2013 poverty threshold and average household size

Source: 2013 American Community Survey, 5-year estimate

Table 24 – Means of Transportation to Work for Township of Lakewood

Means of Transportation to Work	Study Area	Entire Municipality	Ocean County	NJ statewide
Drove Alone	65%	61%	82%	72%
Motorcycle	0%	0%	0%	0%
Car Pool	12%	16%	8%	8%
Public Transit	6%	3%	2%	11%
Walked	3%	6%	1%	3%
Bicycle	0%	1%	0%	0%
Worked at Home	11%	9%	5%	4%

Source: 2013 American Community Survey, 5-year estimate

2. Future Baseline Conditions

Planned Geometric Changes

As part of a private development project, Lakewood is creating a new street called Broadway, and realigning Chateau Drive to intersect it. (Note that this roadway was a “paper street,” meaning that a right of way existed with no physical improvements). A new traffic signal will be provided at this intersection on U.S. Route 9.

Anticipated Growth in Corridor

To predict the development of land within the corridor over a 20 year horizon, a two-pronged approach was taken. First, the project team conducted a thorough review of pending land development applications, followed by a forecasting of potential additional applications. The forecast was based on the current rate of absorption of land and available vacant lots or lots that are likely to be redeveloped (e.g. properties used for residential or agricultural uses that could be assembled into a developable parcel). The anticipated growth in the U.S. Route 9 corridor in Lakewood to the year 2035 is shown below (Table 25). Within Table 25, the pending column refers to developments in the approval process (i.e. approval has been granted, but the project hasn’t been built yet, or an application for approval has been filed), whereas prospective refers to additional anticipated developments. Appendix D contains a map of potential development by location.

Table 25 – Land Development Forecast for Township of Lakewood

Land Use	Pending	Prospective	Total
Single Family or Duplex	153 units	314 units	467 units
Multifamily	114 units	185 units	299 units
Retail	7,960 sf	69,000 sf	76,960 sf
Office	15,965 sf	81,000 sf	96,965 sf
Industrial Park	0 sf	0 sf	0 sf
Institutional	4,242 sf	0 sf	4,242 sf

Source: Land Use and development data collected for study

Using the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition, traffic was projected for the new developments. Note that the trip generation for single family or duplex units was adjusted to assume that each unit had a basement apartment. All residential units were further adjusted for existing transit and walk share of trips in Lakewood. The results, excluding pass-by traffic (i.e. traffic already in the traffic stream), are shown in Table 26, below. Trip distribution for this traffic was based on the census journey to work survey for residential or work-related trips, and a gravity model distribution for other trips.

Table 26 – Traffic Growth from New Development for Township of Lakewood

Land Use	Size	Trip Generation		
		AM Peak	PM Peak	Sat Peak
Residential	766 units	531	656	240
Office	97 ksf	237	326	356
Retail	77 ksf	194	308	746
Sub-Total		962	1,290	1,342

Source: Land Use and development data collected for study

Although many of the lots on U.S. Route 9 are subject to trip limitations under the NJDOT AMC, the study team found that the trip limits had no impact on the potential developments identified.

Background Traffic Growth

A growth rate for through traffic (traffic with neither an origin nor destination within the study area) was applied within the corridor at a rate of 1.2 percent per year for 20 years, based on estimated total growth for Ocean County. As traffic was explicitly added for developments in the Lakewood and Toms River portions of the corridor, the through traffic portion of traffic was derived from Table 16, shown earlier (i.e. only 5-8 percent of traffic on U.S. Route 9 and only 2-6 percent of the traffic to/from Route 70).

One additional factor added to forecasts was the continued growth of Lakewood outside the specific study area. Between 2000 and 2010, the population of Lakewood increased by a very substantial rate of 4.4 percent per year, and by more than 50 percent throughout the whole period. This growth rate trend appears to continue. The Township of Lakewood Capital Improvement Plan for Transportation Infrastructure, Transportation Improvement Districts 1 & 2, cited the number of additional dwelling units anticipated:

- West of Study Area in Lakewood – 2,745 units
- East of Study Area in Lakewood – 5,185 units
- North of Study Area in Lakewood – 13,270 units

It should be noted that by assuming this level of development and the average household size in Lakewood, the assumed population would be far higher than the 2040 projections provided by the NJTPA. Specifically, the assumed buildout population of Lakewood was close to 200,000 persons.

One other factor not applied in this study was the effect of widening U.S. Route 9 to four lanes continuously from Route 88 to Indian Head Road (CR 571). Such a project could be anticipated to draw additional traffic into the corridor from parallel routes, such as Old Freehold Road/New Hampshire Avenue to the east and Whitesville Road to the west. This increase would be due to latent demand that is not being served in the corridor, as demonstrated by the very low share of through traffic in the corridor, which indicates that motorists may tend to avoid the corridor by using parallel routes. Based on traffic volumes on these parallel routes, it is estimated that a widening may increase northbound traffic volume on U.S. Route 9 by approximately 400 vehicles during the morning peak hour, and may increase southbound traffic volume by approximately 450 vehicles per hour during the evening peak hour.

Future (2035) Traffic Volumes

Traffic flows for the horizon year 2035 were developed by combining existing traffic volumes with traffic from new developments and the aforementioned changes to background traffic. Specific flows are summarized in Appendix E. The flow maps are specific to a roadway that remains two lanes (one lane per direction) for the most part. As noted earlier, a widening of the roadway to four lanes can be anticipated to lead to further increases in peak hour traffic.

Future Traffic Signals

One factor when determining future traffic signals is spacing to existing traffic signals. For roadways with 35-45 mile per hour operation and long cycle lengths, the NJDOT AMC looks for a minimum spacing of 0.5 miles between traffic signals in order to maintain orderly flow of traffic. Exceptions are given where it can be demonstrated that a new signal will not interfere with the green band (i.e. the amount of time in seconds that a group of cars can travel Route 9 at the intended speed without having to stop at traffic signals) of the corridor. Since traffic signals on U.S. Route 9 in **Lakewood** are presently not coordinated, there is no green band presently. However, traffic signal ***U.S. Route 9 Corridor Study – Managing and Accommodating Growth in Lakewood and Toms River, Ocean Co.***

coordination in the corridor could easily be implemented in the future, and has been investigated by NJDOT in the past. While such a strategy wouldn't increase capacity, it could improve level of service slightly on U.S. Route 9 by reducing the number of stops required. Traffic signal coordination sometimes can lead to pedestrians crossing without traffic signal indications, because longer waiting times when push buttons are pressed to cross the roadway can lead pedestrians to believe that the buttons are malfunctioning. This trend can be easily overcome however, by keeping traffic signal cycle lengths short, and providing indicator lights on push buttons, similar to elevator buttons. Given that pedestrian phases need to come up every cycle automatically on Friday evenings and Saturdays in Lakewood, implementing traffic signal coordination in this area would be a good strategy for these time periods.

As noted earlier, a new traffic signal is planned for U.S. Route 9 and Broadway/Chateau Drive, as part of a new development. This signal does not violate the spacing criteria of the NJDOT AMC in the existing condition.

The Township of Lakewood Capital Improvement Plan for Transportation Infrastructure, Transportation Improvement Districts 1 & 2 recommended a new signal at U.S. Route 9 and Oak Street. Analysis confirms the need for this signal. Although this signal would satisfy spacing criteria to existing signals, a spacing violation would occur between this signal and the U.S. Route 9 and Broadway/Chateau Drive. The signals have 0.3 mile spacing, versus the requirement of 0.5 mile spacing. Given these parameters, both signals could be designed in a manner to coordinate with green bandwidth on U.S. Route 9 if signal timing optimization were to be implemented.

A hybrid pedestrian HAWK beacon (i.e. a special form of traffic signal only used by pedestrians crossing the roadway, not traffic entering the roadway) is proposed for John Street, to better protect pedestrians in this area. It can be designed to function with coordination.

Summary of Recommendations: Implement traffic signal coordination on U.S. Route 9 with time of day plans, add a traffic signal at U.S. Route 9 and the new Broadway/Chateau Drive intersection, add a traffic signal at U.S. Route 9 and Oak Street intersection, add a HAWK beacon to U.S. Route 9 and John Street to accommodate pedestrian crossings.

Future (2035) Level of Service

LOS analysis for the various intersections in this study were conducted for the weekday morning and evening peak hours and Saturday midday peak hour utilizing the methods outlined in the *Highway Capacity Manual, 2010 Edition*, published by the Transportation Research Board, using the program Synchro (using Highway Capacity Manual methodology). The level of service results for each overall intersection, along with notations of any issues evident, is summarized in Table 27. As shown, six intersections will fail to function adequately and will experience excessive delay.

Table 27 – Future (2035) Baseline Level of Service for Township of Lakewood

Intersection	Morning		Evening		Saturday		Comments
	LOS	Delay	LOS	Delay	LOS	Delay	
U.S. Route 9 & Route 88 (Main St)	E	70.3	F	159.9	C	31.9	Southbound queue spillback from merge, southbound and westbound lefts failing
U.S. Route 9 & Hurley Avenue-Central Avenue	F	146.0	F	234.3	E	55.1	All approaches failing
U.S. Route 9 & James Street-Pine Street	D	44.5	F	115.0	B	17.7	All approaches failing
U.S. Route 9 & Prospect Street	F	152.3	F	131.6	B	14.7	All approaches failing
U.S. Route 9 & Oak Street	B	13.1	B	15.7	B	13.9	
U.S. Route 9 & Chateau Drive-Broadway	A	7.1	A	8.6	A	4.8	
U.S. Route 9 & Chestnut Street-Cross Street	D	53.1	F	179.2	E	76.1	All approaches failing
U.S. Route 9 & Shopping Center / Courtier Street	A	7.4	C	26.8	B	17.9	
U.S. Route 9 & Locust Street	B	19.0	F	85.3	F	82.4	Northbound, side streets failing

Source: Analysis developed for study

3. Low Cost – High Impact Improvements

Recommended Improvements

Low-cost, high-impact improvements are spot improvement projects that generally can be performed within the existing right of way, have limited environmental impacts and can consequently be supported with a categorical exclusion document, and can be implemented in a short timeframe as a breakout project.

Conceptual improvement schemes were developed for six locations. All can be constructed within the existing right of way. One proposed improvement at U.S. Route 9 and Main Street/Central Avenue/Hurley Avenue has two versions that are incremental to one another due to public concerns about the ultimate design. (Figures 13-19).

The low-cost, high-impact improvement for U.S. Route 9 and Main Street/Central Avenue/Hurley Avenue was investigated due to the high crash history, traffic operational deficiencies, and having been identified as the most significant bottleneck in the corridor. Central Avenue is the primary means of ingress/egress into a large neighborhood, and this approach is congested throughout the day. One proposal is to eliminate traffic conflicts by making Hurley Avenue one way and redirecting traffic. This improves safety and traffic operations. Many stakeholders were concerned about secondary impacts of the traffic rerouting, but were in favor of the additional lanes. For this reason, the improvement was re-designed to be staged, so that the one way operation could be implemented at a later stage and could be reversed if necessary.

The low-cost, high-impact improvement for U.S. Route 9 and John Street was investigated in response to a need for safe pedestrian crossings of U.S. Route 9, as well as the high crash rate for this location.

The low-cost, high-impact improvement for U.S. Route 9 and James Street/Pine Street was investigated at the request of Lakewood officials. The high crash rate at this intersection was also a factor.

The low-cost, high-impact improvement for U.S. Route 9 and Oak Street/Chateau Drive/Broadway was investigated as a result of the findings of the Township of Lakewood Capital Improvement Plan for Transportation Infrastructure, Transportation Improvement Districts 1 & 2, which T&M Associates prepared for the township (August, 2014). The high number of pedestrian crashes in this area, and high number of vehicle crashes at Oak Street were also factors in the selection of this location.

The low-cost, high-impact improvement for U.S. Route 9 and Cross Street/Chestnut Street was investigated due to the high crash history, traffic operational deficiencies, and because it's the most significant bottleneck in the corridor.

The low-cost, high-impact improvement for U.S. Route 9 and Locust Street was investigated due to traffic operational deficiencies and the lack of a left turn lane on U.S. Route 9 (this was one of the two locations in the corridor with this condition.)

Analysis of one corridor-wide treatment (i.e. not a low-cost, high-impact spot improvement) of a two-way left turn lane configuration found that such an improvement would yield safety and operational benefits.

Summary of Recommendations: Implement two-way left turn lane, improve the intersection of U.S. Route 9 and Main Street/Central Avenue/Hurley Avenue, improve the intersection of U.S. Route 9 and John Street, improve the intersection of U.S. Route 9 and James Street/Pine Street, improve the intersections of U.S. Route 9 and Oak Street/Chateau Drive/Broadway, improve the intersection of U.S. Route 9 and Cross Street/Chestnut Street, improve the intersection of U.S. Route 9 and Locust Street.

Cost Estimates

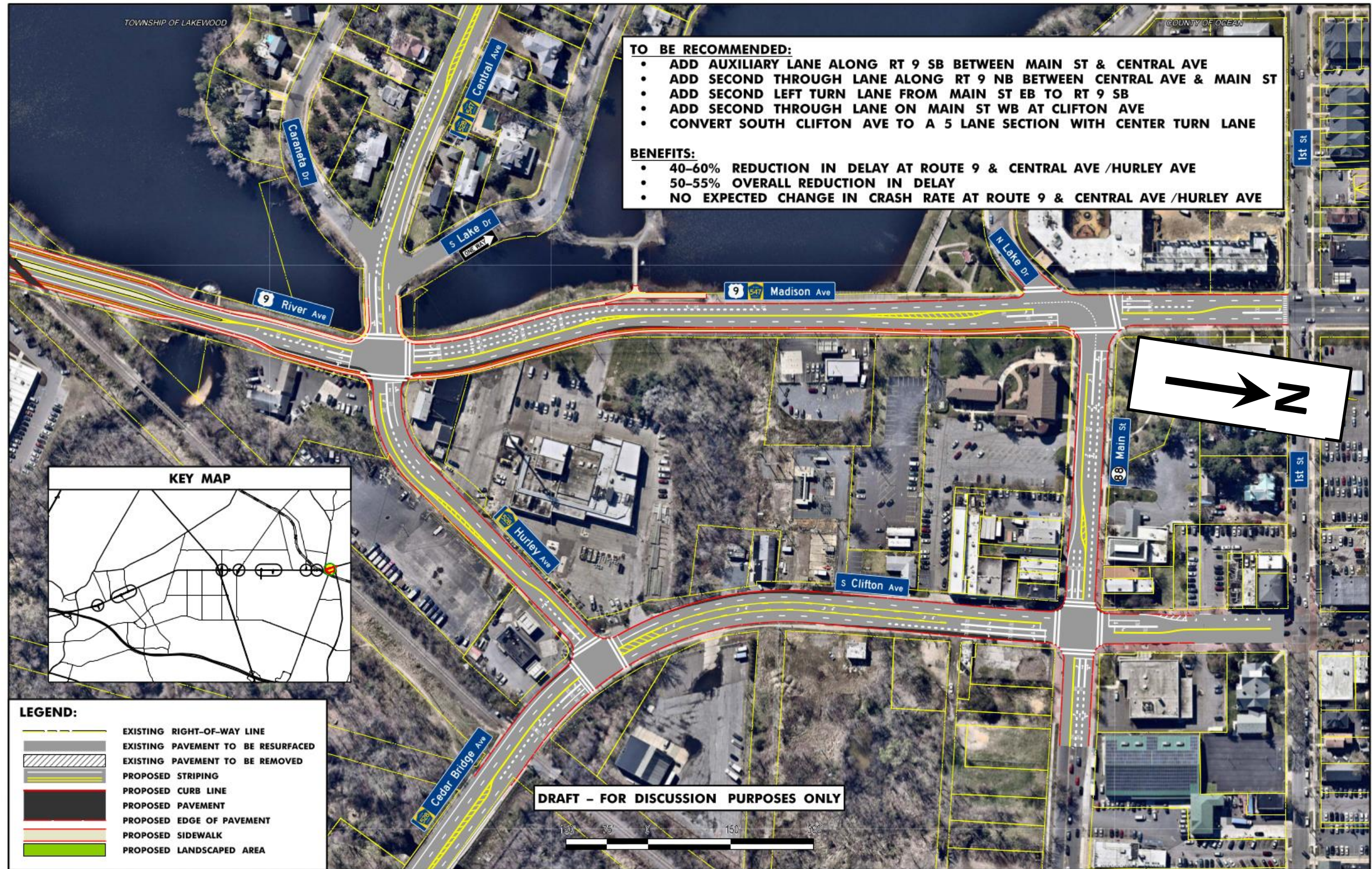
The following order of magnitude cost estimates were developed for improvement schemes. Note that full resurfacing of U.S. Route 9 within the project limits is included in these costs, as well as implementation of a two-way left turn lane within the area of work. Full replacement of existing traffic signals was also assumed. Note that utility relocation is not included in these cost estimates. A detailed breakdown of costs is contained in Appendix F.

U.S. Route 9 and Main Street/Central Avenue/Hurley Avenue	- \$2,720,000.00
U.S. Route 9 and John Street	- \$ 320,000.00
U.S. Route 9 and James Street/Pine Street	- \$ 670,000.00
U.S. Route 9 and Oak Street/ Chateau Drive/Broadway	- \$1,410,000.00
U.S. Route 9 and Cross Street/Chestnut Street	- \$ 960,000.00
U.S. Route 9 and Locust Street	- \$1,610,000.00

Bottleneck and Level of Service Analysis

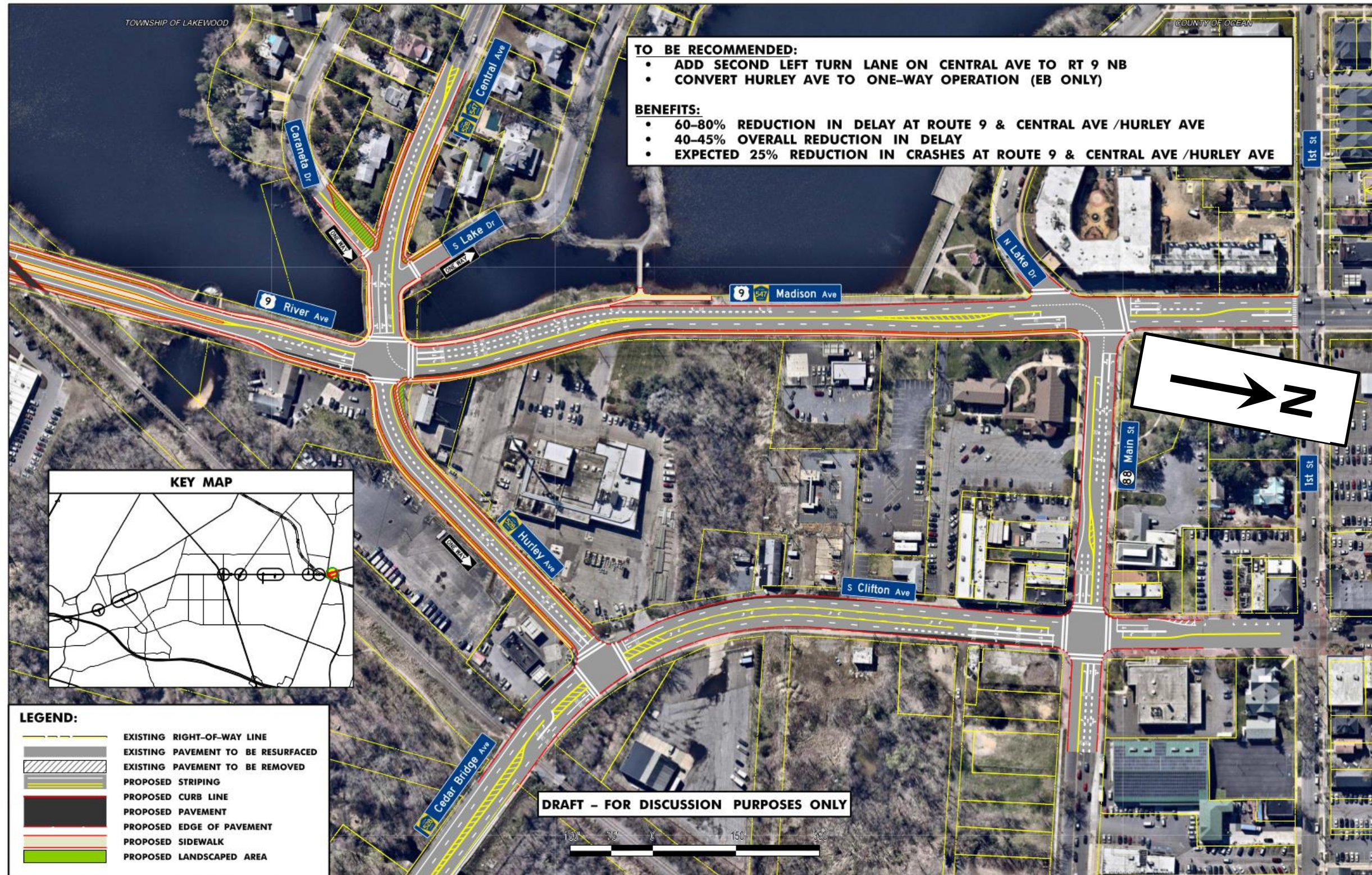
An analysis of projected future volume in the corridor combined with existing and expanded capacity (i.e. capacity with low cost-high impact improvements) at key bottlenecks was conducted to determine the potential effectiveness of the six improvements and assess traffic operations in the corridor. LOS analysis for various U.S. Route 9 intersections indicate that they will operate at marginally acceptable levels for U.S. Route 9, with some left turn movements at side streets failing. Bottleneck analysis is shown below (Table 28). As indicated, with the low-cost, high-impact improvement schemes, no bottleneck will exceed capacity by more than 10 percent, with one exception — southbound U.S. Route 9 at Central Avenue/Hurley Avenue, which will become a new bottleneck (21 percent over capacity in evening peak hour). Note that it is not uncommon for approaches to operate slightly over capacity in the peak hour, and this usually operates at a marginal LOS E. This information is summarized in below (Figure 20).

Even though a low-cost, high-impact improvement for U.S. Route 9 and Prospect Street was not developed as part of this study, it was identified that adding a southbound right turn lane would further improve future traffic operations in the corridor. Adding additional right turn lanes were also found to be beneficial in the future at U.S. Route 9 and Main Street (Route 88), U.S. Route 9 and James Street/Pine Street, and U.S. Route 9 and Cross Street/Chestnut Street.



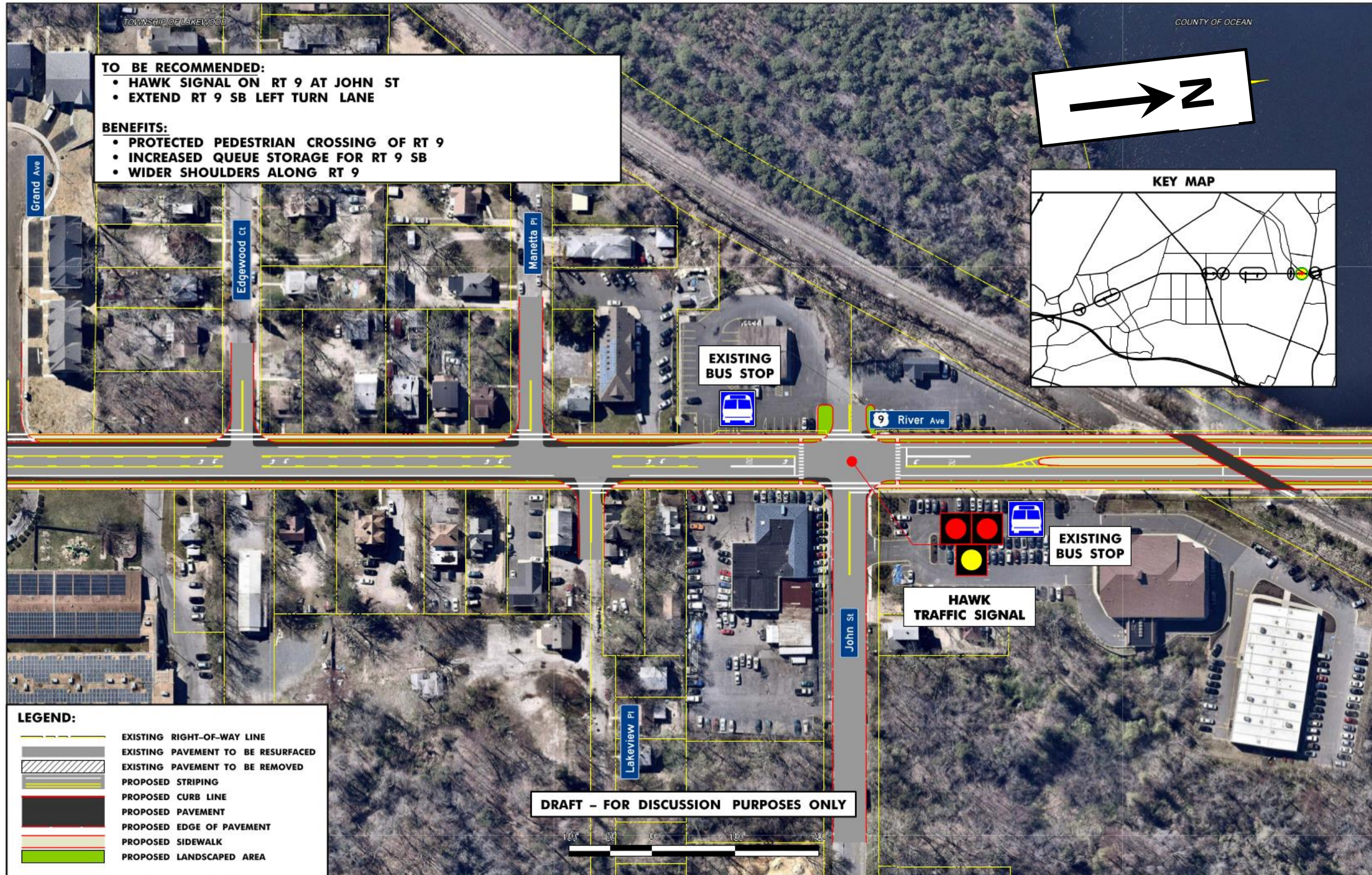
Source: NJDEP Aerial Photo with project specific enhancements

Figure 13 - Improvements to Main Street, Central Avenue and Hurley Avenue, Scheme A



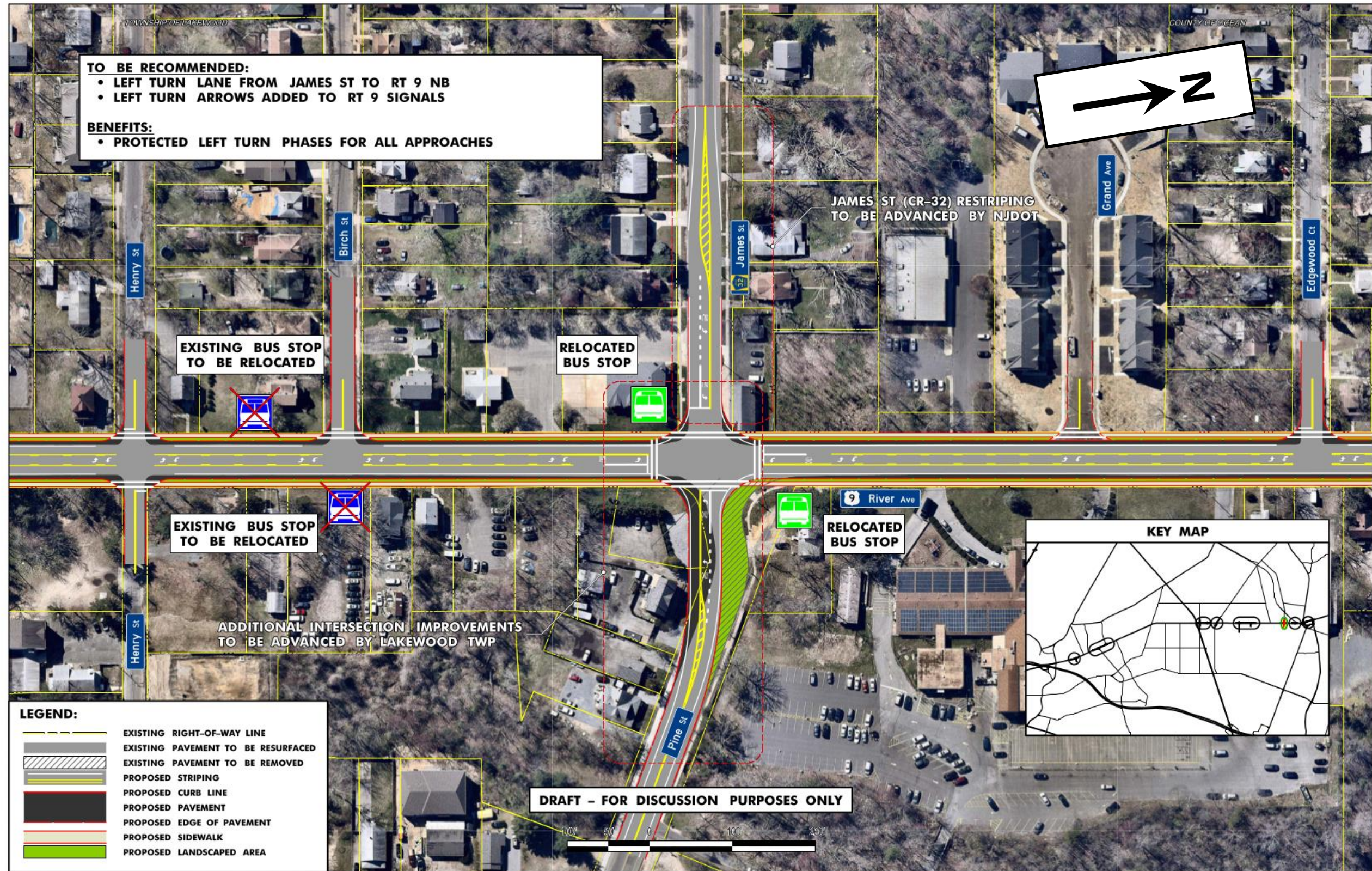
Source: NJDEP Aerial Photo with project specific enhancements

Figure 14 - Improvements to Main Street, Central Avenue and Hurley Avenue, Scheme B



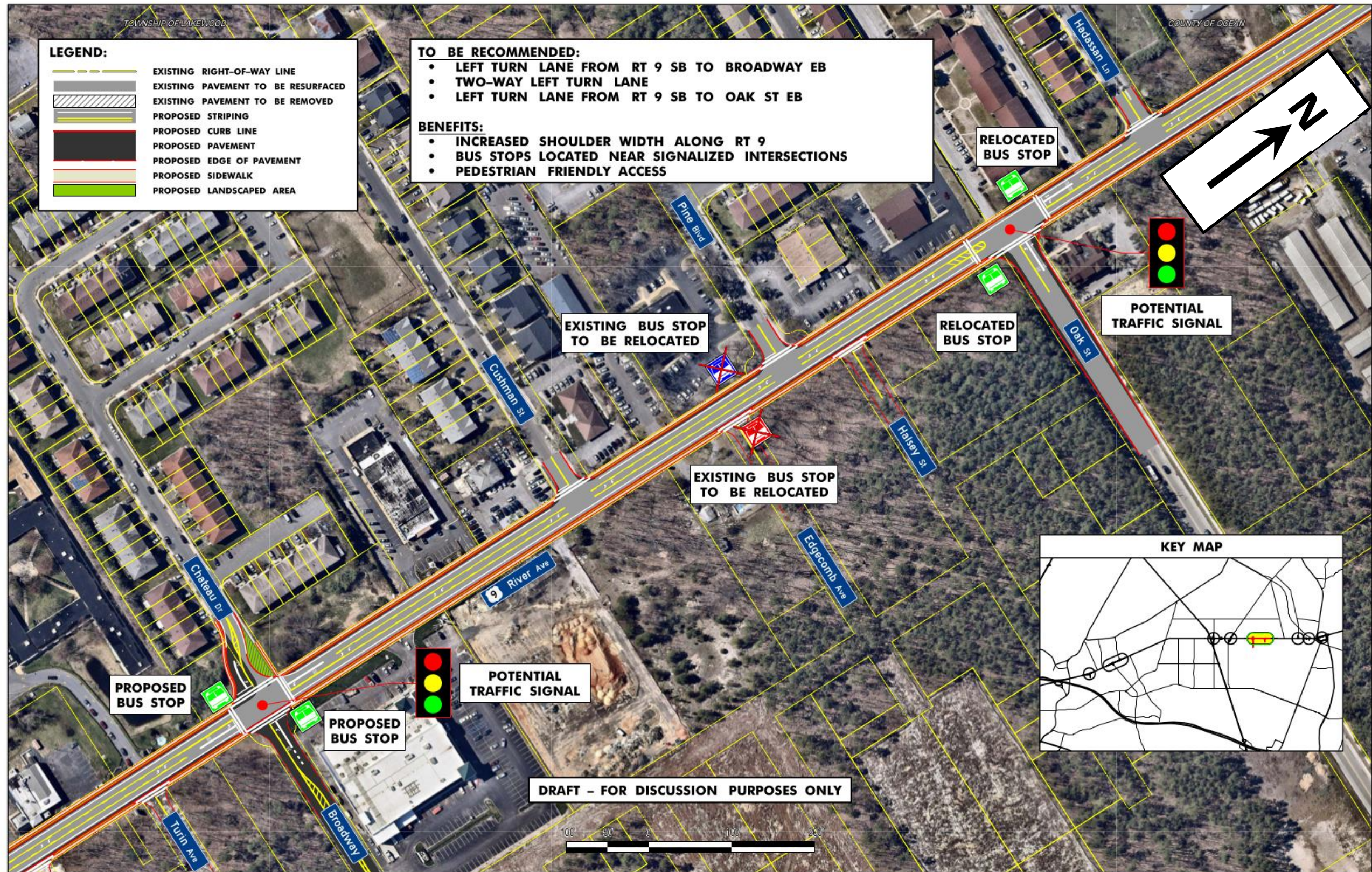
Source: NJDEP Aerial Photo with project specific enhancements

Figure 15 - Improvements to John Street



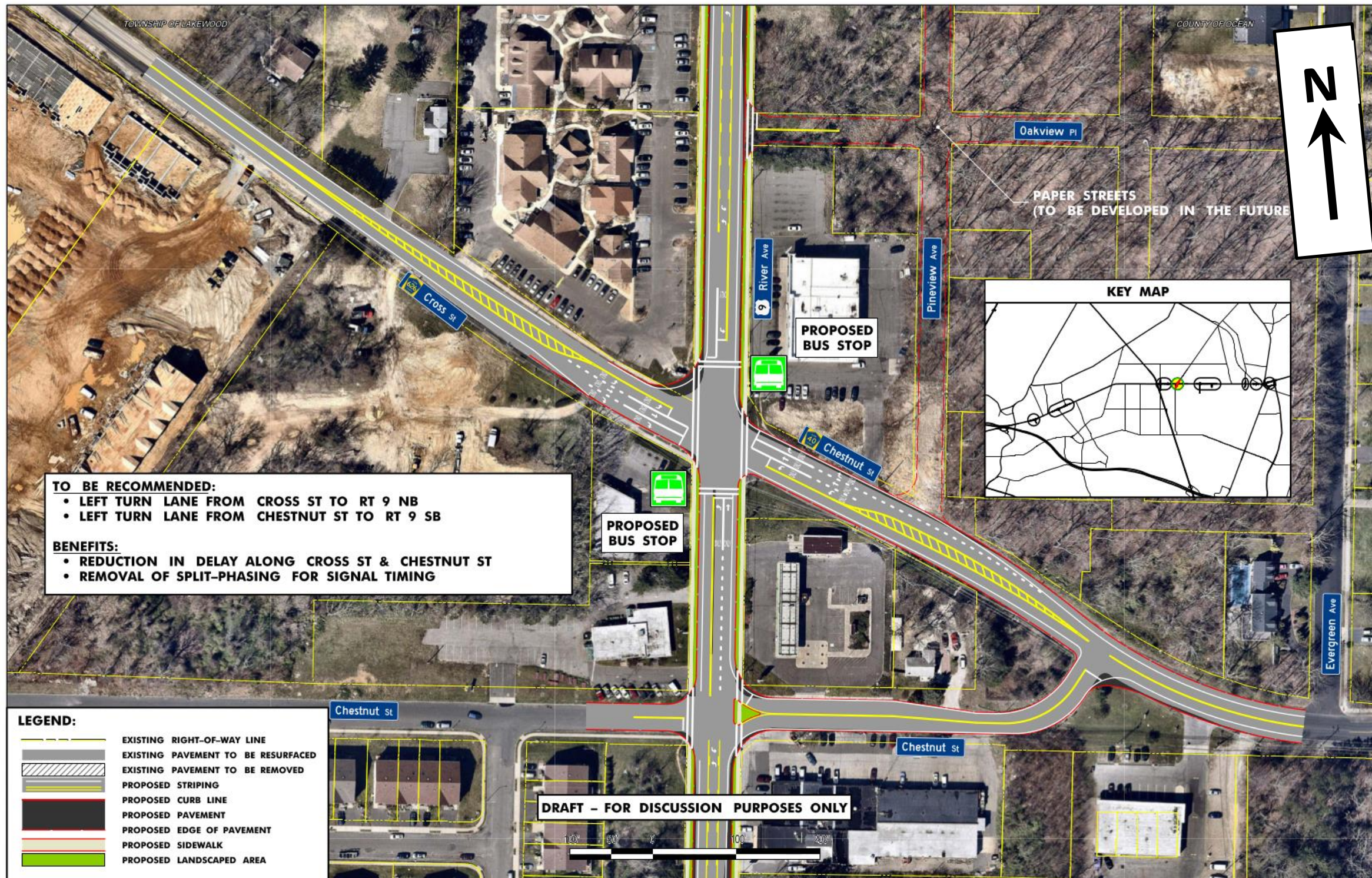
Source: NJDEP Aerial Photo with project specific enhancements

Figure 16 - Improvements to James Street/Pine Street



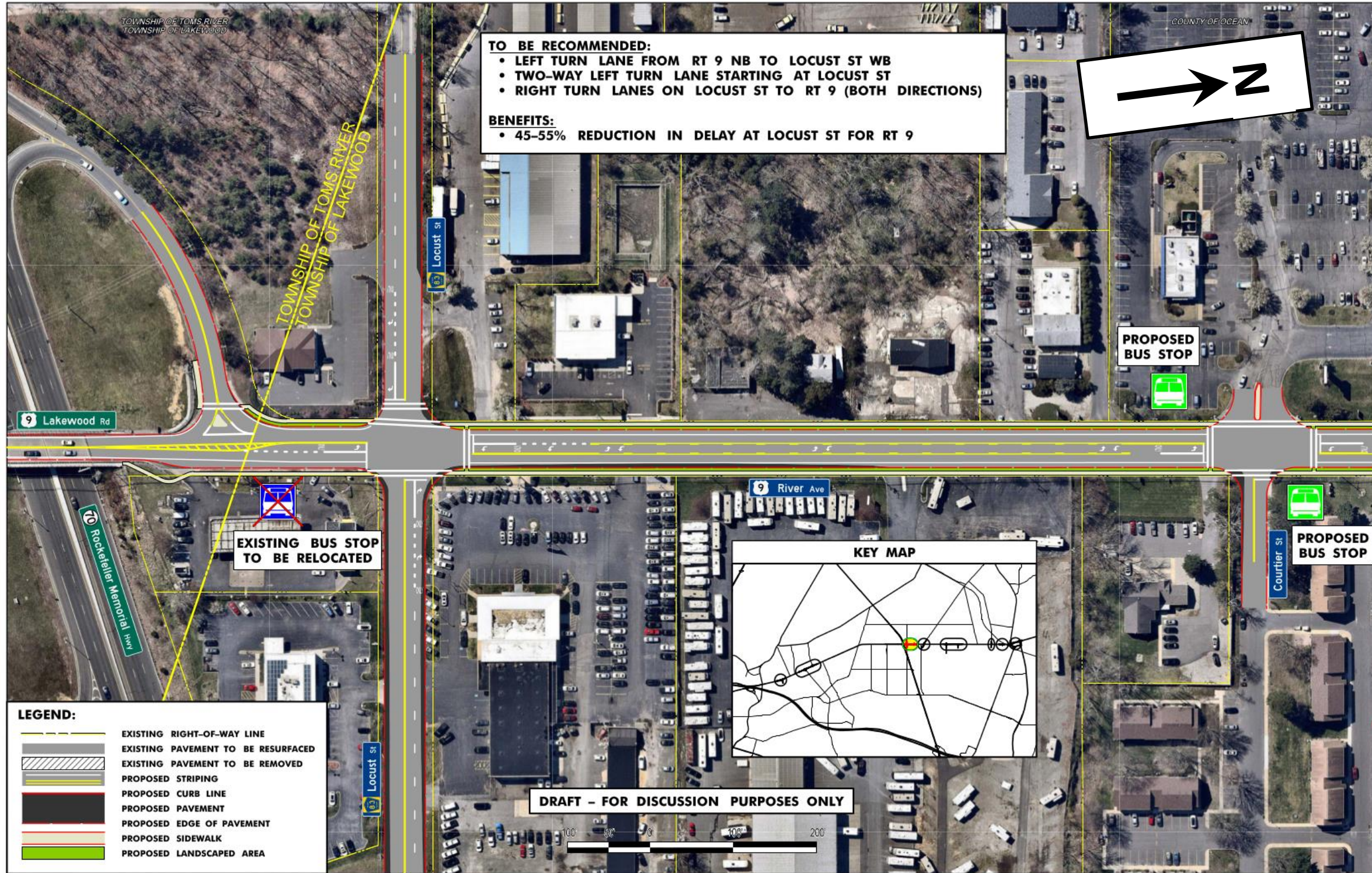
Source: NJDEP Aerial Photo with project specific enhancements

Figure 17 - Improvements to Oak Street - Chateau Drive/Broadway



Source: NJDEP Aerial Photo with project specific enhancements

Figure 18 - Improvements to Cross Street/Chestnut Street

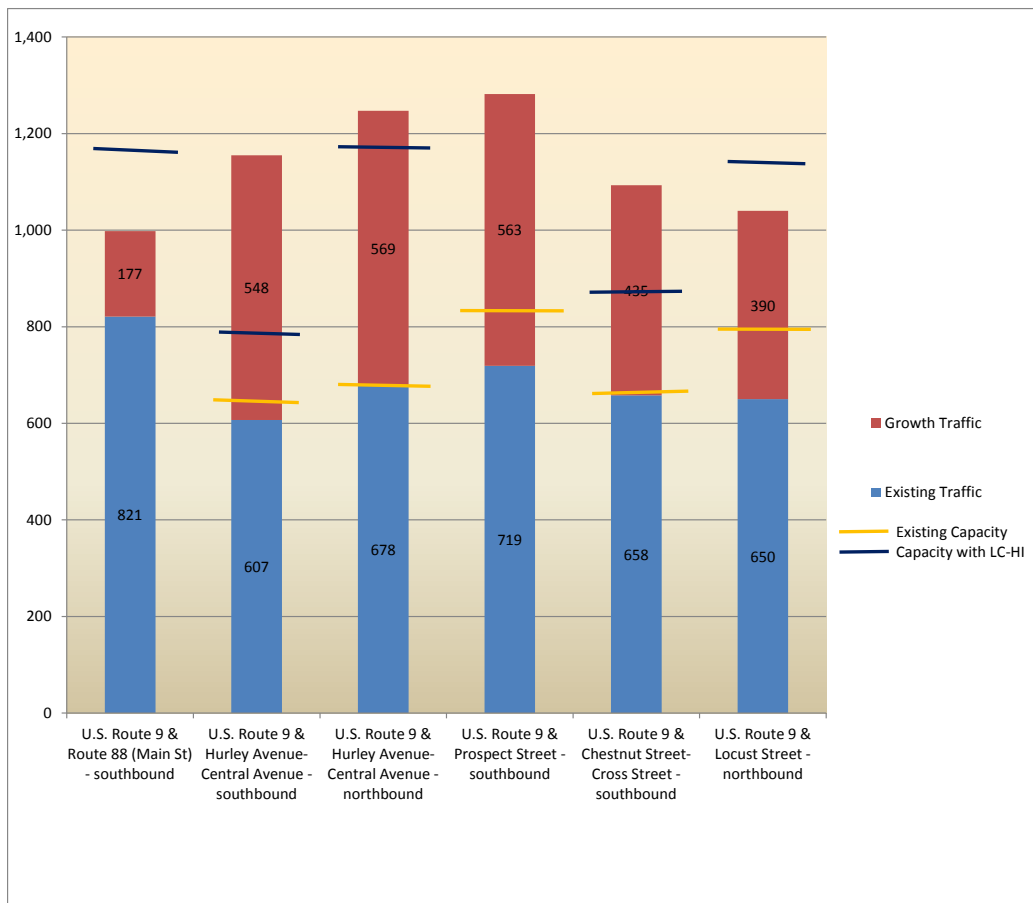


Source: NJDEP Aerial Photo with project specific enhancements

Figure 19 - Improvements to Locust Street

Table 14 - Future (2035) Bottleneck Analysis for the Township of Lakewood

Location	Existing Traffic	Growth Traffic	Total	Existing Capacity	Volume / Capacity Ratio	Expanded Capacity	Expanded Volume / Capacity Ratio
U.S. Route 9 & Route 88 (Main St) - southbound	821	177	998	821	1.22	1,350	0.74
U.S. Route 9 & Hurley Avenue-Central Avenue - southbound	607	548	1,155	750	1.54	950	1.22
U.S. Route 9 & Hurley Avenue-Central Avenue - northbound	678	569	1,247	678	1.84	1,350	0.92
U.S. Route 9 & Prospect Street - southbound	719	563	1,282	970	1.32	n/a	n/a
U.S. Route 9 & Chestnut Street-Cross Street - southbound	658	435	1,093	740	1.48	1,000	1.09
U.S. Route 9 & Locust Street - northbound	650	390	1,040	915	1.14	1,330	0.78



Source: Analysis developed for study

Figure 20 - Future (2035) Bottleneck Analysis for the Township of Lakewood

Safety Benefits

Using the Highway Safety Manual, it was possible to estimate the projected reduction in crashes from the low-cost, high-impact improvements. Note that the Highway Safety Manual appeared to under-represent intersection crashes. This could be due to the effects that congestion (not included in the HSM input) has on increased rear-end crashes. Therefore, these safety improvements may be understated.

Two-way left turn lane in existing right of way + low-cost, high-impact improvements	- 10% crash reduction
Two-way left turn lane in existing right of way + low-cost, high-impact improvements + Access Management	- 18% crash reduction
Two-way left turn lane with full shoulders + low-cost, high-impact improvements	- 21% crash reduction
Two-way left turn lane with full shoulders + low-cost, high-impact improvements + Access Management	- 28% crash reduction

3. U.S. Route 9 Cross-Section and Access Management Plan

U.S. Route 9 Cross Section Options

The present cross section for U.S. Route 9 is two lanes (one lane per direction), with shoulders of varying widths, and a right of way width ranging from 66 feet to 80 feet. Left turns are accommodated from the existing roadway. Appendix B of the NJDOT AMC stipulates that this section of U.S. Route 9 should be a four lane divided roadway with left turns at jughandles only (Access Level 3), with a desired right of way width of 114 feet. DTS can be broken down as follows: four 12-foot lanes, a 12-foot median width, two 12-foot shoulders, and two 15-foot areas between the right of way and edge of pavement to accommodate sidewalks, utilities, and signage (known as border area). These widths are desirable rather than minimum acceptable widths (assuming no design exception) for each cross section element.

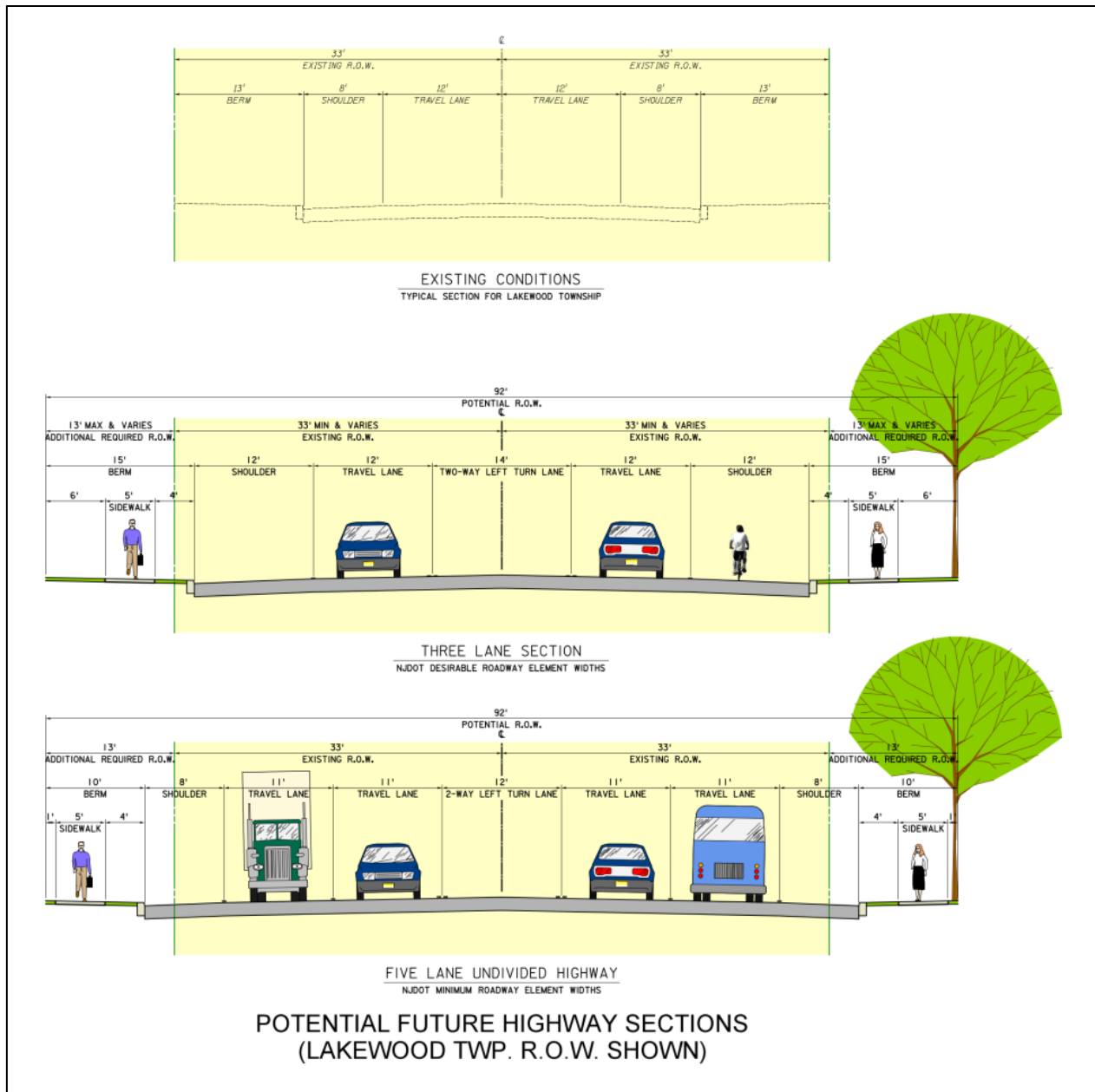
Given the high number of existing access points per mile (48), converting U.S. Route 9 into a divided roadway would represent a substantial deviation from the existing condition. In addition to requiring a significant amount of right of way for the roadway itself, a significant amount of land would be required to convert existing signalized intersections into jughandle ramp intersections. A preliminary review of the corridor reveals that 54 properties would have buildings or parking areas impacted by right of way acquisition to 114 feet before consideration of jughandle ramps, including 11 single family residential lots. Without reconstructing the roadway and many land uses on it, the section of U.S. Route 9 under study could continue to accommodate left turns directly from the existing roadway (as in the current condition which is Access Level 4) with a two-way left turn lane. These center turn lanes have a desired width of 14 feet, but a minimum acceptable width of 12 feet. Other cross-sectional elements have the following width characteristics, based on the New Jersey Roadway Design Manual and A Policy on Geometric Design, by the American Association of State Highway and Transportation Officials (AASHTO):

- Travel lanes for state highways have a desired width of 12 feet, but an acceptable width of 11 feet.
- Shoulders accommodate bicycles and buses in addition to providing stormwater storage in rain events and separate moving traffic from obstructions. Although not required for every road, shoulders become necessary to accommodate pedestrians where there is no continuous sidewalk. Shoulders, if provided, have a desired width of 12 feet, but can be as narrow as 4 feet in width and still have utility. Current NJDOT policy is to provide 4 feet minimum width if there is no continuous sidewalk, or 6 feet where posted speeds are greater than 40 miles per hour. It is noted that shoulders narrower than 8 feet do require design exceptions, as the width would be less than recommended in A Policy on Geometric Design by AASHTO.
- Border areas (the area between the edge of pavement and the right of way) have a desired width of 15 feet, but can be as narrow as 8 feet before a design exception is needed (according to A Policy on Geometric Design by AASHTO).

Redefining U.S. Route 9 as a two lane roadway with full width shoulders and a two-way left turn lane and sidewalk would lead to a desired right of way width of 92 feet. Using the standards above, the same 92 feet (with design exceptions) could accommodate five lanes (i.e. two lanes per direction, plus a two-way left turn lane), plus 8 foot wide shoulders and 10 feet wide border areas as shown below (Figure 21). With a right of way width of 92 feet instead of 114, a preliminary review indicates that only 34 properties will have buildings or parking lots impacted, versus 54 properties for 114 foot right of way. The number of single family homes included in this total would be 3, versus 11 with a 114 foot right of way. The overall right of way acquisition needs of 92 feet versus 114 feet is approximately 8 acres of land, in addition to the above impacts. Other rationale for narrowing the desired roadway dimensions include less overall impervious coverage (approximately 5 fewer acres of impervious surface) and shorter crossing distances for pedestrians (17 percent shorter crossing distance) with an otherwise acceptable design that provides minimal performance reductions. It is also noted that maintaining the shoulder is necessary based on both public sentiment, and to provide an offset for traffic from obstructions, to accommodate bicycles and pedestrians where there is no sidewalk, to store stormwater, to accommodate buses stopping, and to

U.S. Route 9 Corridor Study – Managing and Accommodating Growth in Lakewood and Toms River, Ocean Co.

otherwise enhance safety.



Source: Project Team

Figure 21 – Potential U.S. Route 9 Cross-Sections in Township of Lakewood

Access Management Plan

An Access Management Plan (AMP) is a regulatory document that if adopted defines road widths, striping, traffic signals, and driveway locations along a section of state highway. It must be adopted by a municipality and the state to be enforceable. A process exists to amend it after adoption, if needed. All improvements to the road and redevelopment activity must conform to the plan, as adopted or amended.

U.S. Route 9 Corridor Study – Managing and Accommodating Growth in Lakewood and Toms River, Ocean Co.

The NJDOT AMC has several regulations related to driveway placement that optimize safety and preserve traffic operational efficiency. In addition to these regulations, minimizing conflict points is a key objective of an Access Management Plan. Sharing access between properties, particularly for left turns, is paramount, as is putting as many left turns through signalized intersections as possible.

A lot by lot Access Management Plan has been developed using the philosophy above for the entire section of U.S. Route 9 under study. If fully implemented, the plan would reduce the number of access points from 55 per mile to 28 per mile. The safety benefits of this improvement were quantified earlier (under section entitled Safety Benefits) in this report. Appendix H contains the proposed Access Management Plan for U.S. Route 9 in Lakewood.

4. Complementary Strategies

Bus Stop Relocation Plan

All existing bus stops within the corridor were reviewed, with changes recommended to achieve the following objectives:

- Consolidate closely spaced bus stops, and relocate bus stops to cover areas not covered
- Ensure bus stops are located near shopping mall and other major attractor entrances
- Where possible, align bus stops with traffic signals to facilitate safe pedestrian crossings

The recommended bus stop relocations for the entire project are shown in Appendix I. In summary, the study team recommended consolidating two pair of bus stops into one, relocating several bus stops to existing and future traffic signals, and adding bus stops by a shopping center.

Missing Roadway Links / Parallel Road Network

Providing better connectivity between roadways can be an important strategy for alleviating congestion. Adding parallel routes and alternative access points can help increase resiliency and flexibility to the transportation system by allowing some trips to avoid use of the State highway system for access. The following additional roadway connections were found to be beneficial in this instance. If implemented, these types of improvements can off-load U.S. Route 9 in such a way that leads to improved performance of existing bottlenecks:

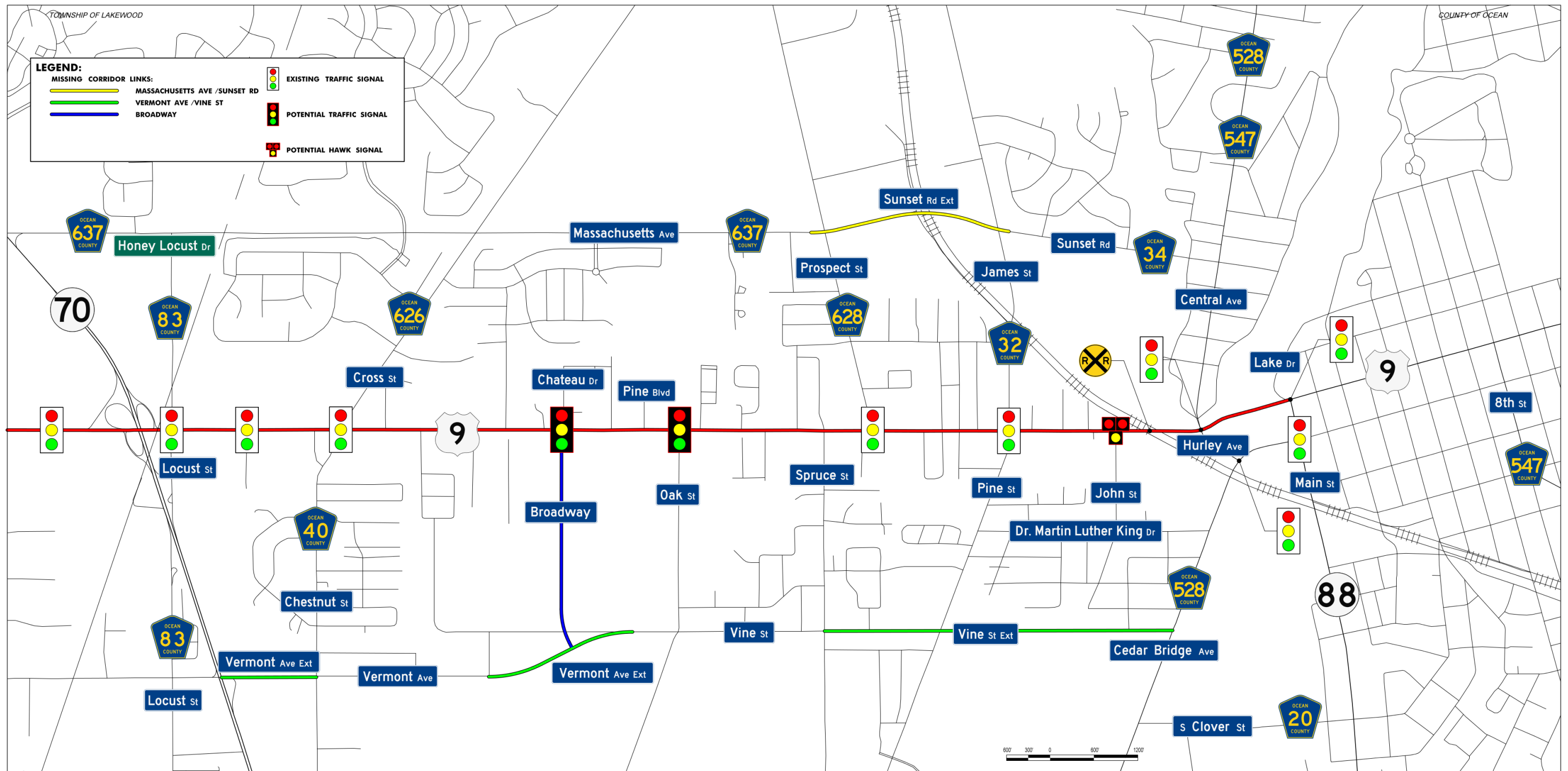
- Extend Vermont Avenue to enhance the easterly parallel route as well as access to existing east-west intersecting routes
- Extend Sunset Avenue to enhance the westerly parallel route and better connect to east-west intersecting routes

Note that although adding the above missing links/parallel routes would intuitively reduce some traffic volumes on U.S. Route 9, no credit was taken for this in analysis, in order to be appropriately conservative. Adding the missing links may resolve the one location on U.S. Route 9 that is projected to be 21 percent over capacity in 2035.

These connections are shown below (Figure 22).

Ordinance Changes/Zoning Controls

It would be useful for Lakewood to modify required lot frontages in the U.S. Route 9 corridor to be consistent with the NJDOT AMC lot conformance. Specifically, a minimum lot frontage of 150-230 feet should be required.



Source: Project Team

Figure 22 - Missing Link Connection Plan in Township of Lakewood

5. Working Groups / Public Outreach

Working Group Meetings

This plan was developed through a series of 11 working group meetings. The team included representatives of the following agencies:

- North Jersey Transportation Planning Authority
- New Jersey Department of Transportation
- Ocean County
- Township of Toms River
- Township of Lakewood
- New Jersey Office of Planning Advocacy
- New Jersey Transit
- Greater Mercer Transportation Management Association

It should be noted that the working group for a Lakewood plan was simultaneous with the development of the Toms River Plan discussed in Part B. The working group met in person or by conference call 11 times.

Meetings were held on the following dates:

- May 29, 2015
- June 23, 2015 (conference call)
- July 14, 2015
- August 18, 2015
- September 18, 2015
- October 15, 2015
- November 16, 2015
- December 15, 2015
- January 12, 2016
- May 6, 2016
- October 28, 2016
- January 20, 2017 (presentation to the NJDOT)

NJDOT Subject Matter Experts

Four meetings were held with various subject matter experts from NJDOT at the department's headquarters. Within these meetings, low-cost, high-impact plans were discussed in detail and refined, as were locations for new signals and potential cross-section elements for the plan. Some concerns were expressed regarding two-way left turn lanes on a roadway posted for 50 mile per hour operation. However, it was determined that the safety benefits outweigh the detriments.

Local Officials Meetings/Briefings

Three meetings were held with local officials in Lakewood prior to public meetings at the Lakewood Municipal Building. These were held on July 22, 2015, May 25, 2016, and September 7, 2016. At the first meeting, local officials indicated the public's overwhelming desire to widen the roadway, and the desire of the land owners in the corridor to dedicate the right of way required for a widening. As the second meeting, concerns were raised regarding one of the low-cost, high-impact improvement schemes (U.S. Route 9 and Main Street/Central ***U.S. Route 9 Corridor Study – Managing and Accommodating Growth in Lakewood and Toms River, Ocean Co.***

Avenue/Hurley Avenue). The third meeting involved additional investigation and refinement of said low-cost, high-impact improvement. During the meeting, it was decided to take a staged approach to said improvement.

Public Outreach Meetings

Two public outreach open house meetings were held at the Lakewood Municipal Building. The first, held on August 25, 2015, introduced the project, and gathered input through workshop-style stations, a visual preference survey, and a written questionnaire. A total of 415 people signed in at the meeting.

The second open house meeting, held on September 28, 2016, presented preliminary findings through a presentation and feedback stations. A total of 287 signed in to the meeting. Each feedback station was staffed by professionals ready to discuss the specific topic. During the initial meeting, a graphic board contrasting two alternatives for numerous elements was provided, and attendees were given dots to vote for their preference. A limited number of dots were provided, thus forcing people to prioritize what was important to them. Attendees were given forms to submit written comments. The results of these meetings are summarized in Appendix L.

Targeted outreach meetings were also held, including a Spanish language session on December 10, 2015. Seven people signed in to the meeting. A focus group for women was also held on December 17, 2015 and 19 people attended (note that no sign in sheet was used for this due to the request of the focus group participants).

Notification for public meetings was given through a direct mailing to all property owners on U.S. Route 9 within the corridor, press releases, and flyers distributed through Ocean County and the Township of Lakewood.

During the public process for the first meeting, some comments were made regarding existing conditions for U.S. Route 9 in Lakewood. Preference surveys were also issued at public meetings, and found the following (based on 385 surveys and stated preference dot survey):

- Over 80 percent of respondents want to maintain left turns to and from U.S. Route 9, and prefer a two-way left turn lane
- About 70 percent of respondents want shoulders
- Most respondents want the ability to cross U.S. Route 9 easier
- Survey respondents want sidewalks and bus stops with shelters
- The top three major concerns were (ranked on a scale of 1-5): travel time (4.93 average), traffic safety (4.43 average), and access to businesses and side streets (4.21 average)
- Ranking concerns by most important, order was: reducing travel time (first priority on 281 out of 358 surveys, second priority on 54 surveys, third priority on 19 surveys), reducing crashes (first priority on 42 of 358 surveys, second priority on 156 surveys), improving pedestrian crosswalks (first priority on 5 of 358 surveys, second priority on 24 surveys, third priority on 66 surveys), completing sidewalks (first priority on three of 358 surveys, second priority on 32 surveys, third priority on 46 surveys)

In the second public meeting, the public expressed support for the recommended improvements and the access management plan. Participants submitted 229 surveys. The surveys showed support of a two-way left turn lane, Access Management Plan, and most low-cost, high-impact improvements. Concerns were expressed about making Hurley Avenue one way.

PART D – Recommendations / Next Steps

Vision for U.S. Route 9

Based upon a review of existing conditions, it is evident that the approximately seven miles of U.S. Route 9 between Indian Head Road (CR 571) in Toms River and Main Street (Route 88) in Lakewood, which is a two lane roadway (one lane per direction), is overburdened. This can be demonstrated by the high degree of congestion throughout the day at several locations, and the determination that through traffic avoids the roadway. It has been estimated that 400-475 vehicles per hour may be avoiding U.S. Route 9 in favor of parallel county roadways. In the short term, a package of low-cost, high-impact improvements and other improvements that are part of the Garden State Parkway Interchange 83 improvements can add sufficient capacity to the roadway to address existing capacity. Another strategy that can provide traffic relief that has been discussed earlier is coordinating traffic signals with time of day plans, particularly given potential new traffic signals already planned or recommended within this study.

This stretch of U.S. Route 9 in Lakewood and Toms River has crash rates that are 2.5-3.5 times the statewide average for similar roadways. Implementing a continuous two-way left turn lane can improve safety within the corridor, especially if combined with continuous shoulder within the corridor. The shoulder could accommodate bicycle traffic and bus stops. Then incorporation of a two-way left turn lane will require a change in the designation of U.S. Route 9 within the New Jersey Department of Transportation Access Management Code, irrespective of whether an Access Management Plan is adopted. It is also recognized that right of way would be required to implement this proposal at widths NJDOT desires.

There is a need to complete sidewalks along this stretch of U.S. Route 9. Within the Township of Lakewood, a large portion of the population is required to walk for religious reasons on certain days of the week. Further, the demographic information for the Township of Lakewood indicates a large reliance on transit and walking for commuting purposes. Within Toms River, sidewalks are necessary for full accessibility and safety reasons, due to the 50 mile per hour posted speed limit (although it is recognized that the speed limit in this area appears to be a statutory speed for a rural area that has not been reviewed in the context of development activity within the corridor).

Significant traffic growth is anticipated over the next 20 years along this stretch of U.S. Route 9 due to growth both within the corridor and in the surrounding area. At key capacity constraints in the corridor, this can be an increase in peak direction traffic of 30-115 percent over existing volumes. It is further recognized that the sentiment locally is that this portion of U.S. Route 9 should be widened to four lanes. Given the development pressures in the corridor and the surrounding area, this should continue to be the long term vision for U.S. Route 9. However, it is further recognized that if this vision is combined with a two-way left turn lane, it can be accomplished within a right of way width of 92 feet and still comply with NJDOT standards (versus the 114 feet currently included in the DTS of the portion of U.S. Route 9 under discussion). It is also recognized that approximately half of the capacity of the additional lane of the roadway could be taken up by traffic that diverts to the U.S. Route 9 corridor from parallel county routes.

Consequently, the vision for the approximately seven miles of U.S. Route 9 between Indian Head Road (CR 571) in Toms River and Main Street (Route 88) in Lakewood would be as follows:

- Implement low-cost, high-impact improvements in the near term
- Add a two-way left turn lane to U.S. Route 9 in the near term

- Adopt the bus stop relocation plan for U.S. Route 9 in the near term
- Add additional traffic signals and traffic signal coordination in the near term
- Modify the access level and Desired Traffic Section of the section of U.S. Route 9 under study within the NJDOT Access Code to conform to the changes described above in the near term
- Adopt an Access Management Plan for the section of U.S. Route 9 under study in the near to mid-term
- Seek opportunities to complete the sidewalk network on U.S. Route 9
- As new developments come on line, ensure that shoulders are widened and right of way dedicated in accordance with the Access Management Plan
- Construct the missing links and parallel routes presented within this study in the mid to long term
- Convert the roadway to a five-lane section with shoulders in the long term when warranted by traffic growth

The study recommendations can be divided into three levels, with increasing levels of action by municipalities.

Implement the Low-Cost High Impact Improvements, including Two-Way Left Turn Lane

It is recommended that the following Low-Cost High Impact improvements be implemented (Figures 5-6, 13-19):

- U.S. Route 9 and Main Street/Central Avenue/Hurley Avenue
- U.S. Route 9 and John Street
- U.S. Route 9 and James Street/Pine Street
- U.S. Route 9 and Oak Street/Chateau Drive/Broadway
- U.S. Route 9 and Cross Street/Chestnut Street
- U.S. Route 9 and Locust Street
- U.S. Route 9 and Whitty Road
- U.S. Route 9 and Church Road (including Stevens Road signal)

Other improvement recommendations would be:

- Add two-way left turn lane throughout corridor
- Implement traffic signal coordination and time of day plans
- Complete sidewalks (Figures 2A, 2B, 10A, and 10B)
- Implement bus stop relocation plan (Appendix I)
- Implement missing links/parallel roadway plan (Figures 9 and 22)
- Provide continuous shoulders in corridor as opportunities arise

The low-cost, high-impact improvements may be implemented independently of other recommendations of this study.

Currently, NJDOT is developing roadway improvement plans for U.S. Route 9 within the study corridor. The NJDOT has expressed the willingness to evaluate these low-cost, high-impact improvements for implementation to the extent possible, within the constraints of the department’s improvement plans. Coordinated support from municipalities and Ocean County can assist this endeavor to ensure that new development applications are consistent with this plan and assist in implementing improvements in accordance with fair share obligations.

Modify the Access Level and Desired Typical Section for U.S. Route 9 in the Study Area

It is recommended that the access level (AL) and DTS be modified from the current designations to DTS 2B or modified 4F (meaning that a two-way left turn lane is incorporated into a 2 or 4 lane roadway, versus the current 4A with a median barrier) and AL 4 (meaning that left turns to/from driveways are permitted, whereas they are not under the current AL 3). The municipal governing bodies may initiate the process to change these access code designations by petitioning the NJDOT (through municipal resolution). Taking this action would articulate local support for a 92-foot right of way DTS with a two-way left turn lane. The choice of a 92 foot right of way is predicated on the reduction of required amount of right of way (approximately 16 acres less than that required for a 114 foot right of way), the need to acquire existing homes and business enterprises (23 fewer businesses and 10 fewer single family homes), the reduction in new impervious coverage with a still acceptable design (approximately 12 fewer acres of pavement), and the reduced crossing distance for pedestrians (17 percent shorter crossing distance). It is also noted that maintaining the shoulder is necessary where the posted speed limit exceeds 35 miles per hour based on both public sentiment, and to provide an offset for traffic from obstructions, to accommodate bicycles and pedestrians where there is no sidewalk, to store stormwater, to accommodate buses stopping, and to otherwise enhance safety. Consequently, DTS 4G (five lanes without shoulders) is inappropriate for all areas except the block of U.S. Route 9 between Central Avenue/Hurley Avenue and Main Street (Route 88).

The DTS and AL modifications may be implemented independent of other recommendations of this study.

Adopt Access Management Plans

It is recommended that the Access Management Plans for U.S. Route 9 in Toms River and Lakewood be adopted (Toms River – Part B and Appendix G; Lakewood – Part C and Appendix H). The recommended plans identify permitted driveway locations for new development, and DTS and AL designations. Adoption of the plans would improve safety in the corridor by reducing the number of vehicular access points that will be permitted over time. The adoption process for each municipality may proceed independent of the other, and involves the following steps:

- Submission of documents to the NJDOT Commissioner: Access Management Plan, working group progress reports, resolutions from governing bodies to enter into the Access Management Plan process and separately to adopt
- Public hearing with proper public notice to property owners
- Submission of any amendments to NJDOT, signed by working group
- After review, incorporate the Access Management Plan into land development ordinances and Master Plan

Next Steps

The next steps to achieve the outcomes described earlier would be as follows:

- Municipalities provide resolutions of support for low-cost, high-impact improvements to the NJDOT
- Municipalities request a change in access level and DTS from the NJDOT Commissioner
- Municipalities provide resolutions of support for the Access Management Plans
- Public hearings will need to be held if Access Management Plan is to be adopted
- Public comments must be received and discussed at a meeting not more than 60 days after the closing of the public comment period
- Master plans and ordinances need to be modified to incorporate Access Management Plan