

# **NBTOD Traffic Study**

*(Part 1 of 2: Final Report)*

*For:*

## **North Brunswick Transit Village** *(Block 148, Lot 5.04)* **BJs Wholesale Club** *(Block 4.46, Lot 1.04)*

*Township of North Brunswick  
Middlesex County, New Jersey*

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MC Project No. 08000051A



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## **EXECUTIVE SUMMARY**

### **Purpose and Scope of the Study**

This traffic impact study has been commissioned by the Planning Board for the Township of North Brunswick (Township) to assess the traffic impact of a proposed Transit Village Development located along Route 1 NB between Aaron Road and Commerce Blvd, and a proposed BJs Wholesale Club located along Route 1 SB between Aaron Road and Commerce Boulevard.

North Brunswick TOD Associates, LLC (NBTOD) proposes to construct a multi-use development, consisting of several phases including big-box retail, main street retail, rental and ownership residential units, office space, and a transit facility. The transit facility will be complemented by a parking facility and a bus depot. The impact of the NBTOD will be analyzed in phases as follows:

**Phase 1** will consist of the following land uses: Big-Box Retail - 500,000 SF, Restaurant - 40,000 SF, Main-Street Retail & Kiosks - 50,000 SF, Residential Units (Rental) - 255 Units, Hotel - 160 Rooms

The **Final Build**, in addition to the above, will consist of the following: Main-Street Retail & Kiosks - 75,000 SF, Residential Units (Rental) - 520 Units, Residential Units (Sale) - 1,100 Units, General Office Space - 195,000 SF, Park & Ride Facility - 4,000+ Parking Stalls.

Prestige proposes a 106,000 SF BJs Wholesale Club across from NBTOD along Route 1 SB between Commerce Boulevard and Aaron Road. This development will impact the same intersections as NBTOD and therefore it is relevant to consider it as part of this analysis. As such, BJs Wholesale Club has been included within Phase 1 of this analysis.

This report will provide a broad understanding of the improvements necessary to mitigate the traffic impact of the proposed developments. This report will provide specific improvements which should be implemented to mitigate the traffic impact of the 2012 build year and improve the existing conditions. The purpose of the 2017 analysis is to determine the improvements that will be necessary to accommodate the Final Build for NBTOD. Of paramount importance is the need to identify if the Final Build for NBTOD can be accommodated on the roadway network.

### **Recommended Improvements for Site Rezoning**

In summary, the improvements necessary to mitigate the traffic impact of NBTOD's Phase 1 and BJs Wholesale Club can be summarized as follows:



- Route 1 and Cozzens Lane / Adams Lane: Realign Cozzens Lane and merge it with the ramp fronting the Malouf facility, and widen Adams to four lanes. Right-of-way acquisitions are needed to realign Cozzens Lane.
- Route 1 and Commerce Boulevard: Construct far-side jughandle for Route 1 SB, widen all approaches to increase capacity. Right-of-way acquisitions for these improvements are very minor.
- Route 1 and Aaron Road: Improve the Route 1 S/B jughandle and realign it to increase capacity and prevent queuing onto Route 1, install a new reverse jughandle to service Route 1 N/B left turn demand (primarily to improve access to BJs). The right-of-ways needed for these improvements are mostly within parcels owned by the developers.

Additional improvements are planned in this area. The County is currently investigating a grade separated interchange, and the State is investigating widening Route 1 from Aaron Rd to the Princeton area.

### **Cost of Improvements and Cost Sharing Analysis**

The cost of these improvements has been prorated between NBTOD and BJs based on their respective trip demand. The recommended fair share contribution Phase 1 of NBTOD and for BJs is approximately 85% and 15% respectively. The cost sharing analysis for each intersection improvement is detailed within this report.

### **Phase 1 Conclusions**

Based on the results of this study, both Phase 1 of NBTOD and BJs may be developed according to the current land use plan outlined within this study, provided that the recommended improvements are constructed. The resulting overall traffic operations along the Route 1 corridor, Cozzens lane, Adams Lane, Commerce Boulevard, Aaron lane, and Finnegan Lane will be significantly better than existing conditions.

### **Final Build Conclusions**

For the Final Build of the NBTOD development, including the Train Station and the Park & Ride facility, significant improvements will be required. Grade separation will be required at Finnegan Lane, Commerce Blvd and Cozzens Lane along Route 1. Please note that the County is currently investigating a grade-separated interchange at Finnegan Lane, based on its existing operation. Additional relatively minor improvements will also be required at Adams Lane & Route 130. It is also possible that a reverse jughandle may be required at Aaron Road & Route 1 during the Final Build condition.



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Appendix A - Complete Set of Volume Flow Diagrams
Appendix B - Straight Line Diagrams & Intersection Aerial Photos
Appendix C - NJDOT Signalized Intersection Plans & Timing Plans
Appendix D - Traffic Count Data Summary Sheets
Appendix E - Trip Generation Matrix Worksheets & Referenced Documents
Appendix F - Gravity Model Summary Sheets
Appendix G - NJDOT Growth Rate Table & NJTPA Population Forecast
Appendix H - LOS Summary Sheets & HCM Data Summary Sheets
Appendix I - NJDOT Preliminary Cost Estimates



## **I. INTRODUCTION**

This traffic impact study has been commissioned by the Planning Board of the Township of North Brunswick (Township) to assess the traffic impact of a proposed Transit Village Development, located along Route 1 NB, between Aaron Road and Commerce Blvd, and a proposed BJ's Wholesale Club located along Route 1 SB between Aaron Road and Commerce Boulevard. **Figure 1** depicts the site locations.

This study is primarily funded by the applicants, *North Brunswick T.O.D. Associates, L.L.C. (NBTOD)* and *Prestige Properties & Development Co. Inc. (Prestige)*. Prestige is independent of NBTOD. The Township has also contributed funds for certain revisions not related to the proposed developments. The overall progress of this study has been supervised by the Township.

Ultimately, NBTOD proposes to construct a multi-use development, consisting of several phases, including big-box retail, main street retail, rental and ownership residential units, office space, and a transit facility. The transit facility will be complemented with a parking facility and bus depot.

NBTOD will be analyzed in phases as follows:

**Phase 1** will consist of the following land uses:

- Big-Box Retail - 500,000 SF
- Restaurant - 40,000 SF
- Main-Street Retail & Kiosks - 50,000 SF
- Residential Units (Rental) - 255 Units
- Hotel - 160 Rooms

**Final Build** the will consist of the following, in addition to the above:

- Main-Street Retail & Kiosks - 75,000 SF
- Residential Units (Rental) - 520 Units
- Residential Units (Sale) - 1,100 Units
- General Office Space - 195,000 SF
- Park & Ride Facility - 4,000+ Parking Stalls

Prestige proposes a 106,000 SF BJ's Wholesale Club across from NBTOD along Route 1 SB between Commerce Boulevard and Aaron Road. This development will impact the same intersections as NBTOD and therefore it is relevant to consider it as part of this analysis. As such, BJ's Wholesale Club has been considered as part of Phase 1 of this analysis.



The purpose of this report is to assess the traffic impacts for two (2) analysis years, 2012 and 2017. The year 2012 analysis is representative of when Phase 1 of NBTOD and BJs will be occupied. The 2017 analysis will represent the Final Build for NBTOD. Prestige will not impact the 2017 analysis.

This report will provide a broad understanding of the improvements necessary to mitigate the traffic impact of the proposed developments. This report will provide specific improvements which should be implemented to mitigate the traffic impact of the 2012 build year and improve the existing conditions. The purpose of the 2017 analysis is to determine the order of magnitude improvements that will be necessary to accommodate the Final Build for NBTOD. Of paramount importance is the need to identify if the Final Build for NBTOD can be accommodated on the roadway network.

In summary, the following is included as part of this report:

- Field Investigation / Data Collection - A field investigation has been conducted throughout the study area to document traffic volumes, existing lane configurations and traffic patterns during the AM, PM and Saturday peak hours. Traffic counts were collected from alternative sources and compared with those counts conducted as part of this study.
- Gravity Model - Four (4) gravity models have been prepared to determine the distribution of site generated trips for each of the proposed land uses.
- Trip Generation - The site generated trips associated with the proposed developments have been generated in accordance with the Institute of Transportation Engineers (ITE), Trip Generation: An ITE Informational Report, 8<sup>th</sup> Edition.
- Capacity Analyses - Capacity analyses have been conducted according to the Highway Capacity Manual (HCM) to assess the operation of the study intersections.
- Recommended Improvements - Recommendations are made for each of the study intersections for the 2012 analysis. Order of magnitude improvements are identified, including various alternatives where applicable to mitigate the 2017 traffic conditions.

Throughout this report, it is necessary to provide the reader with Volume Flow Diagrams to depict various traffic scenarios. It is not practical to include all diagrams within the body of the report. Therefore, a complete set of Volume Flow Diagrams has been included within **Appendix A** of the Technical Appendix. Please note that the most relevant volume flow diagrams have been included within the text of this report, however they are duplicated within the appendix.







## II. STUDY AREA

The Township has identified several intersections to be studied for the 2012 and 2017 analysis periods. Maser Consulting has conducted a review of the surrounding roadway network to determine if additional intersections warrant inclusion within this study.

The following lists the **2012 study intersections**:

- Route 27 & Finnegans Lane
- Route 1 & Finnegans Lane
- Route 1 & Aaron Road
- Route 1 & Commerce Blvd
- Route 1 & Cozzens Lane / Adams Lane
- Route 130 & Adams Lane

In addition to the above study intersections, Maser counted several additional intersections outside of the 2012 study area to document existing travel patterns for evaluation of an E-W connector. These additional intersections either fall outside of the borders of the Township or are not impacted by the proposed developments to the extent that warrants analysis. If an E-W connector becomes a viable option in the future, this report could be modified to include such intersections as necessary.

The Township requested Arlington Avenue, Orchard Street and Jersey Avenue be added to the study area to assess the operation of such intersections due to improvements recommended at Route 1 & Cozzens Lane. Specifically, the Township desires to reduce congestion through the residential street of Arlington Avenue. Township Officials have requested that any improvements in the study area aim to do so. Therefore, the following intersections were also counted and included within this count program.

- Cozzens Lane & Arlington Avenue
- Arlington Avenue & Orchard Street
- Orchard Street & Jersey Avenue



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### III. EXISTING CONDITIONS / FIELD INVESTIGATION

A field investigation has been conducted in the area of the subject site to obtain an inventory of existing roadway conditions, posted traffic controls, adjacent land uses, lane configurations, and existing traffic patterns. The significant roadways, and all study intersections are described below. The associated straight line diagrams, and a summary sheet of the existing roadways can be found in **Appendix B**. The signalized intersection plans and signal timings have been obtained from NJDOT and are contained in **Appendix C**.

#### Roadways

**US Route 1** is a north-south Urban Principal Arterial. Generally, Route 1 is 4-6 lanes throughout the study area, and the posted speed limit is 55 MPH. The roadway is separated by a concrete jersey barrier. Left turns are generally permitted via near-jug handles. Route 1 is a main thruway between Trenton, Newark and New York. In addition to connecting the State Capitol with the northeastern portion of the State, Route 1 carries a significant amount of commuter traffic. Generally, where auxiliary lanes are not present, an approximate 12' shoulder exists.

**US Route 130** is a north-south Urban Principal Arterial which begins at Route 1, just north of the study area, and continues to the southwestern portion of New Jersey. Route 130 runs in a parallel to the New Jersey Turnpike. Route 130 is generally a 4 lane highway, with auxiliary lanes as necessary. The speed limit is posted at 55 MPH.

**State Route 27** is a north-south Urban Principal Arterial servicing Central and Northeastern New Jersey which starts in Princeton and terminates in Newark. Route 27 generally runs parallel with Route 1. Within the study area, Route 27 consists of four lanes, with turning slots as necessary for left turns. The speed limit is posted at 40 MPH.

**Adams Lane / Cozzens Lane** is an east-west Urban Minor Arterial connecting Route 130, Route 1, and Route 27. The posted speed limit is 35 MPH. The roadway is under the jurisdiction of Middlesex County, and is also known as **County Route 608**.

**Commerce Boulevard** is an Urban Local Roadway under the jurisdiction of North Brunswick that connects Route 1 with Hartland Commons. Hartland Commons is a local access roadway providing access between Cozzens Lane and Aaron Road, primarily servicing residences. Commerce Boulevard also provides access to Commerce Plaza, containing a shopping center, Regal Cinema Complex and offices.

**Aaron Road** is an East-West Urban Local Roadway under the jurisdiction of North Brunswick that provides access between Route 1 and a large residential development between Route 27 and Route 1. There is no direct connection between Route 1 and Route 27 via Aaron Road.



**Finnegans Lane (Route 1)** is an East-West Urban Minor Arterial under the jurisdiction of Middlesex County that connects Route 1 and Route 27. Finnegans lane is also known as **County Route 682**. Finnegans Lane is generally a 4 lane roadway. The posted speed limit is 45 MPH.

**Black Horse Lane** is an east-west Urban Local Roadway under the jurisdiction of South Brunswick. Black Horse lane generally provides access to Route 1 NB from Route 130 NB via Deans Lane.

**Henderson Road** is an east-west Urban Collector roadway between Route 1 and Route 27 under the jurisdiction of Middlesex County, and an Urban Local Roadway between Route 1 and Black Horse Lane under the jurisdiction of South Brunswick. Henderson Road is also known as **County Route 610** between Routes 1 and 27.

**Deans Lane** is a East-West Urban Collector roadway under the jurisdiction of Middlesex County, which connects Route 130 with Route 1, along the southerly border of the study area. Deans Lane is also known as **County Route 610** and has a posted speed limit of 40 MPH.

**Georges Road** is a north-south oriented Urban Local Roadway under the jurisdiction of Middlesex County that is generally located between Route 1 and Route 130. Georges Road is also known as **County Route 697**.

**Arlington Road** is a 2-lane local roadway under the jurisdiction of the Township. The speed limit is posted as 25 MPH. Trucks are not permitted. Arlington Road connects Orchard Street and Cozzens Lane. It is currently utilized as a cut-through between Route 1 SB and Jersey Avenue and the area west of Arlington Avenue along Cozzens Lane.

**Orchard Street** is a local roadway under the jurisdiction of the Township. Orchard Street connects Route 1 SB, Jersey Avenue and Princess Drive. It is primarily used as a cut-through (in conjunction with Arlington Avenue) between Route 1 SB, Jersey Avenue and the area west of Arlington Avenue along Cozzens Lane.

**Jersey Avenue** is an Urban Minor Arterial under the jurisdiction of NJDOT that connects New Brunswick with Route 1 SB and other industrial sites. The posted speed limit is 40 MPH.

#### **Route 1 Corridor Intersections** (Refer to Appendix B for Aerial Photographs)

The signalized intersections along Route 1 within the study area operate as a coordinated signal system during the AM, PM and Saturday peak hours and are offset to Raymond Boulevard located south of the study area. During the AM and PM peak hours, the system operates on a 140 second background cycle length. During the Saturday peak hour, the system operates on a 120 second background cycle length. The exception is the intersection of Route 1 & Finnegans Lane which is not coordinated during the AM and PM peak hours. The following provides a brief description of each intersection, and image of said intersection.





**Route 1 & Adams Lane/Cozzens Lane** form a signalized intersection with full movements being permitted via jug handles. Southbound left turns are provided via a far-side jug handle which intersects Cozzens Access Road at an unsignalized intersection prior to arriving at Route 1. Cozzens Lane accesses the intersection via the aforementioned Access Road. There are approximately 175 feet between the Cozzens Access Road and Route 1. Northbound left/right turns are provided via a near-side jug handle that intersects Adams Lane. There are approximately 75 feet between the NB jug-handle and Route 1 along Adams Lane.

**Route 1 & Commerce Boulevard** form a signalized intersection. Left/right turns for the north and southbound directions are provided via near-side jug handles. There are approximately 225 and 300 feet between the near side jug handles and Route 1 for the eastbound and westbound approaches respectively.

**Route 1 & Aaron Road** form a signalized intersection. Left/right turns for the southbound and northbound directions are provided via near-side jug handles. There are approximately 180 feet between the near side jug handles and Route 1 for the eastbound and westbound approaches.

**Route 1 & Finnigans Lane** form a three-legged signalized intersection. Right and U-turn movements for the southbound direction are provided via a near-side jug handle. Approximately 125 feet exists between the jug handle and Route 1. Northbound left and U-turns are provided via a near-side jug handle.

**Route 1 & Black Horse Lane** form a three-legged signalized intersection. Left and U-turns for the southbound direction are provided via a near-side jug handle. Northbound right and U-turns provided via a near-side jug handle that intersects Black Horse Lane. There are approximately 40 feet between the jug handle and Route 1.

**Route 1 & Henderson Road** form a four-way signalized intersection. Left turns are prohibited in the southbound direction. Right/left turns for the northbound direction are provided via a near-side jug handle that intersects Henderson Road. Approximately 240' is provided between the northbound nearside jug handle and Route 1.

**Route 1 & Deans Lane** form a three-legged signalized intersection. Left and U-turns for the southbound direction are provided via a near-side jug handle.

#### **Route 130 Corridor Intersections** (Refer to Appendix B for Aerial Photographs)

The signalized intersections along Route 130 operate as a coordinated signal system, referencing Raider Boulevard as the master intersection. During the AM, PM and Saturday peak hours, the signalized intersections operate on a background cycle length of 90 seconds. The exception is Route 130 & Adams lane which operates with a background cycle length of 120



seconds during the AM and PM peak hours, and is un-coordinated during that period of time. The following provides a brief description of each intersection, and an image of the same.

**Route 130 & Adams Lane** form a four-legged signalized intersection. Left turns are prohibited in the southbound direction. Left turns in the northbound approach are provided by a dedicated left-turn lane.

**Route 130 & Renaissance Boulevard East** form a three-legged signalized intersection. Left turns in the northbound approach are provided via a dedicated left-turn lane. Approaches to and from Renaissance Boulevard East in the southbound direction are provided with designated acceleration and deceleration lanes.

**Route 130 & Renaissance Blvd South/Apple Orchard Street** form a four-legged unsignalized intersection. Left turns are prohibited in the northbound direction. Access to and from Renaissance Boulevard South from Route 130 southbound is provided by right turn only movements. There is no through movement westbound from Apple Orchard lane.

**Route 130 & Finnigans Lane / Davidson Mill Road** form a four-legged signalized intersection. Left turns are provided via designated left turn lanes in the north and southbound directions. Ingress and egress movements on Finnigans Lane are divided by a landscape island, approximately 50 feet in width.

**Route 130 & Georges Road** form a three-legged unsignalized intersection. Access to and from Georges Road are provided by right-turn only movements for Route 130, southbound approach. A left turn movement cannot be performed from Route 130 northbound.

**Route 130 & Deans-Rhodes Halls Road** form a four-way signalized intersection. Deans-Rhodes Hall Road crosses Route 130 at an angle less than ninety degrees (90°). Dedicated left turn lanes are provided for all approaches. Concrete islands with associated striping delineate the right turn movements from Route 130 in both directions.

#### **Route 27 Corridor Intersections** (Refer to Appendix B for Aerial Photographs)

**Route 27 & Finnigans Lane / Bennington Parkway** form a four-legged signalized intersection. Left turn movements for the north, south and westbound directions are provided via dedicated left-turn lanes.

#### **Traffic Counts**

Several counts have been conducted within the study area to gain a broad and accurate understanding of the typical traffic conditions throughout the study area. **Appendix D** contains the traffic count data summary sheets.



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### June 2009 Counts (Langan Counts)

Prior to the commencement of this study, manual turning counts (MTC) were conducted at each of the study intersections during the AM, PM, Saturday peak hours, and several automatic traffic recorders (ATR) were placed throughout the study area by Langan Engineering. These counts were conducted during the second week of June, prior to summer break for the North Brunswick School District, but after the spring session for Rutgers University. The following summarizes the **time periods counted in June 2009**.

- 7:00 AM - 9:00 AM, Typical Weekday
- 4:00 PM - 7:00 PM, Typical Weekday
- 11:00 AM - 2:00 PM, Typical Saturday

### September 2009 Counts

Additional counts were conducted during the middle of September to update the preliminary counts, and provide data for the time period when both Rutgers University and the North Brunswick School District were in operation. Two (2) hour counts were conducted for each time period. The time period counted was inclusive of the peak hour, as determined by the June 2009 counts, plus one-half hour prior to, and after the determined peak hour during the June 2009 counts. The following summarizes the **time periods counted in September 2009**:

- 7:00 AM - 9:00 AM, Typical Weekday
- 4:15 PM - 6:15 PM, Typical Weekday
- 12:00 PM - 2:00 PM, Typical Saturday

These counts were analyzed to determine the peak hour of operation for the roadway network. The following summarizes the **peak hour periods for the September 2009 counts**:

- AM Peak Hour: 7:30 AM - 8:30 AM
- PM Peak Hour: 4:45 PM - 5:45 PM
- Saturday Peak Hour: 12:30 PM - 1:30 PM

### Other Counts

Additional counts have also been obtained, which were conducted during the summer of 2009, while school was not in session, along the Route 1 corridor between Aaron Road and Forrestal Village. These counts encompassed study intersections along Route 1, and were conducted by GPI associates in coordination with an ongoing Route 1 corridor study beginning at Aaron Road and continuing south.



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### **Baseline Conditions**

The baseline traffic conditions are generally based on the counts conducted during September 2009. The September 2009 counts were balanced as necessary to provide balanced conditions between intersections. Generally, they were balanced in an upward fashion to achieve a conservative baseline. The balanced conditions were compared with the traffic data collected by GPI Associates and Langan Engineering. All counts were found to be generally consistent. **Figure 2** depicts the balanced 2009 existing traffic conditions.

### **Arlington Avenue, Orchard Street & Jersey Avenue**

The three following intersections form the cut-through path between Route 1 SB, Jersey Avenue and Cozzens Lane.

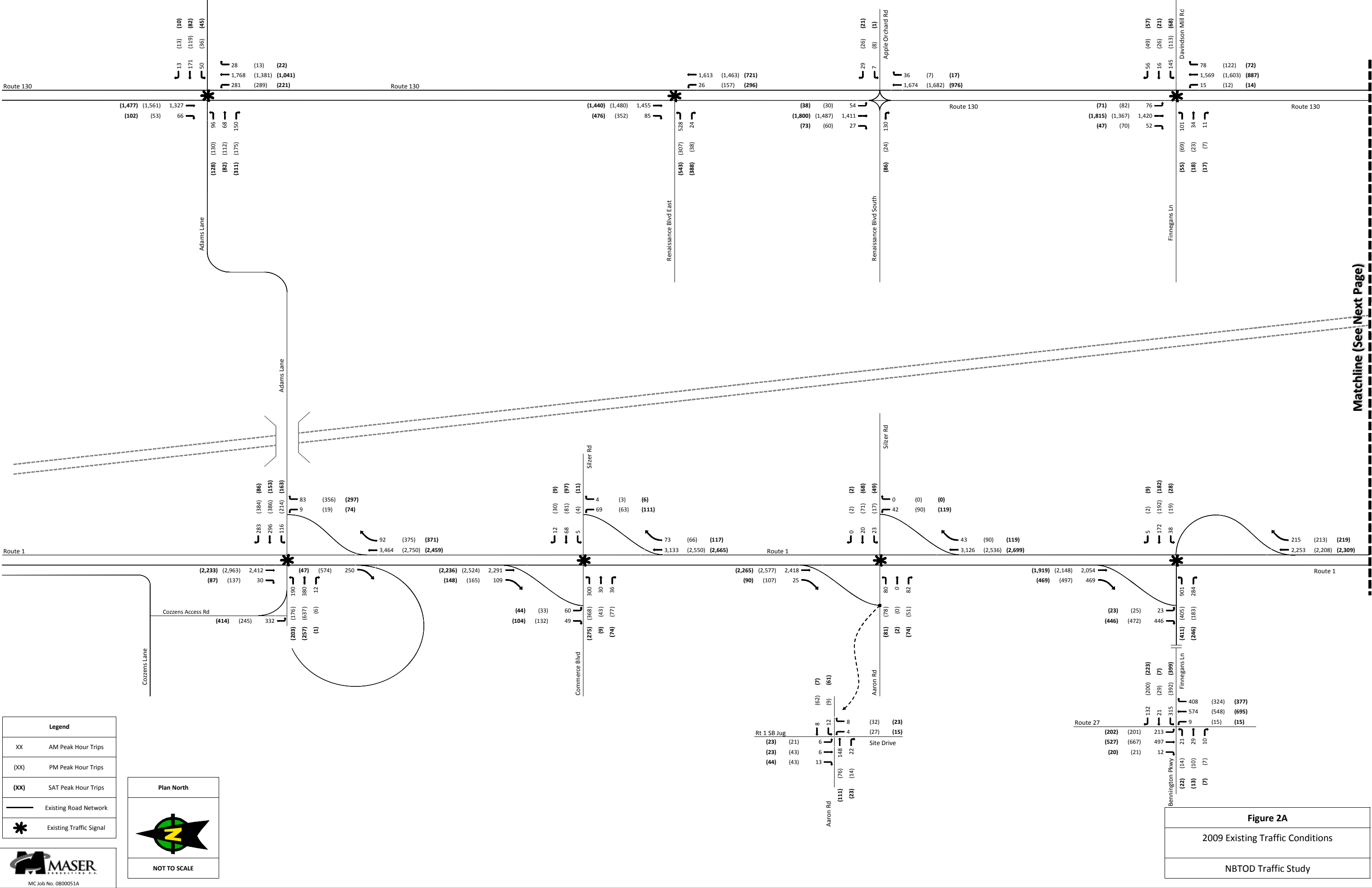
**Arlington Avenue & Cozzens Lane** forms an unsignalized three-legged intersection. Arlington Avenue is stop controlled; Cozzens Lane is free. One lane is provided for all approaches. All movements are permitted.

**Arlington Avenue & Orchard Street** forms an unsignalized four-legged intersection. Orchard Street is stop controlled; Arlington Avenue is free. One lane is provided for all approaches. All movements are permitted.

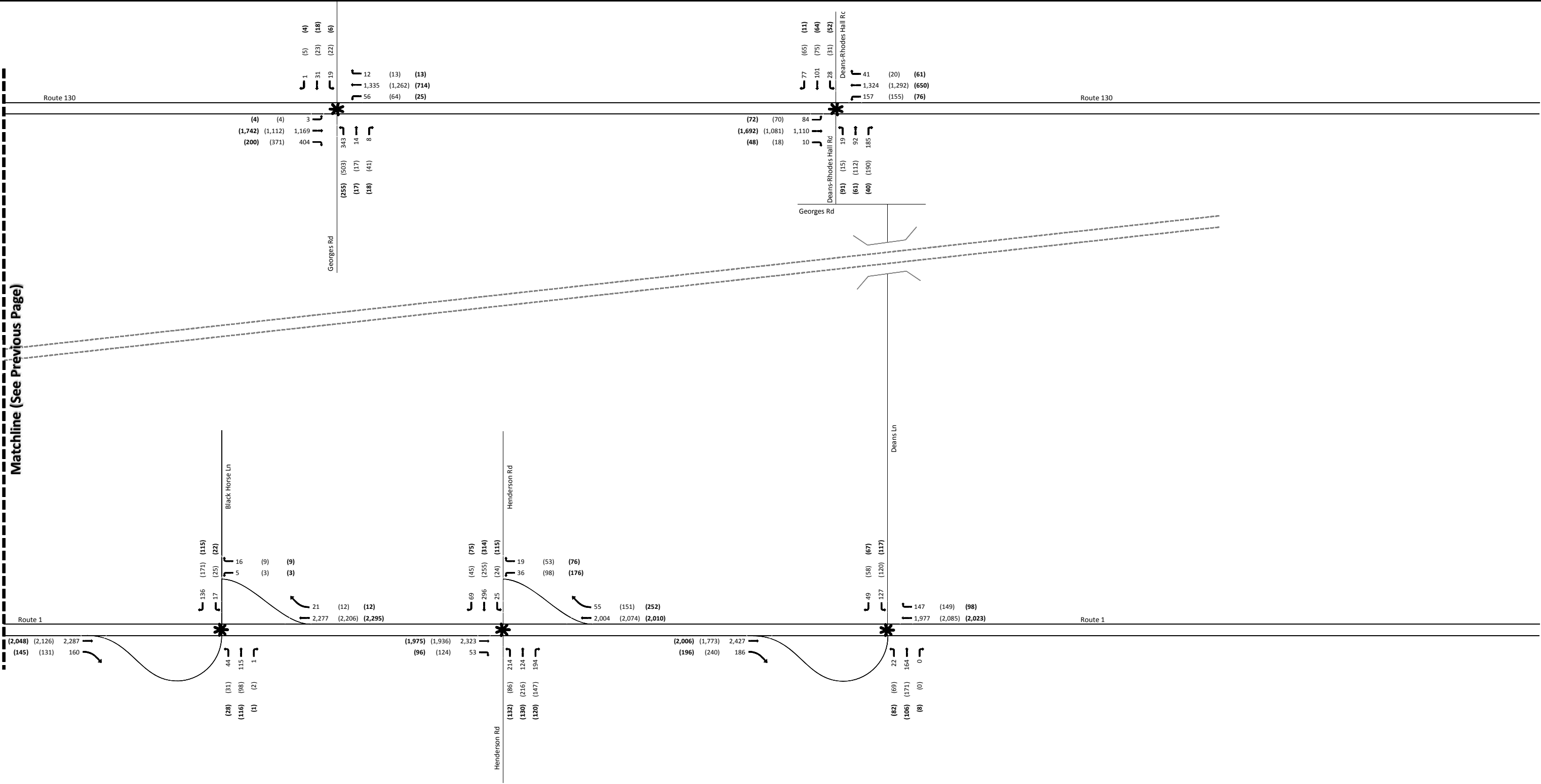
**Orchard Street & Jersey Avenue** forms an unsignalized three-legged intersection. Jersey Avenue is stop controlled; Orchard Street is free. The eastern leg of the intersection is the on/off-ramp for Route 1 SB. All movements are permitted.

The Planning Board expressed that the PM peak hour represents unacceptable conditions within the roadway network. Therefore to analyze these conditions, traffic counts were conducted during the PM peak hour at the three above intersections on Tuesday November 10<sup>th</sup> and Wednesday November 11<sup>th</sup> from 4-6 PM.

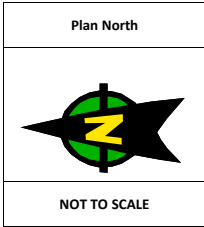
**Figure 3** depicts the collected traffic conditions for the Arlington-Orchard-Jersey counts.



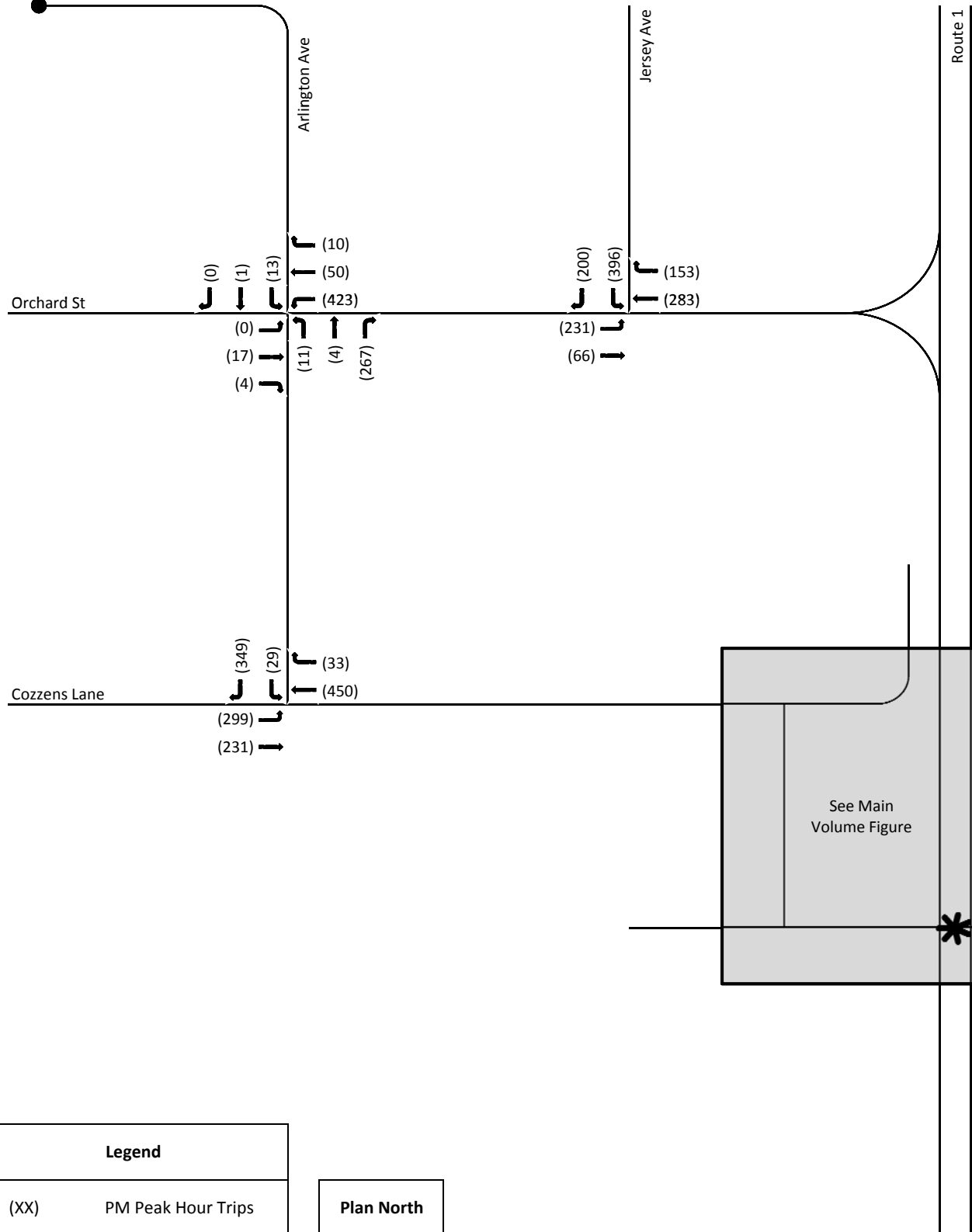
Matchline (See Previous Page)



Legend	
XX	AM Peak Hour Trips
(XX)	PM Peak Hour Trips
(XX)	SAT Peak Hour Trips
—	Existing Road Network
*	Existing Traffic Signal



**Figure 2B**  
2009 Existing Traffic Conditions  
NBTOD Traffic Study



Legend	
(XX)	PM Peak Hour Trips
—	Existing Road Network
*	Existing Traffic Signal



MC Job No. 0800051A

**Figure 3**

2009 Existing Traffic Conditions

Arlington Avenue / Orchard St / Jersey Avenue

NBTODTraffic Study



#### **IV. SITE GENERATED TRIPS**

The site generated trips for the proposed project were estimated using the *Trip Generation Manual: An ITE Informational Report, 8<sup>th</sup> Edition* published by the **Institute of Transportation Engineers (ITE)**. This ITE publication tabulates the trip generation rates associated with existing developments throughout the United States and Canada, categorized into their respective land uses. The appropriate land uses for the proposed development are listed below, along with the ITE description:

##### ***Shopping Center (ITE LU 820)***

*"A shopping Center is an integrated group of commercial establishments that is planned, developed, owned and managed as a unit. A shopping center's composition is related to its market area in terms of size, location and type of store. A shopping center also provides on-site parking facilities sufficient to serve its own parking demands."*

##### ***Hotel (ITE LU 310)***

*"Hotels are places of lodging that provide sleeping accommodations and supporting facilities such as restaurants; cocktail lounges; meeting and banquet rooms or convention facilities; limited recreational facilities (pool, fitness room); and/or other retail and service shops."*

##### ***Apartment (ITE LU 220)***

*"Apartments are rental dwelling units located within the same building with at least three other dwelling units, for example, quadraplexes and all types of apartment building."*

##### ***Residential Townhome / Condo (ITE LU 230)***

*"Residential condominiums/townhomes are defined as ownership units that have at least one other owned unit within the same building structure. **Both condominiums and townhomes are included in this land use.**"*

##### ***General Office (ITE LU 710)***

*"A general office building houses multiple tenants; it is a location where affairs of businesses, commercial or industrial organizations, or professional persons or firms are conducted. An office building of buildings may contain a mixture of tenants including professional services, insurance companies, investment brokers and tenant services, such as a bank of savings and loan institution, a restaurant or cafeteria and service retail facilities."*

As per general practice, the **Shopping Center** land use was used to determine the site generated trips for the retail uses within the development, including the restaurant, big-box retail, and main street retail. The **Apartment** land use was used to determine the site





generated trips for the proposed rental units, and the **Residential Townhome / Condo** land use was used to determine the site generated trips for the ownership units. **Hotel** and **General Office** were used to generate the trip for each of the respective uses.

Langan Engineering had previously conducted traffic counts at the existing park & ride facility located along Jersey Avenue, in New Brunswick, NJ, located just north of this site. Based on these counts, Langan determined the site generated trip rates for the existing station based on the number of parking stalls. The Jersey Avenue train station closely represents the anticipated trip generation characteristics of the proposed station, therefore the trip rates calculated by Langan Engineering have been utilized to determine the site generated trips for the proposed park & ride facility. It should be noted that based on a review of available material published by ITE, the rates determined by Langan are reasonable. **Table 1** tabulates the rates. The full counts conducted by Langan Engineering are contained within **Appendix E**.

**Table 1 - Site Generated Trip Rates for Jersey Avenue Train Station (Per Langan Engineering)**

Description	In	Out	Total
AM Peak Hour Trip Rate	0.49 per stall	0.08 per stall	0.57 per stall
PM Peak Hour Trip Rate	0.06 per stall	0.26 per stall	0.32 per stall
Sat. Peak Hour Trip Rate	0.12 per stall	0.12 per stall	0.24 per stall

It should be noted that Langan engineering did not conduct counts at the Jersey Avenue train station for the Saturday peak hour. Therefore, 50% of the average trip rate for the AM and PM peak hour rates was used to determine the trip rate for the Saturday peak hour. This is a conservative estimate and will create a “worst case analysis” for the Final Build analysis.

The following summarizes the trip generation characteristics for NBTOD & Prestige. Refer to Appendix E for Specific Trip Generation calculations.



## **NBTOD Site Generated Trips**

### ***Site Generated Trips for NBTOD (without trip reductions)***

**Tables 2 & 3** tabulate the site generated trips for **Phase 1 & Final Build**, respectively, prior to trip reductions being applied.

**Table 2 - Site Generated Trips for NBTOD - Phase 1 (Before Trip Reductions)**

Description	Trip Gen. Source	Units	AM Peak Hour	PM Peak Hour	Sat. Peak Hour
Big-Box Retail	ITE LU 820	590,000 SF	439	2,090	2,716
Restaurant					
Main Street Retail & Kiosks					
Hotel	ITE LU 310	160 Units	73	94	115
Rental Residential Units	ITE LU 220	255 Units	129	158	124
<b>Total Trips:</b>			<b>641</b>	<b>2,342</b>	<b>2,955</b>

**Table 3 - Site Generated Trips for NBTOD - Final Build (Before Trip Reductions)**

Description	Trip Gen. Source	Units	AM Peak Hour	PM Peak Hour	Sat. Peak Hour
Big-Box Retail	ITE LU 820	678,000 SF	476	2,293	2,973
Restaurant					
Main Street Retail & Kiosks					
Hotel	ITE LU 310	160 Units	73	94	115
Rental Residential Units	ITE LU 220	775 Units	383	444	337
Ownership Res. Units	ITE LU 230	1,100 Units	352	429	362
General Office	ITE LU 710	195,000 SF	320	297	64
Park & Ride Facility (P & R)	Langan	4,000 Stalls	2,280	1,280	890
<b>Total Trips:</b>			<b>3,888</b>	<b>4,855</b>	<b>4,760</b>

### ***Trip Reductions for NBTOD***

The site generated trips tabulated within Tables 2 & 3 are those trips that would exist if each land use were developed completely independent of each other. However, as these land uses will be developed adjacent to each other, there will be interaction between them, creating a net reduction of site generated trips distributed to the adjacent street network. They are described and tabulated as follows:



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## Internal Trip Capture

Generally, within mixed-use developments a percent of trips attracted to retail and office uses, from residential uses are made internally. This interaction will result in a decrease of external trips impacting the adjacent road network.

For example, there will likely be trips which will originate from the residences located within NBTOD that are destined for the office or retail located within the same development. Although there would be trips generated by each land use, neither the trip departing the residence, nor the trip arriving to the office will impact the adjacent roadway network. To account for this interaction between on-site land uses, ITE has published a methodology known as **internal trip capture**.

ITE has published studies of existing multi-use sites in the *Trip Generation Handbook, an ITE Recommended Practice, March 2001*. In this publication, ITE publishes a specific methodology to estimate the number of site generated trips which are internal to the site and **do not affect the adjacent road network**.

In the studies conducted by ITE, surveys were completed to determine the percent of vehicles entering the site from a similar on-site land use, a different on-site land use (if so, defined) and external locations. In a reverse fashion, the same data was collected for trips exiting the site, instead asking for their destination. Based on these results, internal trip capture rates were determined for the retail, office and residential land uses. For internal trip capture to occur, at least two of the three land uses must be present. Therefore, internal trip capture will take place during Phase 1 and Final Build of NBTOD. For reference, the appropriate sections from the handbook are included in **Appendix E** which defines the methodology in greater depth.

ITE publishes known data for the weekday mid-day peak hour and PM peak hour to account for internal trip capture. Due to the lack of internal trip capture data available for the Saturday peak hour, the weekday mid-day peak hour was applied.

## Pass-By Trips

Pass-by trips are trips which are not made for the sole purpose of visiting the proposed development, and are currently present within the existing traffic volumes. For the purposes of this study, a pass-by trip would be a motorist whose existing commuting route makes use of Route 1. After the development is constructed, this motorist may elect to make an intermediate shopping trip while conducting his/her normal commuting trip at the subject development. This trip is not 'new' to the roadway network, as it has already existed prior to the development being constructed. The only impact that this trip would have to the road network would be its use of the proposed site drive. These trips are known as **Pass-By Trips**. Refer to **Appendix E** for the appropriate ITE literature defining pass-by trips.



In the *ITE Trip Generation Handbook, an ITE Recommended Practice, March 2001*, ITE has published pass-by rates for individual land uses. These rates are published as a percentage of the total site generated traffic, after credit for internal trip capture as defined above, has been taken. They are based on numerous site studies where surveys were conducted to determine if the trip was a primary destination or an intermediate trip.

As one would reasonably expect, pass-by trips are not typically associated with the office or residential land uses. Therefore, pass-by reduction has only been taken for the retail portion of the proposed developments.

### **Mass-Transit Trip Capture**

The transit facility proposed for the Final Build of the development will create an additional opportunity for site generated trips to be eliminated from the adjacent roadway network. A resident leaving the development and traveling to another train station, will be able to utilize the new train station, reducing the impact to the adjacent roadway network. Likewise, workers commuting to the proposed office will have the opportunity to arrive via the new train station.

The reduction in site generated trips has been quantified within an article prepared by M.G.P. Stringham within the ITE journal. This article studied train stations, where residential and office uses were concentrated around the station. Persons utilizing the train station were asked the approximate distance they live from the station and the primary travel mode between the station and place of residence or work.

This allowed a correlation between the distance to transit and mode of transportation to be established. Based on an average walking distance of 1,500 feet from the proposed train station to the residences and offices located within the development there will be a 50% reduction of site generated trips associated with residences (Apartments & Single Family), and a 15% reduction of site generated trips associated with the office use. **Figure 4** depicts the referenced chart and reductions. Refer to **Appendix E** for the full article.

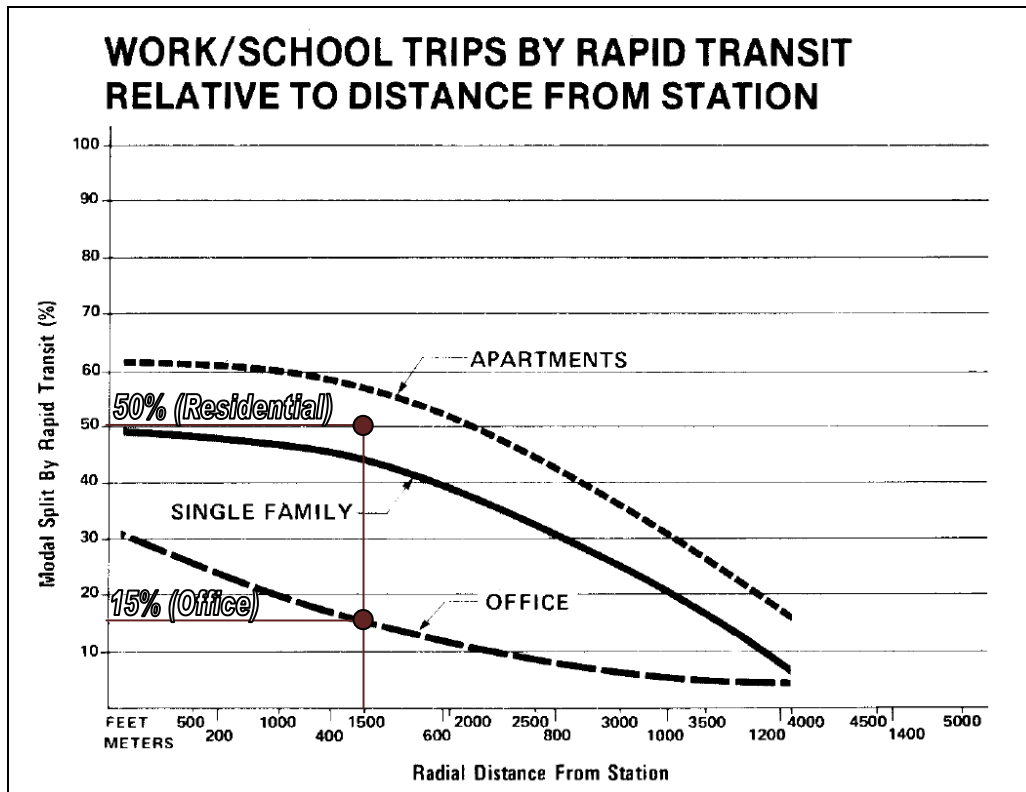


Figure 4 - Modal Split vs Distance to Transit Service (Stringham 1982)

In addition to the mass-transit reduction, a portion of the motorists currently traveling on Route 1 NB to arrive at the Jersey Avenue Train station, will now travel to the North Brunswick station as a matter of convenience. It is anticipated that this will occur for a total of 20% of the site generated trips associated with the Park & Ride facility.



### ***Net Site Generated Trips for NBTOD***

**Tables 4 & 5** tabulate the net site generated trips after trip reductions, as outlined for Phase 1 and Final Build. These are the 'new' site generated trips anticipated to impact the adjacent street network after development.

**Table 4 - Site Generated Trips for NBTOD - Phase 1 (After Trip Reductions)**

Description	AM Peak Hour		PM Peak Hour		Sat. Peak Hour	
	%	Trips	%	Trips	%	Trips
Total Site Generated Trips (Table 2)		641		2,342		2,955
<i>Internal Trip Capture (Retail)</i>	0%	0	-3%	-62	-2%	-44
<i>Internal Trip Capture (Residential)</i>	0%	0	-3%	-62	-2%	-44
<i>Pass-By Trips (Retail)</i>	0%	0	-20%	-471	-22%	-653
<b>Total Trips After Reductions:</b>		<b>641</b>		<b>1,747</b>		<b>2,214</b>

**Table 5 - Site Generated Trips for NBTOD - Final Build (After Trip Reductions)**

Description	AM Peak Hour		PM Peak Hour		Sat. Peak Hour	
	%	Trips	%	Trips	%	Trips
Total Site Generated Trips (Table 3)		3,888		4,855		4,760
<i>Internal Trip Capture (Retail)</i>	0%	0	-5%	-264	-4%	-177
<i>Internal Trip Capture (Residential)</i>	0%	0	-5%	-242	-4%	-177
<i>Internal Trip Capture (Office)</i>	0%	0	-1%	-24	0%	0
<i>Pass-By Trips (Retail)</i>	0%	0	-9%	-452	-13%	-624
<i>Mass-Transit Trip Reduction (Residential)</i>	-10%	-370	-7%	-325	-6%	-271
<i>Mass-Transit Trip Reduction (Office)</i>	-1%	-48	-1%	-41	-0%	-10
<i>Mass-Transit Trip Relocation (P &amp; R)</i>	-12%	-456	-5%	-256	-0%	-0
<b>Total Trips After Reductions:</b>		<b>3,014</b>		<b>3,251</b>		<b>3,501</b>



### Site Generated Trips for BJs

The proposed BJs will be located south of the Regal Cinema and existing vacant shopping center, between Aaron Road & Commerce Boulevard. BJs will require that approximately 12,500 SF of the existing vacant shopping center be eliminated so that the 106,000 SF BJs Wholesale club can be erected.

The existing shopping center and proposed BJs will operate as one large shopping center when fully occupied. Therefore, the site generated trips due to the BJs has been determined by comparing the existing and proposed trip generation characteristics for the site as a whole, before and after the occupation of BJs. **Table 6** tabulates the trip characteristics for the existing and proposed conditions.

**Table 6 - Site Generated Trips for Prestige Development (Before Trip Reductions)**

Description	Trip Gen. Source	Units	AM Peak Hour	PM Peak Hour	Sat. Peak Hour
<b>EXISTING</b> Vacant Shopping Center	ITE LU 820	57,587 SF	111	440	599
<b>PROPOSED</b> BJs & Shopping Center	ITE LU 820	151,087 SF	196	839	1,121
<b>Site Generated Trips due to BJs*:</b>			<b>85</b>	<b>399</b>	<b>522</b>

\*Calculated as the difference between the Existing and Proposed Trip Generation Characteristics

Similar to the NBTOD development, Pass-By Trips are applicable to the Prestige Development. **Table 7** tabulates the Pass-By trips for the existing and proposed conditions, as well as the increase in pass-by trips.

**Table 7 - Pass-By Trips for Prestige Development**

Description	AM Peak Hour		PM Peak Hour		Sat. Peak Hour	
	%	Trips	%	Trips	%	Trips
<i>Pass-By Trips for Existing SC:</i>	0%	0	-46%	-201	-37%	-223
<i>Pass-By Trips for Proposed SC &amp; BJs:</i>	0%	0	-34%	-289	-35%	-392
<b>Pass-by Trips due to BJs:</b>	<b>0</b>		<b>-88</b>		<b>-169</b>	
<b>Net Increase of Site Generated Trips due to BJs:</b>	<b>85</b>		<b>314</b>		<b>353</b>	



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## **V. TRIP DISTRIBUTION**

The distribution of the site generated trips has been determined by preparing four (4) gravity models.

A gravity model is a scientific tool used to assess the distribution of traffic within the market area considering the existing road network, demographics for each boundary within the market area, frictional factors (travel time or distance between the geographic center of each boundary to the proposed site) and socioeconomic factors such as household income. However, socioeconomic factors are difficult to determine and are generally not utilized for operational level gravity models, such as those prepared for this analysis.

Each gravity model has been disaggregated by municipal boundaries within the market area. Municipalities which are bisected by the market area boundary have been adjusted to utilize the portion of the municipality which is located within the market area.

The basic theory which governs the gravity model is that as the travel time between each municipality and the project site increases, there is less likelihood of a trip being attracted to the site. This becomes specifically true in New Jersey, as the state is generally highly urbanized, and there are many shopping opportunities throughout the state.

The travel times from the geographic center of each municipality within the market area to the project site were obtained using Google Maps. It is understood that there may be variations between the travel times obtained from Google and those which would be observed in real world travel time studies, however, it is expected that the variation will be uniform throughout all of the obtained travel times, therefore, nullifying any variation which may be encountered.

Four separate market areas have been determined to be relevant for the site. A five (5) mile market area was used for the retail portion of the development, and is based on population location within the market area. A twenty (20) mile market area, based on population distribution throughout the market area, has been prepared to distribute the general office. Another twenty (20) mile market area, based on job location, has been prepared to distribute the trips generated by the proposed residences. The fourth gravity model was prepared specifically for the Park & Ride facility. This gravity model takes into account adjacent park & ride facilities, and density of service north and south of the proposed project site.

The total population for each municipality located within the market area was obtained from demographic data published by the US Bureau of Statistics. The number of jobs available within each municipality was obtained from the Census Transportation Planning Package (CTPP), Part 3. CTPP is a traffic planning tool prepared by the US Department of Transportation.





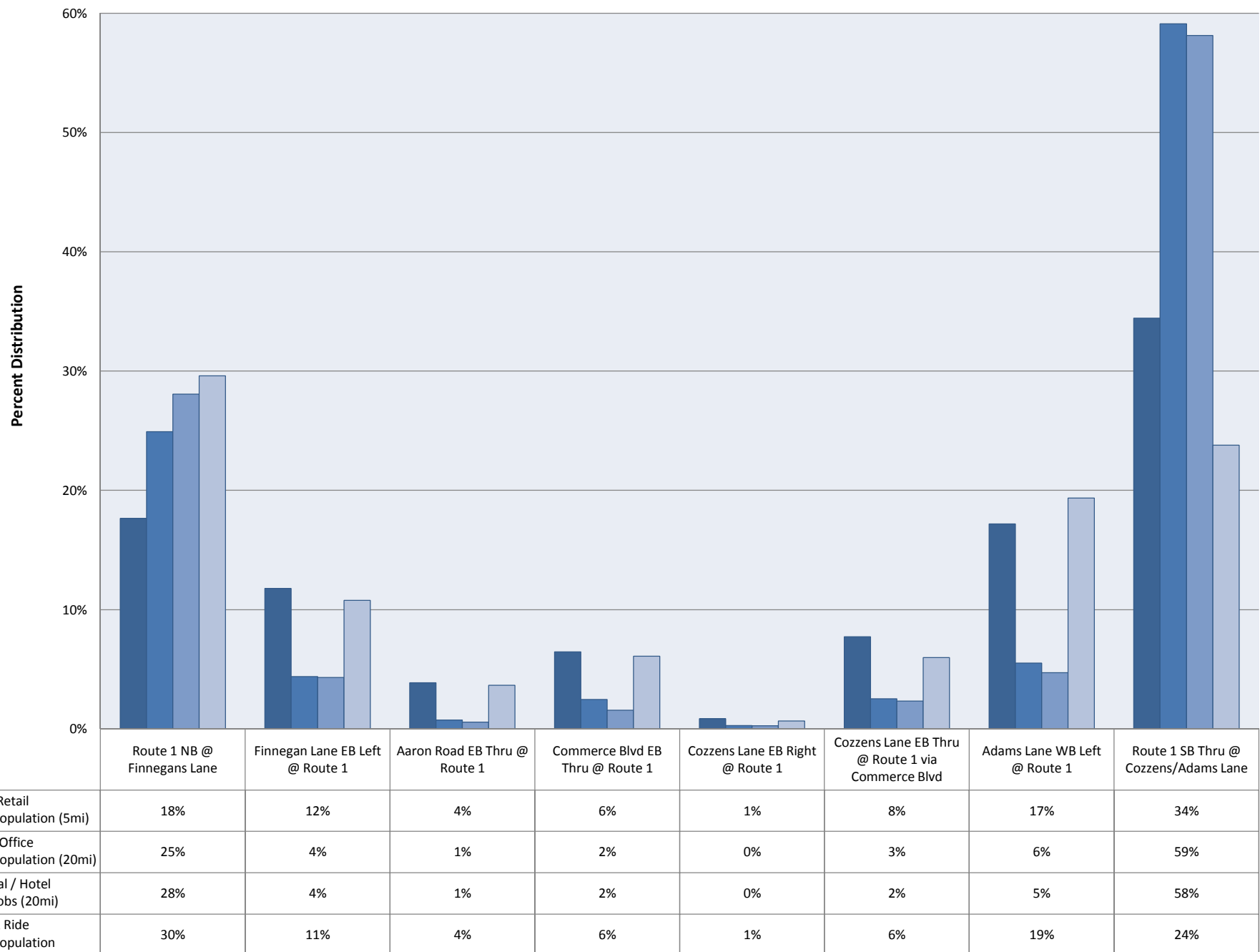
The route taken from each municipality to arrive to the project site was determined by conducting a thorough review of the network to determine the most appropriate routes to be used. For each scenario, there may be multiple approaches which may be used to the site. For example, those trips arriving from Franklin Township may utilize Cozzens Lane, Finnegans Lane, Henderson Road or Route 1 NB. This kind of variability of arrival/departure patterns has been included within the analysis by assigning percentages to each relevant approach.

A detailed calculation sheet for each gravity model prepared, summarizing all assumptions, including travel patterns between municipalities, and travel times to and from the site are included in **Appendix F**.

There are several approaches to the study area that could be utilized to arrive to the project site, however **Figure 5** tabulates trip distribution for each gravity model via the most relevant approaches.

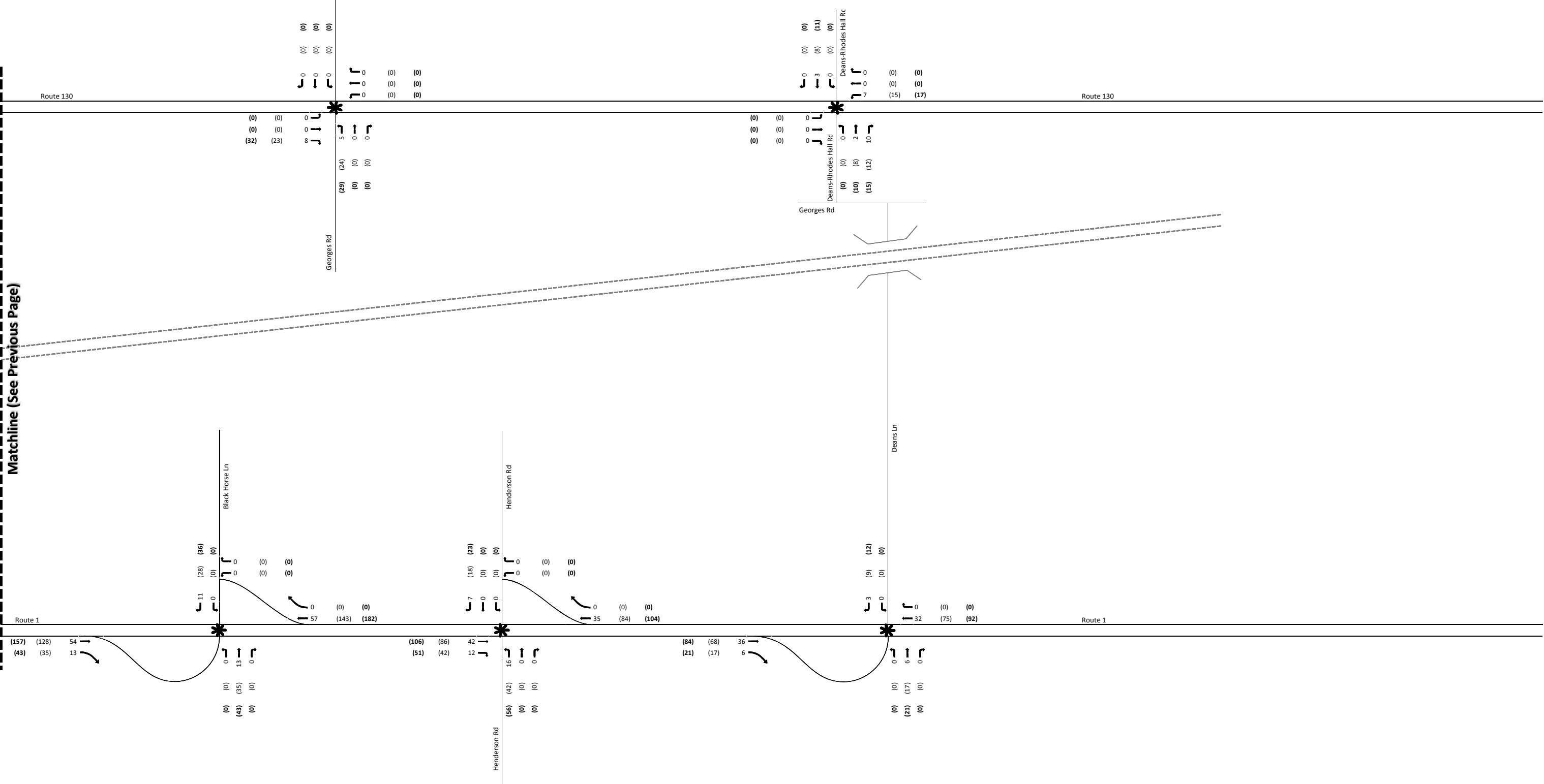
The trips have been assigned to the driveways for NBTOD based on a 50/50 split between the Commerce Blvd and Aaron Road when arriving from the North and 20/80 distribution respectively when arriving from the south. The distribution of Prestige Development trips varies slightly due to the availability of right-in/right-out drives along Route 1 SB. Trip distribution volume flow diagrams are included within **Appendix A**.

The site generated trips, distributed to the adjacent roadway network, based on the gravity models, are depicted in **Figures 6, 7, & 8** for the NBTOD Phase 1/Prestige Development and Final Build conditions, respectively.

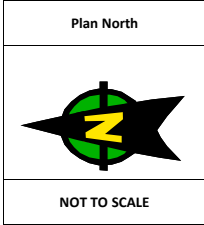




Matchline (See Previous Page)



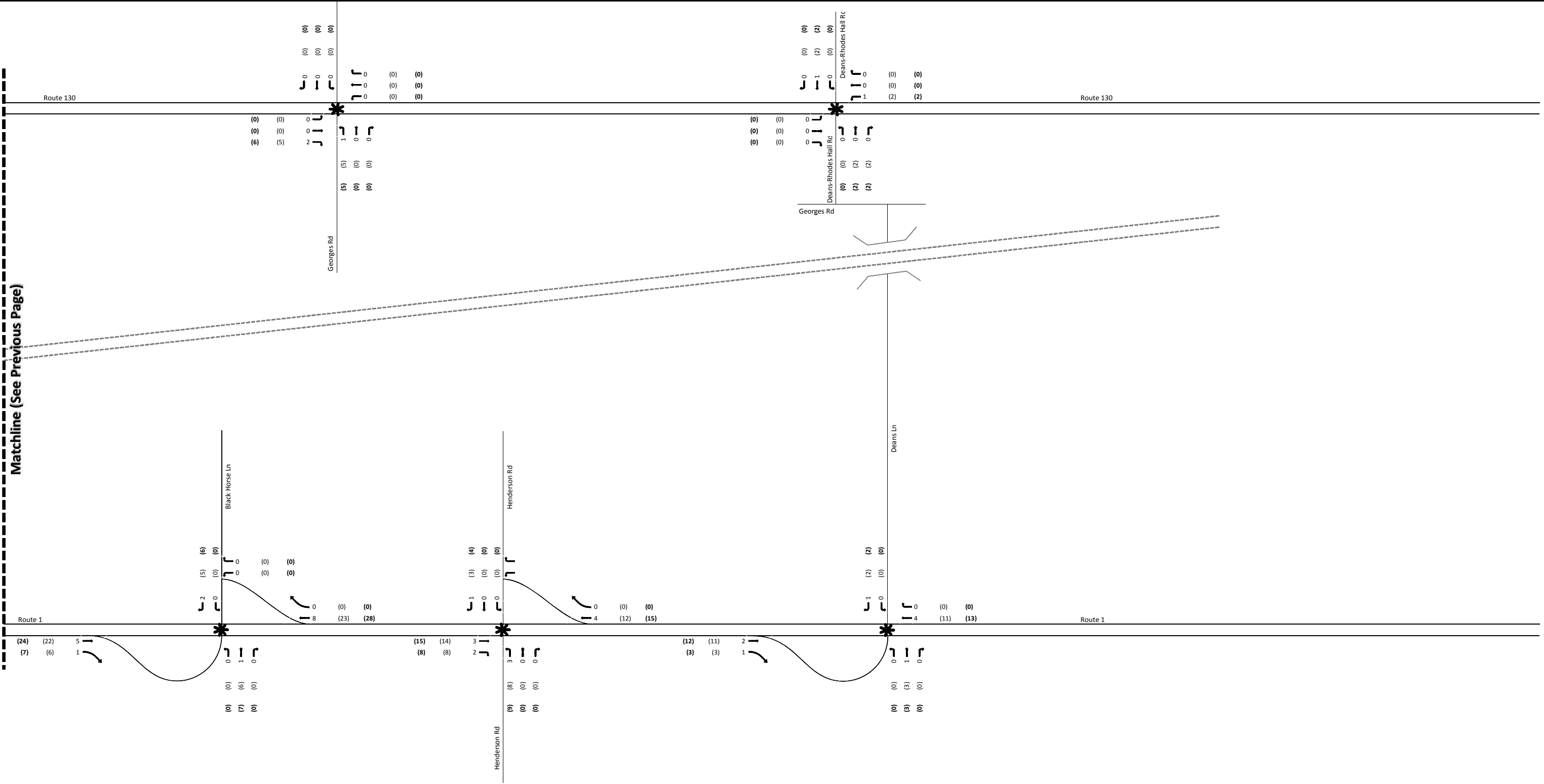
Legend	
XX	AM Peak Hour Trips
(XX)	PM Peak Hour Trips
(XX)	SAT Peak Hour Trips
—	Existing Road Network
*	Existing Traffic Signal



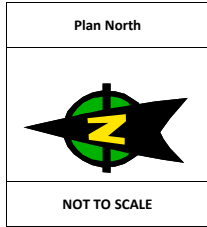
<b>Figure 6B</b>
Site Generated Trips for NBTOD Phase 1
NBTOD Traffic Study



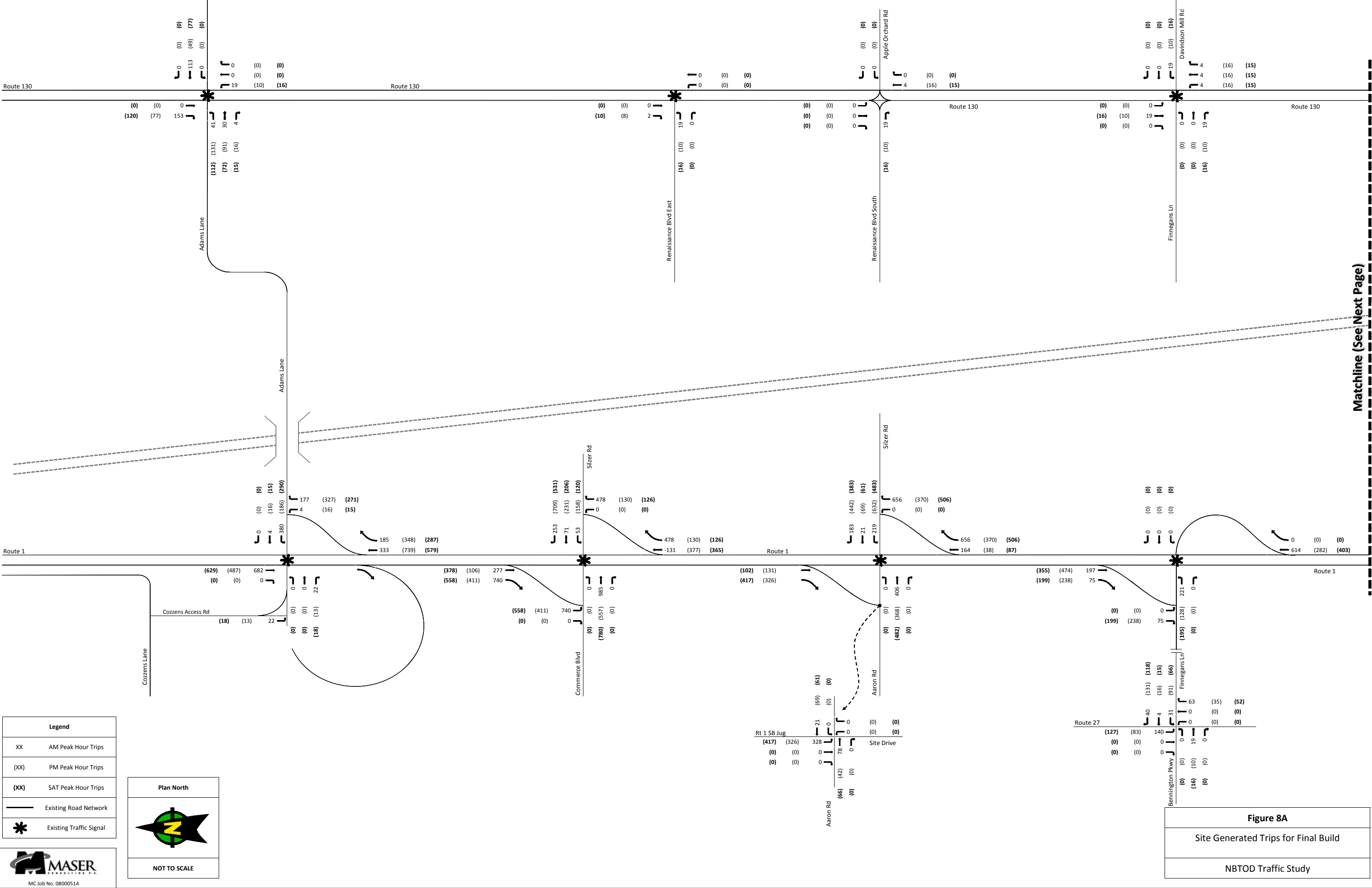
Matchline (See Previous Page)



Legend	
XX	AM Peak Hour Trips
(XX)	PM Peak Hour Trips
(XX)	SAT Peak Hour Trips
—	Existing Road Network
*	Existing Traffic Signal



**Figure 7B**  
New Site Generated Trips due to BJs  
NBTOD Traffic Study



Legend	
XX	AM Peak Hour Trips
(XX)	PM Peak Hour Trips
(XX)	SAT Peak Hour Trips
	Existing Road Network
	Existing Traffic Signal

Plan North

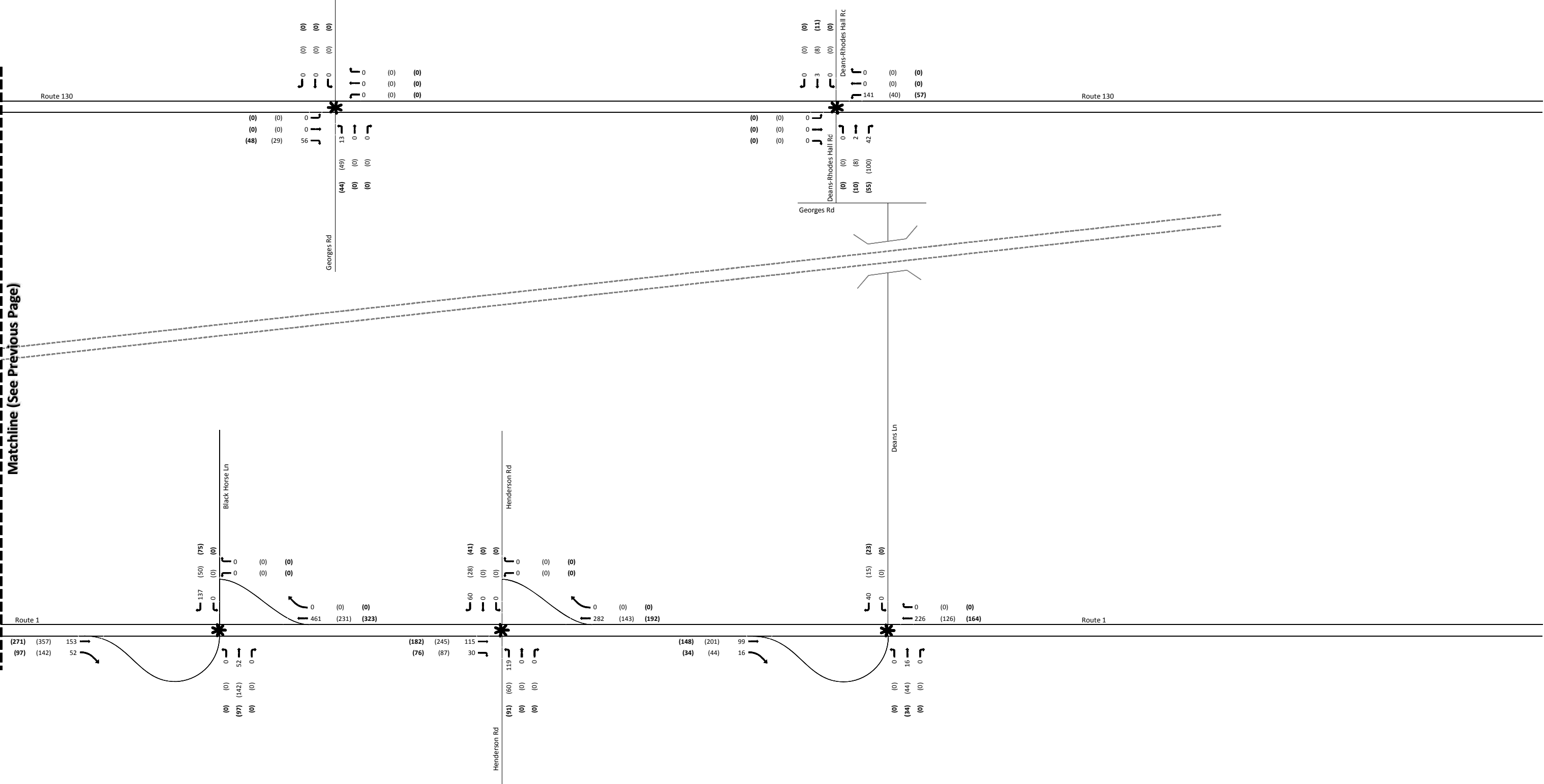
NOT TO SCALE

Figure 8A

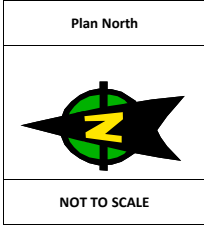
Site Generated Trips for Final Build

NBTOD Traffic Study

Matchline (See Previous Page)



Legend	
XX	AM Peak Hour Trips
(XX)	PM Peak Hour Trips
(XX)	SAT Peak Hour Trips
—	Existing Road Network
*	Existing Traffic Signal



<b>Figure 8B</b>
Site Generated Trips for Final Build
NBTOD Traffic Study





## VI. FUTURE CONDITIONS

The future traffic conditions for the adjacent street traffic have been determined for the build years of the development. Phase 1 is anticipated to be constructed in 2012, and the Final Build in 2017. Future conditions consist of the 2009 existing traffic conditions, background growth, and the site generated trips distributed to the roadway network for the appropriate year.

### No-Build Traffic Conditions

The New Jersey Department of Transportation (NJDOT) publishes annual growth rates that are to be utilized to determine the future traffic conditions of the adjacent street traffic for periods of three (3) years or less. Therefore, the NJDOT background growth rate has been utilized for the 2012 analysis.

Based on the NJDOT background growth rate table, which is contained within **Appendix E** of this report, an annual growth rate of 2.00% is to be applied to Urban Principal Arterials, Urban Minor Arterials, and Urban Local Roadways within Middlesex County.

The use of the NJDOT background growth rate table is not appropriate for the 2017 No-Build Traffic Conditions due to the length of time until the Final Build is achieved. To determine the background growth for the 2017 Baseline Traffic Conditions, the population forecast of the region was obtained from the local Metropolitan Planning Organization, also known as the North Jersey Transportation Planning Authority (NJTPA). NJTPA has prepared a population forecast for the region through the year 2035.

The population for the year of 2017 was extrapolated using the 2008 Census Estimate, as published by the US Bureau of the Census, and 2035 forecasts, which are based on the same census data. The anticipated annual growth corresponding to the year 2017 in North Brunswick and the surrounding municipalities is tabulated in **Table 8**.

**Table 8 - 2017 Background Growth Rate Determination**

Location	2008 Pop.	2035 Pop.	2017 Pop.	Absolute Growth	Percent Growth	Annual Growth Rate
North Brunswick	39,586	46,950	42,041	2,455	6.20%	0.67%
South Brunswick	41,089	58,970	47,049	5,960	14.51%	1.52%
East Brunswick	47,279	63,450	52,669	5,390	11.40%	1.21%
New Brunswick	51,149	73,150	58,483	7,334	14.34%	1.50%
Franklin	59,417	72,400	63,745	4,328	7.28%	0.78%
Average:					10.75%	1.14%



Based on Table 8, the average population growth of the surrounding municipalities will be approximately 10.75% from 2008 to 2017, which corresponds to an annual growth rate of 1.14%. As a conservative measure, an annual growth rate of 1.50% was applied uniformly to the 2009 Baseline Conditions to determine the 2017 Baseline Traffic Conditions.

### **Adjacent Development**

In addition to considering the background growth, adjacent developments anticipated to be operational must also be considered. The existing vacant Prestige Development located adjacent to the proposed site for BJs will generate trips once occupied. However, as it is already constructed and approved, the trips associated with this development must be accounted for within the No-Build Traffic Conditions.

The trips for this development, without BJs, have already been generated within a previous section of this report. These volumes, distributed to the roadway network in an identical fashion as the proposed Prestige Development, have been added to the No-Build Traffic Conditions for 2012 and 2017.

The 2012 and 2017 No-Build traffic volume flow diagrams are included within **Appendix A**.

### **Full-Build Traffic Conditions**

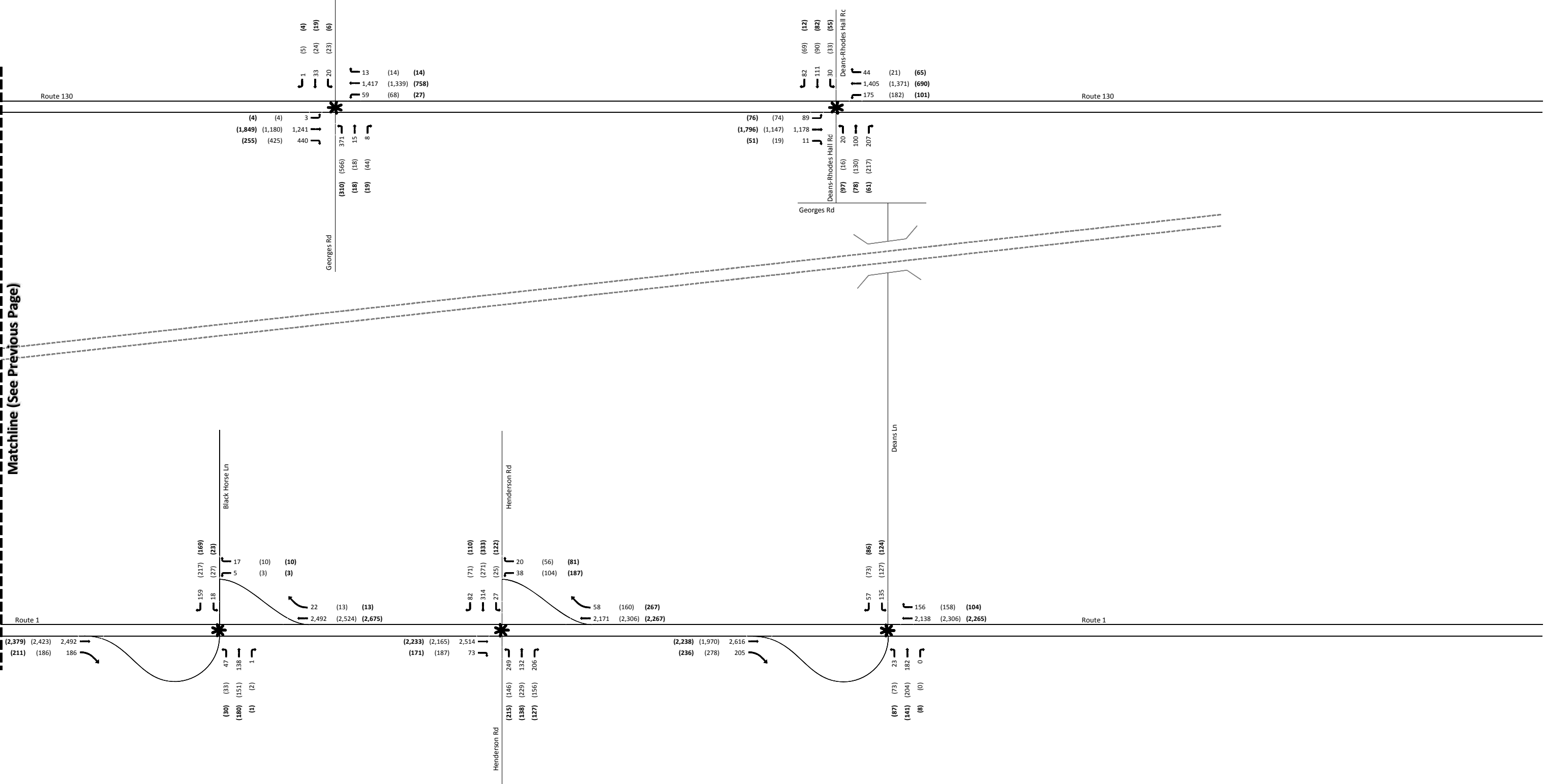
The full-build traffic conditions represent the traffic conditions anticipated to exist when the development is fully constructed and occupied, for each respective phase. They are created by combining the 2012 and 2017 No-Build Traffic Conditions with the Site Generated Trips for NBTOD Phase 1/BJs and Final Build scenarios.

**Figure 9** depicts the 2012 Full-Build Traffic Conditions for NBTOD Phase 1 and BJs.

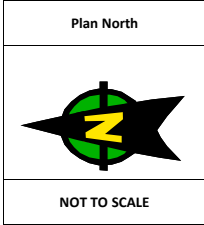
**Figure 10** depicts the 2017 Final Build traffic conditions.



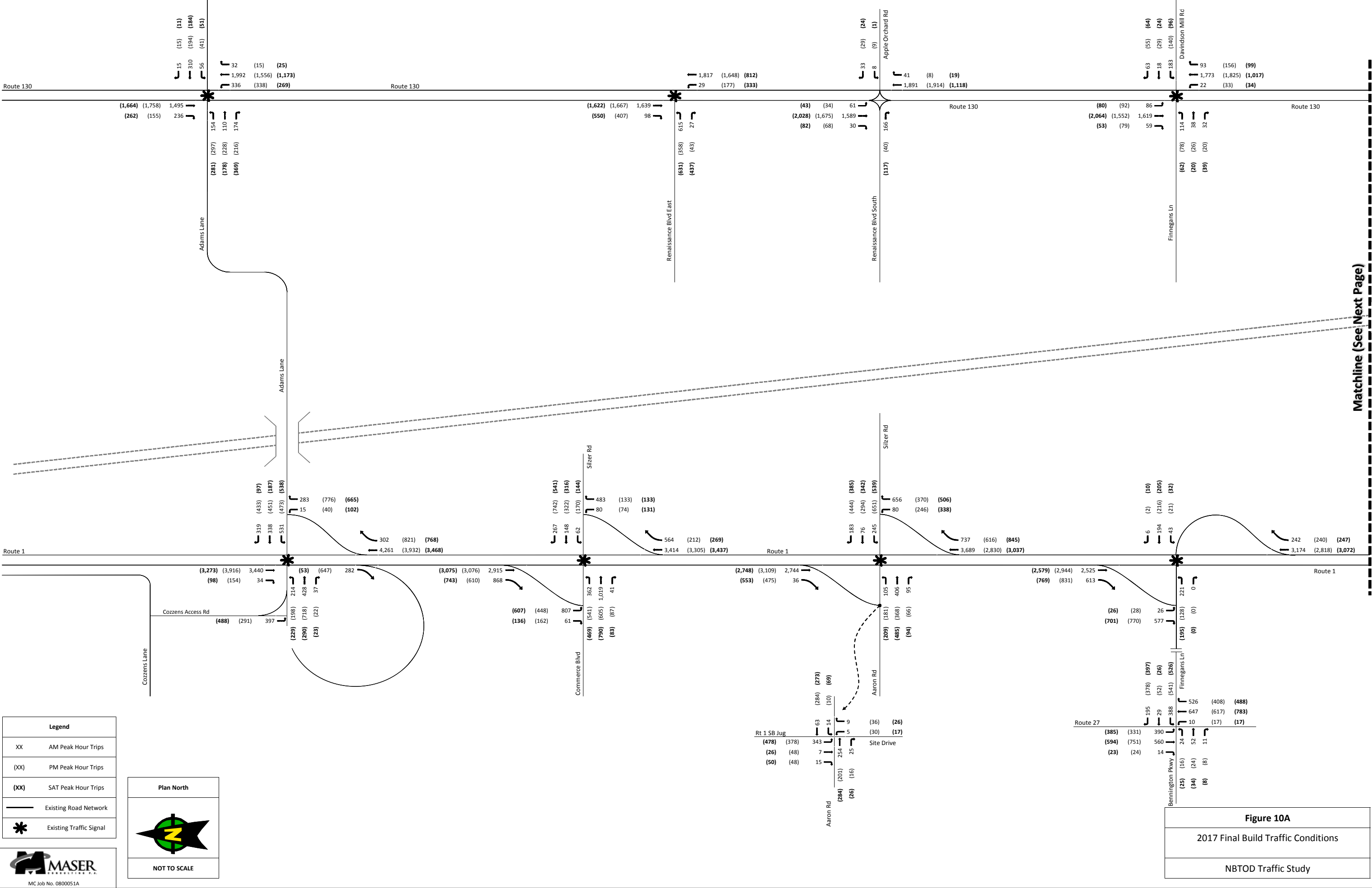
Matchline (See Previous Page)



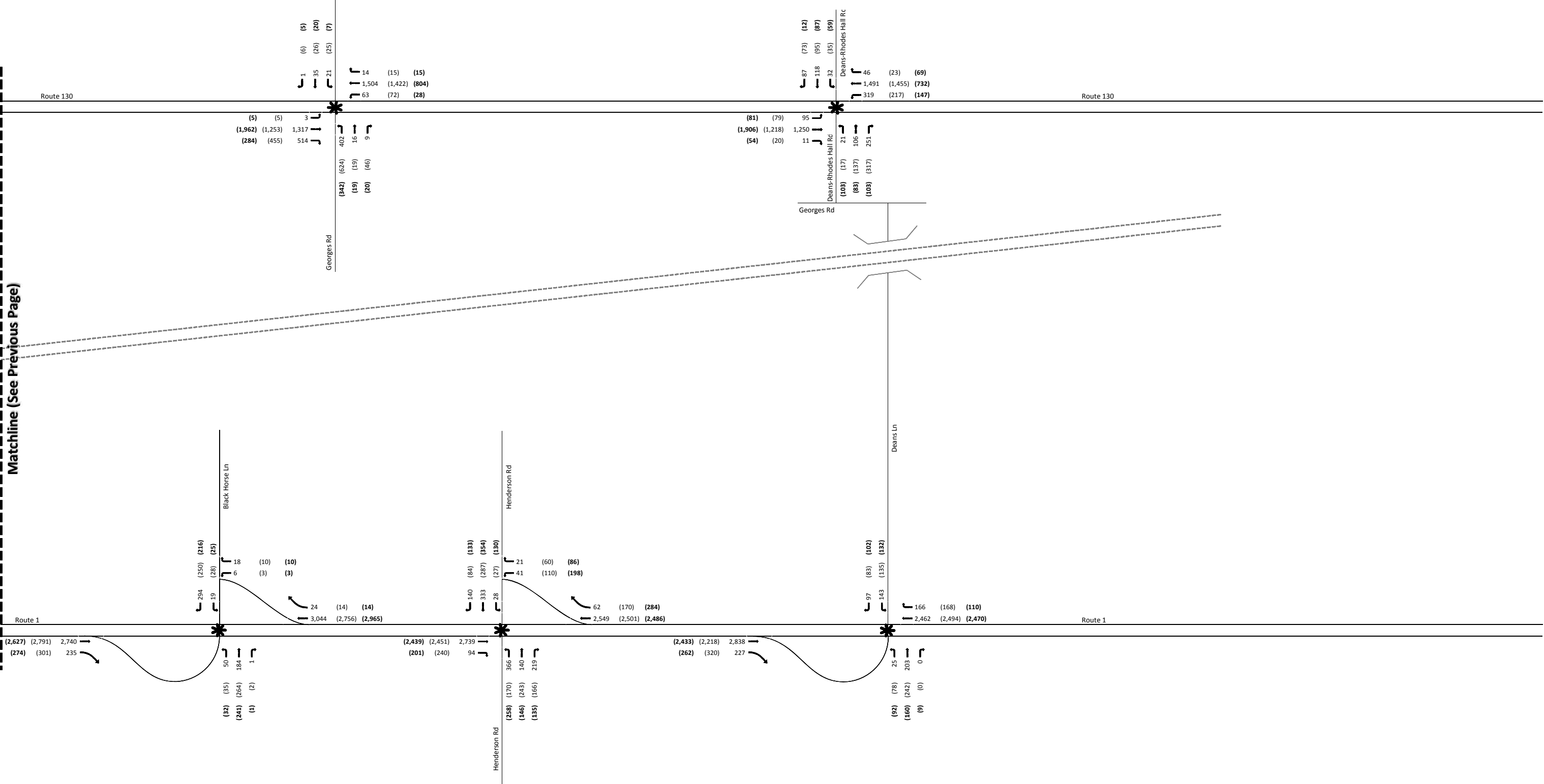
Legend	
XX	AM Peak Hour Trips
(XX)	PM Peak Hour Trips
{XX}	SAT Peak Hour Trips
—	Existing Road Network
*	Existing Traffic Signal



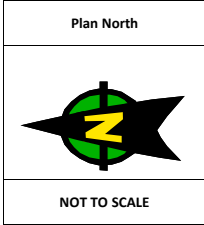
**Figure 9B**  
2012 Full-Build Traffic Conditions  
NBTOD Traffic Study



Matchline (See Previous Page)



Legend	
XX	AM Peak Hour Trips
(XX)	PM Peak Hour Trips
(XX)	SAT Peak Hour Trips
—	Existing Road Network
*	Existing Traffic Signal



**Figure 10B**  
2017 Final Build Traffic Conditions  
NBTOD Traffic Study



## VII. CAPACITY ANALYSIS

Capacity analyses have been conducted to assess the impact of the proposed development to the adjacent street network. The capacity analyses conducted for this report are based on the 2003 Highway Capacity Manual (HCM) which provides methodology in terms of determining Level of Service (LOS).

Levels of Service (LOS) are qualitative measures describing operational conditions within a traffic stream in terms of traffic characteristics such as freedom to maneuver, traffic interruption, comfort and convenience. The LOS of an intersection is determined by the computed control delay for each movement. Six (6) LOS are defined for signalized and unsignalized intersections. Levels of Service range from "A" through "F", with "A" representing excellent conditions with no delays, and failure or breakdown denoted by Level "F". The LOS criteria for unsignalized intersections are tabulated in **Table 9**.

Table 9 - HCM Level of Service Criteria

Level of Service (LOS)	Average Control Delay (sec/veh)	
	Unsignalized Intersections	Signalized Intersections
A	< 10 sec.	< 10 sec.
B	10 - 15 sec.	10 - 20 sec.
C	15 - 25 sec.	20 - 35 sec.
D	25 - 35 sec.	35 - 55 sec.
E	35 - 50 sec.	55 - 80 sec.
F	> 50 sec.	> 80 sec.

The analysis was performed using the latest version of Synchro v7. Synchro is a traffic analysis and simulation software which applies the standards and methodologies found in the HCM. The results provide Level of Service and average seconds of delay per vehicle for the intersection movements.

Capacity analyses have been conducted for the following traffic conditions:

- 2009 Existing Conditions (Baseline)
- 2012 No-Build Traffic Conditions
- 2012 Full-Build Traffic Conditions (NBTOD Phase 1/Prestige Development)



### **Summary of Level of Service Design Criteria & Assessment Approach**

The Township has created design criteria to be adhered to when assessing improvements to mitigate the impact of the developments within the study area. This criterion was established by the Township and are tabulated within **Table 10**.

**Table 10 - North Brunswick Design Criteria**

<b>No-Build LOS</b>	<b>After Development Requirement</b>
<b>E or Better</b>	<b>Maintain No-Build LOS</b>
<b>F</b>	<b>Improve No-Build LOS by at least 25%</b>

Maser Consulting performed an initial analysis and cost estimate in accordance with the North Brunswick design criteria published in **Table 10**. Based on that analysis and discussions with the Township Planning Board and Officials, it was determined that it is not economically feasible to require that NBTOD and Prestige construct all of the improvements needed to meet the North Brunswick criteria.

The County and State are each investigating improvements that would directly impact Route 1 & Finnegans Lane. The County is investigating a grade-separated interchange which would alleviate all existing congestion at this intersection, and mitigate the impact of the Phase 1 and Final Build of NBTOD. Concurrently, the State is investigating widening Route 1 from two (2) to three (3) lanes from between Aaron Road in North Brunswick to the Princeton area. As will be discussed on the following pages, the State improvements would meet the North Brunswick design criteria.

Therefore, the Township decided that due to the impending improvements at Route 1 & Finnegans Lane, the developers will not be required to construct improvements at this intersection prior to the rezoning of the subject sites. This would allow the developers to focus resources on other key intersections, without compromising the quality of improvements at such intersections.

To provide a complete analysis, the improvements required at the intersection of Route 1 & Finnegans Lane to meet the North Brunswick Design criteria are discussed below. However, it should be noted that these improvements will not be the responsibility of the Developers, but will be completed by State and/or County agencies as part of ongoing projects.

In general, for all of the study intersections, regardless of who is conducting the improvements, the North Brunswick LOS Criteria was used as a guideline. However, in certain situations, such as at the site driveways, it is not practical to fully comply with the criteria due to financial and physical constraints. At such intersections, the LOS was permitted to degrade beyond the





North Brunswick requirement. This methodology has been discussed with the Township and found to be acceptable.

It should be noted that the North Brunswick LOS criteria presented above exceeds the requirements of the New Jersey Department of Transportation (Department). Therefore, in general, where the North Brunswick LOS criteria is met, the requirements as published by the New Jersey Highway Access Code (NJAC) will also be met.

### **2012 Phase 1 Analysis**

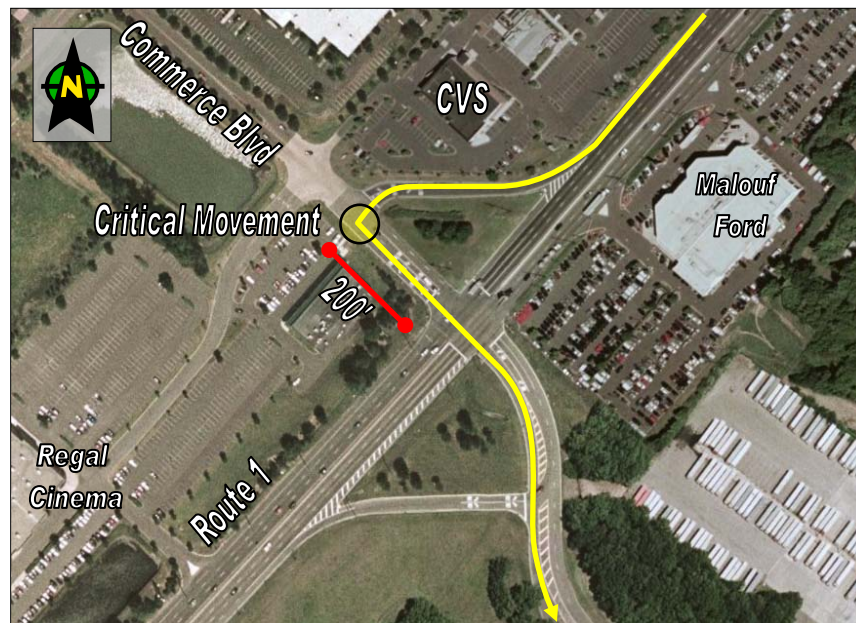
The 2012 NBTOD Phase 1/Prestige Development analysis accounts for Phase 1 of the NBTOD development and the increase of trips due to BJ's for the Prestige Development. The Level of Service for each intersection, approach and movement, has been determined as per HCM guidelines. All HCM Data Summary Sheets are included within **Appendix H** for each intersection.

Due to the coordinated signal system along Route 1 extending outside of the study area, it is not feasible to modify the cycle length of the signal within the study area. Therefore, modifying the cycle length has not been considered.



### **Route 1 & Commerce Blvd**

Due to the location of the development, trips arriving via Route 1 SB must use the near-side jughandle at Commerce Boulevard, make a left turn, and travel through to the site. **Figure 11** depicts this movement. As shown in Figure 11, there is a storage length of approximately 200'. When Phase 1 of the development is fully occupied, this storage will become fully utilized, preventing motorists from making a left turn onto Commerce Blvd from the near-side jughandle. This will create a 'grid-lock' condition where vehicles looking to enter the development will queue onto Route 1.



**Figure 11 - Entering Site Movement @ Commerce Blvd w/o Improvements**

To accommodate the increased demand on the near-side jughandle, it is recommended that a far-side jughandle be constructed to increase queuing capacity and eliminate the conflicting left turn movement. The existing near-side jughandle would be converted to a channelized right turn with deceleration. Two primary options exist, each with their positives and negatives.

**Option 1** for the far-side jughandle would require that the existing shopping center containing Bertuccis be acquired and the parking field for Regal Cinemas be reduced. **Figure 12** depicts Option 1 for the far-side jughandle.

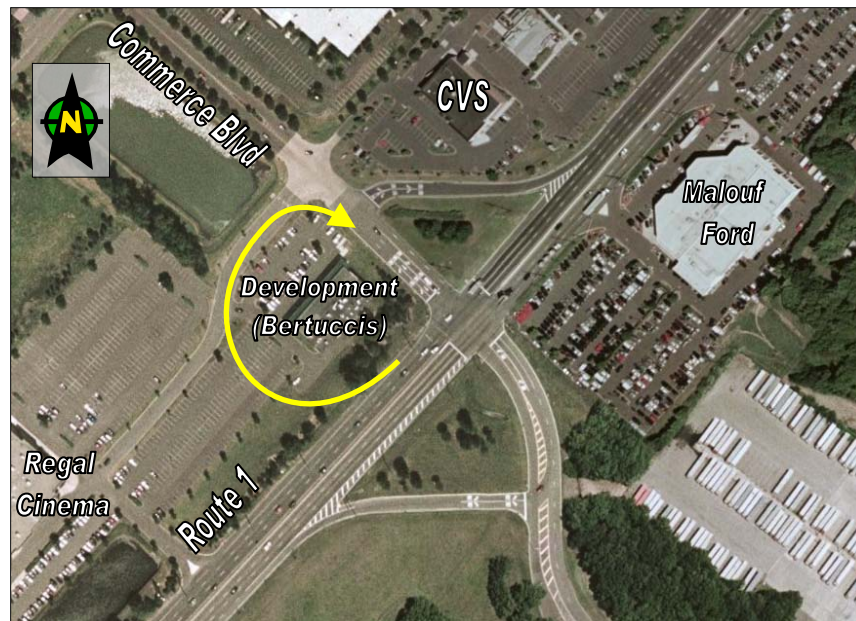


Figure 12 - Option 1 for Far-Side jughandle @ Commerce Blvd

**Option 2** for the far-side jughandle would make use of the existing internal cartways associated with Regal Cinema and reconstruct them as an Urban Style Jughandle. Option 2 would also provide more storage capacity. Urban Style Jughandles are commonly found throughout the State, and are generally accepted.

In contrast to Option 1, Option 2 would allow the shopping center and parking field to remain intact. However, Option 2 may isolate a parking field which is occasionally utilized for the movie theatre. More commonly, it is utilized by customers of the shopping center containing Bertuccis. **Figure 13** depicts Option 2.

To gain a better understanding of how that parking field is utilized, Maser Consulting visited the site on a Friday afternoon to observe parking utilization and speak with operators of Regal Cinema. We asked to speak with a manager and we were greeted by Mr. Douglas Mumma. Mr. Mumma stated that the typical peak time for the cinema is from 7-10 PM. Additionally, Mr. Mumma stated that the parking fields fronting the development and to the side become occupied first. He further indicated that the field in question typically becomes busy only during special events such as widely anticipated movie premieres. Mr. Mumma's statements confirmed observations on site.

Additionally, it is not typical for a shopping center and movie theatre to operate at their peak coincidentally throughout the day. Typically, a movie theatre will peak in the evening from 7-10 PM, as stated by Mr. Mumma. However the peak hour for a shopping center is normally coincident with the peak hour of adjacent street traffic, which along Route 1 is from 4:30 PM to 5:30 PM. Therefore the peak for the two establishments will not overlap.



Both Options 1 and 2 would function similarly, however Option 2 would reduce the cost of ROW acquisition. Therefore, it is recommended that Option 2 be constructed.

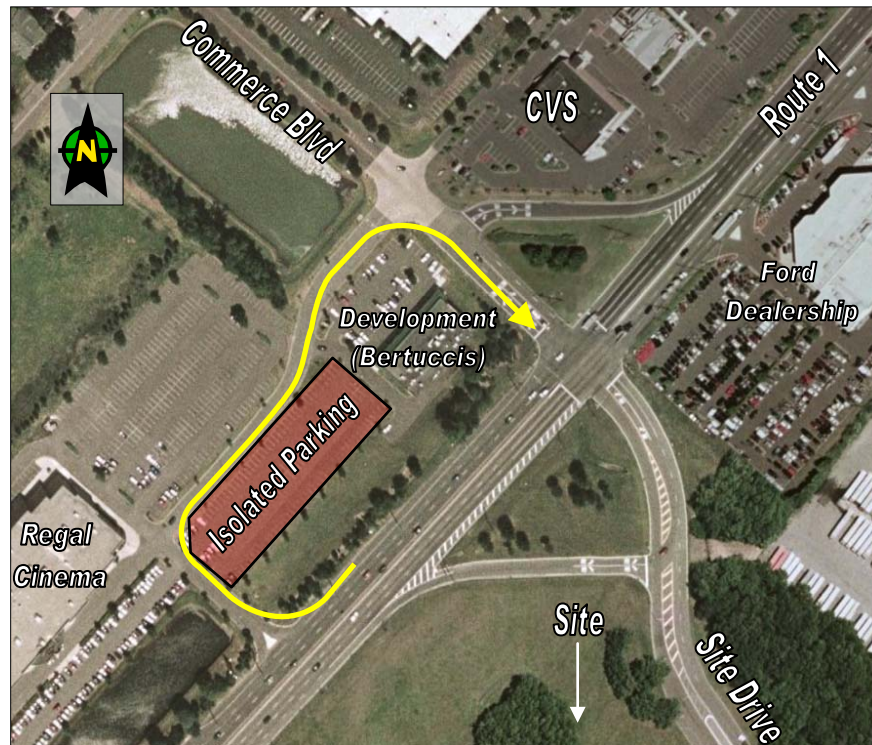


Figure 13 - Option 2 for Far-Side Jughandle @ Commerce Blvd

During the 2012 No-Build Traffic Conditions, the Commerce Blvd EB left turn lane fails during the AM, PM and Saturday peak hours. The additional traffic generated by NBTOD will not directly impact the operation of the left turn lane. However, due to an increase of WB thru/left turns, there will be an indirect impact to the operation of the left turn lane since the protected green time for this movement will be reduced. The Prestige development will directly impact the EB left turn movement due to trips returning to the north.

The following summarizes the **improvements** for the 2012 NBTOD Phase 1/Prestige Development at Route 1 & Commerce Boulevard:

- Construct far-side jughandle for Route 1 SB (Option 2)
- Convert near-side jughandle to channelized right turn with deceleration lane for Route 1 SB
- South of Commerce Blvd
  - Convert shoulder for Route 1 SB to auxiliary lane for jug-handle
- North of Commerce Blvd
  - Widen Route 1 NB to provide acceleration lane for NBTOD exiting traffic
  - Convert shoulder for Route 1 SB to auxiliary lane for jug-handle





- Widen Commerce Blvd EB to provide the following:
  - Two (2) dedicated left turn lanes
  - Two (2) dedicated thru lanes
- Widen the site driveway (WB approach) to provide the following:
  - One (1) dedicated left turn lane
  - Two (2) dedicated thru lanes
  - One (1) dedicated right turn lane
- Reconstruct Signal

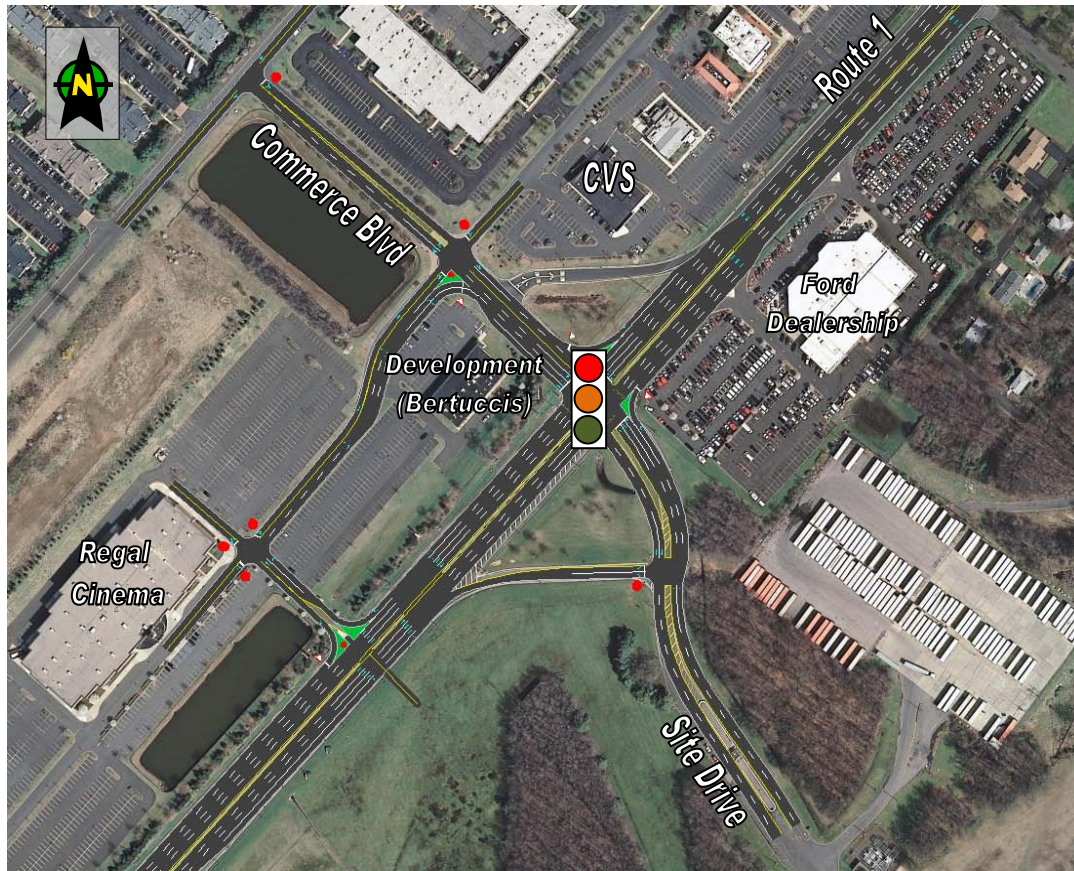


Figure 14 - 2012 Phase 1 Analysis Improvements @ Route 1 & Commerce Blvd

The following summarizes the **impact** to adjacent property for the 2012 Phase 1 Improvements at Route 1 & Commerce Boulevard:

- Access for Regal Cinema/Parking Fields to be modified
- Small Number of Parking stalls for Regal Cinema/Bertuccis Shopping Center to be eliminated
- Parking stalls for Malouf Ford along Route 1 NB to be eliminated



**Table 11** summarizes the overall level of service and the travel delay at the subject intersection for the 2012 No-Build Conditions and 2012 Full-Build Conditions (with improvements).

**Table 11 - 2012 Analysis LOS Results @ Route 1 & Commerce Blvd**

Overall Intersection LOS: Route 1 & Commerce Blvd			
Peak Hour	2012 No-Build LOS (Travel Delay)	2012 Full-Build w/Improvements LOS (Travel Delay)	Change in Travel Delay*
AM	D (52.4 sec.)	C (36.5 sec.)	-15.9 sec.
PM	D (49.6 sec.)	D (45.6 sec.)	-4.0 sec.
SAT	C (29.7 sec.)	D (43.6 sec.)	13.9 sec.

\*Negative Number Represents Desirable Change

As shown in **Table 11**, the LOS will be improved during the AM and PM peak hours. However, during the Saturday peak hour, the control delay will increase slightly from the No-Build condition, to operate at a LOS D. A LOS D is very desirable along Route 1, and although the delay will be increased slightly, the intersection will still operate efficiently.

#### ***Route 1 & Aaron Road***

Similar to the operation at Route 1 & Commerce Blvd, the demand for left turns off of the Route 1 NB/SB near-side jughandles cannot be accommodated by the existing storage lengths. Therefore it is necessary to modify each jughandle.

Due to the amount of traffic exiting NBTOD at Aaron Road, it is not feasible to maintain lefts from the Route 1 NB near-side jughandle regardless of how much storage can be provided. Therefore a far-side jughandle is required. To eliminate a weaving concern between right turns out of the development and the traffic from the proposed jughandle, it is recommended that the right turn be provided via a two-way jughandle ramp.

To provide additional storage for the Route 1 SB near-side jughandle, it is proposed to reconstruct the near-side jughandle, increasing the storage capacity between Aaron Road and Route 1 SB. This would require that the existing driveway for Aaron Plaza be relocated to the west side of the building. Approximately 3 parking stalls would be eliminated from Aaron Plaza. However, there may be an opportunity to relocate these stalls to the east side of the site after closing the existing driveway or converting it to one-way. Additionally, there may be an opportunity to share parking between Aaron Plaza and the adjacent farm market. It is recommended that a shared parking analysis be conducted to investigate such use.

**Figure 15** depicts the modification of the Aaron Road intersection.



Figure 15 - Modification of Aaron Road Intersection

The following summarizes the **improvements** for the 2012 Phase 1 Conditions at Route 1 & Aaron Road:

- Construct two-way far-side jughandle for Route 1 NB
- Reconstruct near-side jughandle to channelized right turn with deceleration for Route 1 NB
- Reconstruct near-side jughandle for Route 1 SB to increase storage length
- Shift intersection to North to reduce impact to Exxon Gas Station
- Convert shoulder/deceleration lane to auxiliary lane for Route 1 NB
- Widen Aaron Road EB to provide the following:
  - One (1) dedicated left turn lane
  - Two (2) dedicated thru lanes
  - One (1) dedicated right turn lane
- Widen the site driveway (WB approach) to provide the following:
  - Two (2) dedicated left turn lanes
  - Two (2) dedicated thru lanes
- Reconstruct Signal



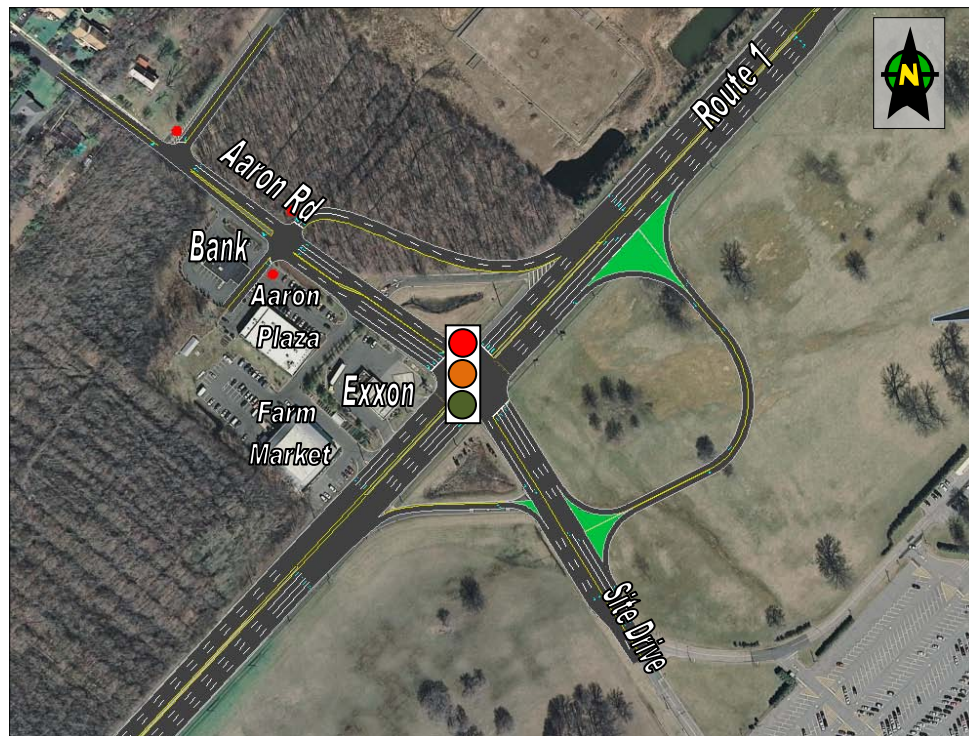


Figure 16 - 2012 Phase 1 Analysis Improvements @ Route 1 & Aaron Rd

The following summarizes the **impact** to adjacent property for the 2012 Phase 1 Improvements at Route 1 & Aaron Road:

- Wetlands in northwest quadrant of intersection to be impacted
- Approximately 3 parking stalls for Aaron Plaza may be eliminated
- Internal access for Aaron Plaza/Farm market to be modified

The proposed BJs and NBTOD will have a significant impact to this intersection. Due to the relatively low existing traffic volumes traveling through this intersection, it is not feasible to maintain the North Brunswick LOS criteria. Additionally, the following improvements will necessitate that the NJDOT issue a waiver for the Saturday peak hour LOS analysis. Although the NJDOT criteria cannot be met, the intersection will still maintain a desirable LOS operation

**Table 12** summarizes the overall level of service and the travel delay at the subject intersection for the 2012 No-Build Conditions and 2012 Full-Build Conditions (with improvements).





**Table 12 - 2012 Analysis LOS Results @ Route 1 & Aaron Road**

Overall Intersection LOS: Route 1 & Aaron Road			
Peak Hour	2012 No-Build LOS (Travel Delay)	2012 Full-Build w/Improvements LOS (Travel Delay)	Change in Travel Delay*
AM	B (19.8 sec.)	B (16.6 sec.)	-3.2 sec.
PM	C (22.5 sec.)	C (36.6 sec.)	14.1 sec.
SAT	B (16.5 sec.)	D (37.8 sec.)	21.3 sec.

\*Negative Number Represents Desirable Change

### ***Route 1 between Finnegans Lane & Aaron Road***

Currently, NJDOT is conducting a study to assess the need to widen Route 1 from Aaron Road in North Brunswick to the Princeton Area. It is our opinion that this study will result in generating a roadway improvement project to widen Route 1 and achieve the desired improvements as are outlined below. This analysis is presented to depict what the operation of the intersection will be like after the State completes the widening of Route 1 within this area.

The EB Left Turn lane at the intersection of Route 1 & Finnegans Lane was recently improved by NJDOT. The improvement provided two (2) EB left turn lanes by converting one of the two receiving lanes to a left turn lane. It has been expressed that this has drastically improved the operation of the intersection. However, it was observed that occasionally motorists would not clear the intersection during one cycle length.

The future development will have a direct impact on these left turns due to the inbound trips to the development utilizing Finnegans Lane. However, it is not feasible to increase the number of left turn lanes.

Additionally, the SB and NB traffic volumes will increase due to the inbound and outbound trips from the development. Therefore, it is recommended to widen Route 1 NB & SB to three (3) lanes in each direction, and retime the intersection to provide sufficient capacity. These improvements are under study by the state, and it is our opinion that they will be constructed by the State as part of their ongoing Route 1 widening project.

The following summarizes the **improvements** for the 2012 Phase 1 Conditions between Finnegans Lane & Aaron Road:

- South of Finnegans Lane
  - Convert shoulder for Route 1 SB to thru lane for approximately 600 feet
  - Convert shoulder/ deceleration lane for Route 1 NB to thru lane
  - Widen to replace the deceleration lane Route 1 NB jughandle



- North of Finnegan's Lane
  - Widen Route 1 NB/SB to provide three travel lanes with shoulder to Aaron Road

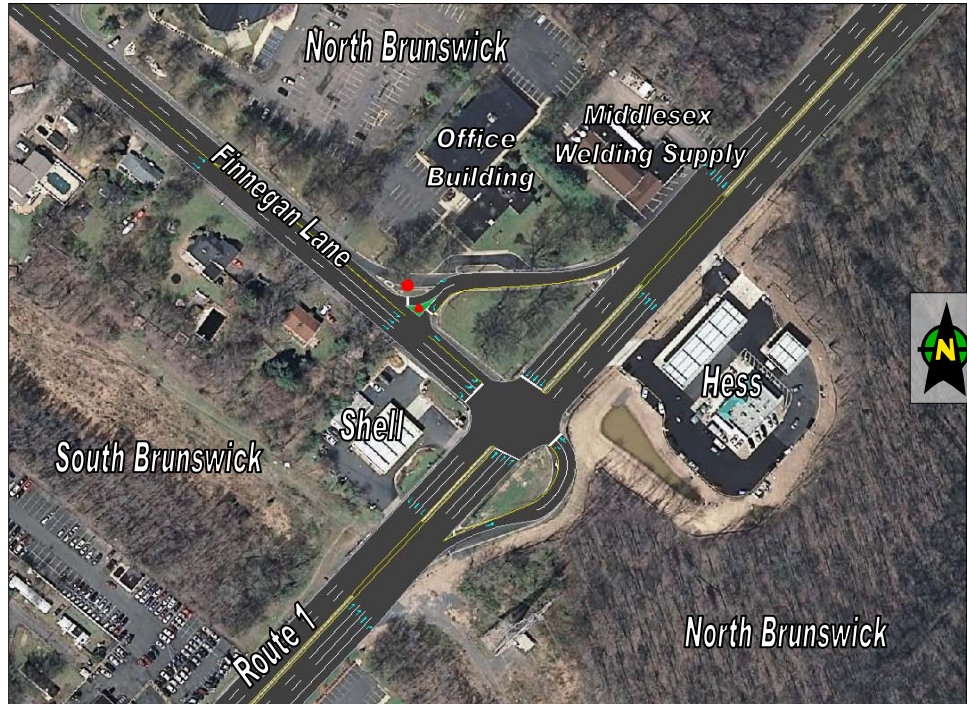


Figure 17 - 2012 Phase 1 Improvement @ Finnegan's Lane & Route 1

The following summarizes the **impact** to adjacent property for the 2012 Phase 1 Improvements along Route 1 between Finnegan's Lane & Aaron Road:

- Parking to be acquired from Middlesex Welding Supply

**Table 13** summarizes the overall level of service and travel delay at the subject intersection for the 2012 No-Build Conditions and 2012 Full-Build Conditions (with improvements).

Table 13 - 2012 LOS Results @ Route 1 & Finnegan's Lane			
Overall Intersection LOS: Route 1 & Finnegan's Lane			
Peak Hour	2012 No-Build LOS (Travel Delay)	2012 Full-Build w/Improvements LOS (Travel Delay)	Change in Travel Delay*
AM	F (154.3 sec.)	F (82.9 sec.)	-71.4 sec.
PM	F (125.5 sec.)	F (91.0 sec.)	-34.5 sec.
SAT	F (112.9 sec.)	D (47.7 sec.)	-65.2 sec.

\*Negative Number Represents Desirable Change

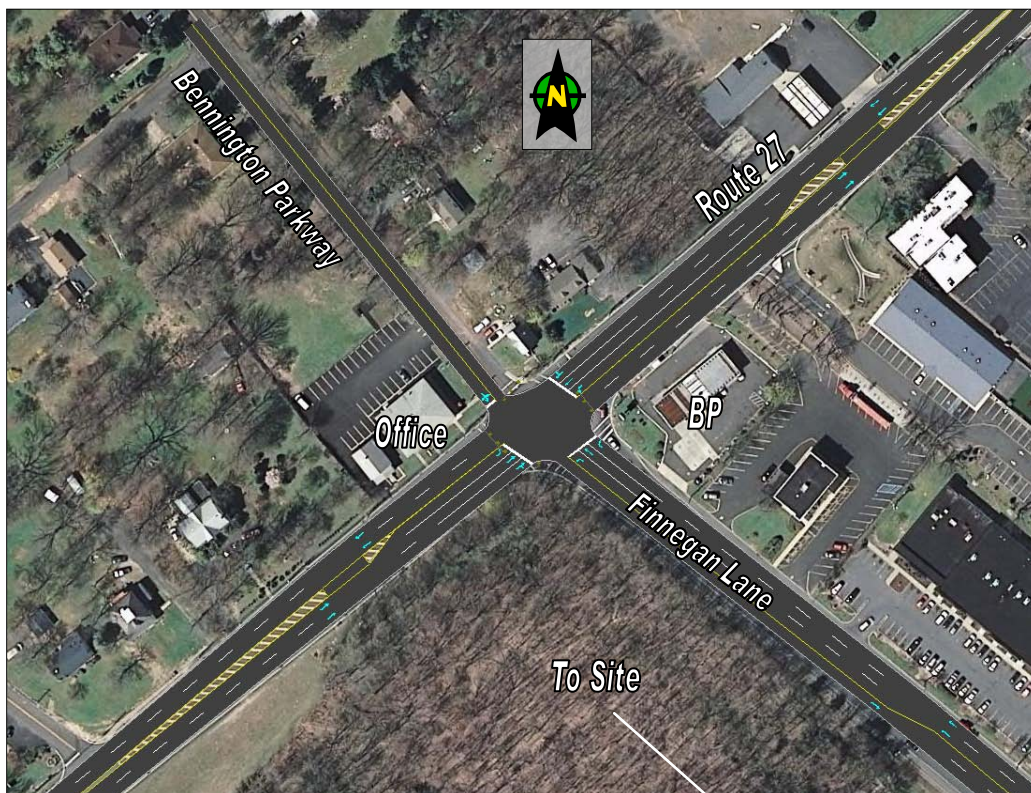


### ***Route 27 & Finnegans Lane***

During the existing conditions, the WB approach fails for the AM, PM and Saturday peak hours. However, the operation of the intersection can be greatly improved by conducting an improvement similar to what was recently done at Finnegans Lane & Route 1; converting a receiving lane for Finnegans Lane EB to a turning lane for Finnegans Lane WB. This will drastically improve the control delay, and mitigate the impact of the Phase 1 development

The following summarizes the **improvements** for the 2012 Phase 1 Conditions at Route 27 & Finnegans Lane:

- Convert a Finnegans Lane EB receiving lane to a Finnegans Lane WB Left Turn Lane to provide the following:
  - One (1) dedicated left turn lane
  - One (1) dedicated thru lane
  - One (1) dedicated right turn lane
- Retime intersection



**Figure 18 -2012 Phase 1 Improvement @ Route 27 & Finnegans Lane**

No significant **impact** to adjacent property is anticipated as result of the recommended improvements.



**Table 14** summarizes the overall level of service and travel delay at the subject intersection for the 2012 No-Build Conditions and 2012 Full-Build Conditions (with improvements).

**Table 14 - 2012 LOS Results @ Route 27 & Finnegans Lane**

<b>Overall Intersection LOS: Route 27 &amp; Finnegans Lane</b>			
<b>Peak Hour</b>	<b>2012 No-Build LOS (Travel Delay)</b>	<b>2012 Full-Build w/Improvements LOS (Travel Delay)</b>	<b>Change in Travel Delay*</b>
<b>AM</b>	<b>D (52.6 sec.)</b>	<b>D (47.4 sec.)</b>	<b>-5.2 sec.</b>
<b>PM</b>	<b>D (49.3 sec.)</b>	<b>D (47.3 sec.)</b>	<b>-2.0 sec.</b>
<b>SAT</b>	<b>E (56.3 sec.)</b>	<b>E (55.2 sec.)</b>	<b>- 1.1 sec.</b>

\*Negative Number Represents Desirable Change

### ***Route 1 & Cozzens Lane / Adams Lane***

Route 1 & Cozzens Lane / Adams Lane currently experiences unacceptable operating conditions due to existing geometry that limits capacity.

It is noted that the proposed developments will have a relatively small impact to the Cozzens Lane approach. However the impact of a development on an approach is not directly correlated to the number of vehicles traversing a specific approach.

The operation of an intersection is primarily based on the available lanes and green time given to each movement. It is not feasible to modify the cycle length due to its inclusion within the Route 1 corridor system. Therefore, the existing cycle length for the intersection must be adequately split to provide the proper green times to each approach. Due to the additional trips on the Adams Lane and Route 1 approaches, it will be necessary to redistribute green time away from Cozzens Lane approach. Without increasing the cycle length, it is necessary to add lanes and increase stacking for this approach.

The Cozzens Lane approach would benefit significantly from added storage capacity and a mechanism to allow Cozzens Lane to enter the jughandle and proceed through the intersection. Currently, during the PM peak hour, traffic along the jughandle queues past Cozzens Lane, blocking motorists along Cozzens Lane from entering the intersection. Queues are consistent through the peak hour, constantly blocking Cozzens Lane for the duration of the PM peak hour. This blockage causes traffic along Cozzens Lane to queue well past Arlington Avenue, subsequently blocking traffic along Arlington Avenue attempting to make a left turn and proceed to Route 1.





To address the lack of stacking and capacity for Cozzens Lane, the Arlington Bypass is proposed. The Arlington Bypass would create sufficient stacking for the jughandle and Cozzens Lane traffic and eliminate the conflict between the two traffic streams. In addition to improving Cozzens Lane, the Arlington Bypass will also improve Adams Lane by providing sufficient space for two (2) receiving lanes.

The Arlington Bypass is sufficiently described as the construction of a connector road between Cozzens Lane and the Route 1 SB jughandle to provide more direct access to the intersection of Route 1 & Adams Lane / Cozzens Lane. The realignment would bypass Arlington Avenue and the surrounding neighborhood, eliminating the existing conflict of left turns from Arlington Avenue with Cozzens Lane thru traffic, and the subsequent queuing throughout that area. To achieve this realignment, it will be necessary to acquire ROW. It is not the intent of this report to propose a final alignment, and therefore one is not proposed, however, the general alignment of the bypass would resemble that which is depicted within **Figure 19**.

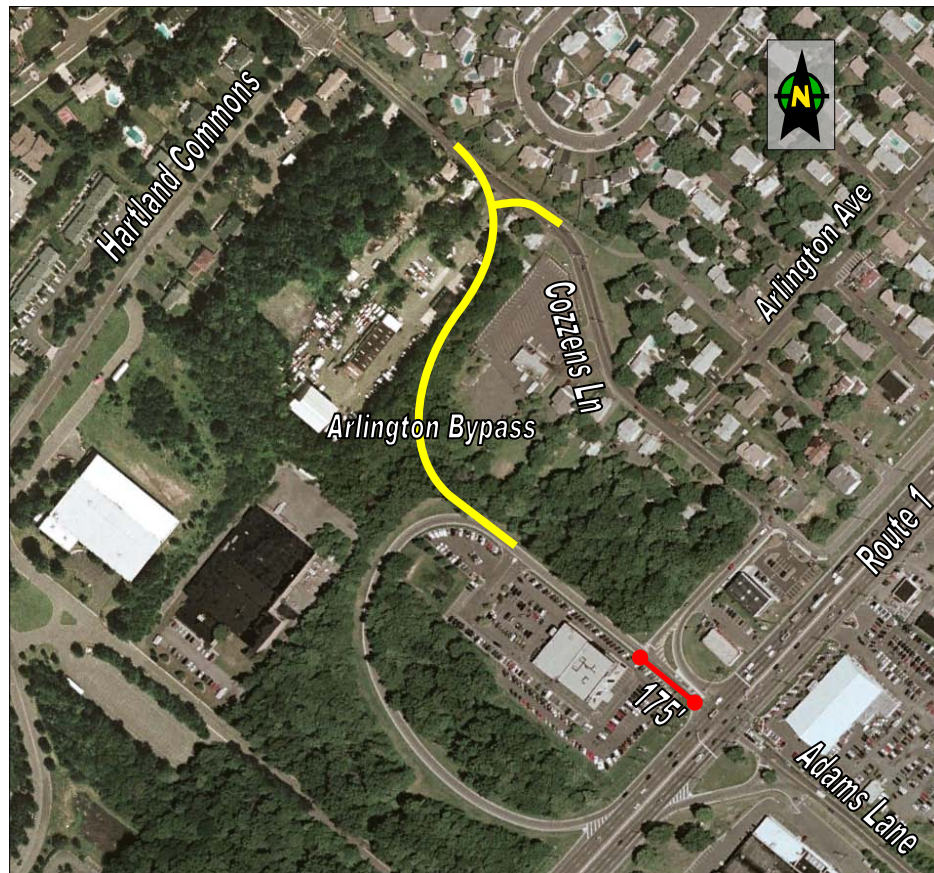


Figure 19 - Arlington Bypass

The general alignment as depicted within Figure 19 will likely require that 2 residences be acquired. Additionally, ROW along the property lines of the existing Industrial Site and Italian



American Club may also need to be acquired, resulting in a modification of access. However, both will remain functionally unchanged.

More modest solutions to the existing congestion along Cozzens Lane have been investigated such as placing stop control on the jughandle lane approach, or installing a signal and coordinating it with the main signal at Route 1 & Cozzens Lane / Adams Lane. However, these solutions are not viable as they will cause significant queues on the jughandle into Route 1 creating a grid-lock condition. It is strongly recommended that the Arlington Bypass be constructed.

The development will increase traffic volumes for the WB left turn lane along Adams Lane, which currently fails during the PM peak hour. As is the case with Cozzens Lane, this approach currently experiences excessive delays and queues well past the NJTransit train bridge. The additional left turns due to the developments will significantly degrade the operation of this approach.

To mitigate the impact of the development to this approach and improve existing conditions, Adams Lane must be widened at the intersection to provide three lanes with a fourth slip right turn lane. Adams Lane WB should be widening to two (2) lanes for the maximum length possible without impacting the existing NJTransit train bridge. This will require that the embankment between Adams Lane and Route 1 be modified to support such a roadway.

The following summarizes the **improvements** for the 2012 Phase 1 Conditions at Route 1 & Cozzens Lane / Adams Lane:

- Construct two-lane, two-way, Arlington Bypass to connect Cozzens Lane with Route 1 SB jughandle
- Widen Cozzens Lane Cross-Section from three (3) to three (5) lanes as follows:
  - One (1) dedicated left turn lane EB
  - One (1) dedicated thru lane EB
  - One (1) shared thru/right turn lane EB
  - Two (2) receiving lanes WB
- Widen Adams Lane Cross-Section from three (3) to six (6) lanes as follows:
  - One (1) dedicated left turn lane WB
  - One (1) shared left/thru lane WB
  - One (1) dedicated thru lane WB
  - One (1) dedicated right turn lane WB
  - Two (2) receiving lanes EB
- Widen Adams Lane WB between Train Bridge and Route 1 from one (1) to two (2) lanes the maximum distance without impacting the train bridge.
- Reconstruct signal

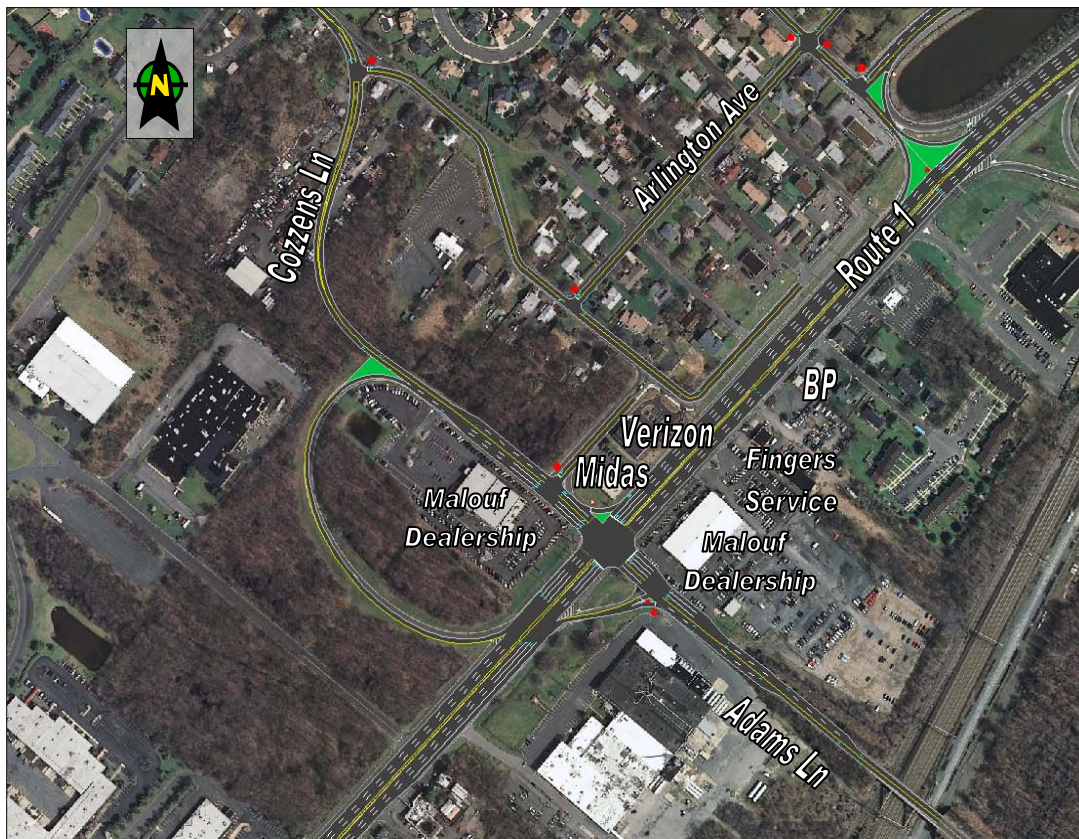


Figure 20 - 2012 Phase 1 Improvements @ Route 1 & Cozzens Lane / Adams Lane

The following summarizes the **impact** to adjacent property for the 2012 Phase 1 Improvements at Route 1 & Cozzens Lane / Adams Lane:

- Parking for Malouf along Adams Lane to be eliminated; access and site to remain
- Parking/pavement for Vertis to be eliminated; access and site to remain
- Parking for Malouf along Cozzens Lane may need to be eliminated, subject to final design; access and site to remain
- Approximately two (2) residences to be acquired
- Portions of Industrial Site and Italian American Club may need to be acquired
- Wetlands to be impacted

**Table 15** summarizes the overall level of service and travel delay at the subject intersection for the 2012 No-Build Conditions and 2012 Full-Build Conditions (with improvements).





**Table 15 - 2012 LOS @ Route 1 & Cozzens Lane / Adams Lane (Overall Int.)**

Overall Intersection LOS: Route 1 & Adams Ln / Cozzens Ln			
Peak Hour	2012 No-Build LOS (Travel Delay)	2012 Full-Build w/Improvements LOS (Travel Delay)	Change in Travel Delay*
AM	F (169.1 sec.)	F (140.3 sec.)	-28.8 sec.
PM	F (171.8 sec.)	F (152.1 sec.)	-19.7 sec.
SAT	D (36.6 sec.)	E (76.8 sec.)	40.2 sec.

\*Negative Number Represents Desirable Change

As tabulated within **Table 15** the overall level of service will improve during the AM and PM peak hours. During the Saturday peak hour, the LOS will decrease due to the site traffic. It should be noted that the intersection will still operate at an acceptable level of service E during the Saturday peak hour, and will operate significantly better than the AM and PM peak hours.

In contrast to the overall levels of service tabulated within table 15, **Tables 16 & 17** depict the level of service and travel delay for the Adams Lane and Cozzens Lane approaches, respectively. As shown, the level of service will improve for all peak hours for both approaches.

**Table 16 - 2012 LOS @ Route 1 & Cozzens Lane / Adams Lane (Cozzens Ln Approach)**

Cozzens Ln Approach LOS: Route 1 & Adams Ln / Cozzens Ln			
Peak Hour	2012 No-Build LOS (Travel Delay)	2012 Full-Build w/Improvements LOS (Travel Delay)	Change in Travel Delay*
AM	F (143.8)	F (120.0)	-23.8 sec.
PM	F (342.9)	F (304.3)	-38.6 sec.
SAT	F (80.9)	F (61.8)	-19.1 sec.

\*Negative Number Represents Desirable Change

**Table 17 - 2012 LOS @ Route 1 & Cozzens Lane / Adams Lane (Adams Ln Approach)**

Adams Ln Approach LOS: Route 1 & Adams Ln / Cozzens Ln			
Peak Hour	2012 No-Build LOS (Travel Delay)	2012 Full-Build w/Improvements LOS (Travel Delay)	Change in Travel Delay*
AM	F (338.6 sec.)	F (137.5 sec.)	-201.1 sec.
PM	F (520.4 sec.)	F (376.6 sec.)	-143.8 sec.
SAT	E (67.2 sec.)	E (60.5 sec.)	-6.7 sec.

\*Negative Number Represents Desirable Change





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### ***Route 130 & Adams Lane***

NJDOT has proposed improvements at this intersection to improve existing conditions. However, these improvements will also benefit the additional development traffic added to this intersection.

The following summarizes the **improvements proposed by NJDOT** at Route 130 & Adams Lane:

- Widen Route 130 SB from three (3) to four (5) lanes to provide the following:
  - One (1) dedicated left turn lane
  - Three (3) dedicated thru lanes
  - One (1) dedicated right turn lane
- Widen Route 130 NB from three (3) to four (4) lanes to provide the following:
  - One (1) dedicated left turn lane
  - Three (2) dedicate thru lanes
  - One (1) shared thru/right turn lane
- Widen Adams Lane EB from two (2) to three (3) lanes to provide the following:
  - One (1) dedicated left turn lane
  - One (1) dedicated thru lane
  - One (1) dedicate right turn lane
- Widen Adams Lane WB from one (1) to two (2) lanes to provide the following:
  - One (1) shared left/thru turn lane
  - One (1) shared thru/right turn lane
- Retime intersection

The proposed NJDOT improvements will provide sufficient capacity to accommodate the traffic generated by the development. The proposed NJDOT improvements are anticipated begin in the Fall of 2010. **Figure 21** depicts the NJDOT proposed improvements.

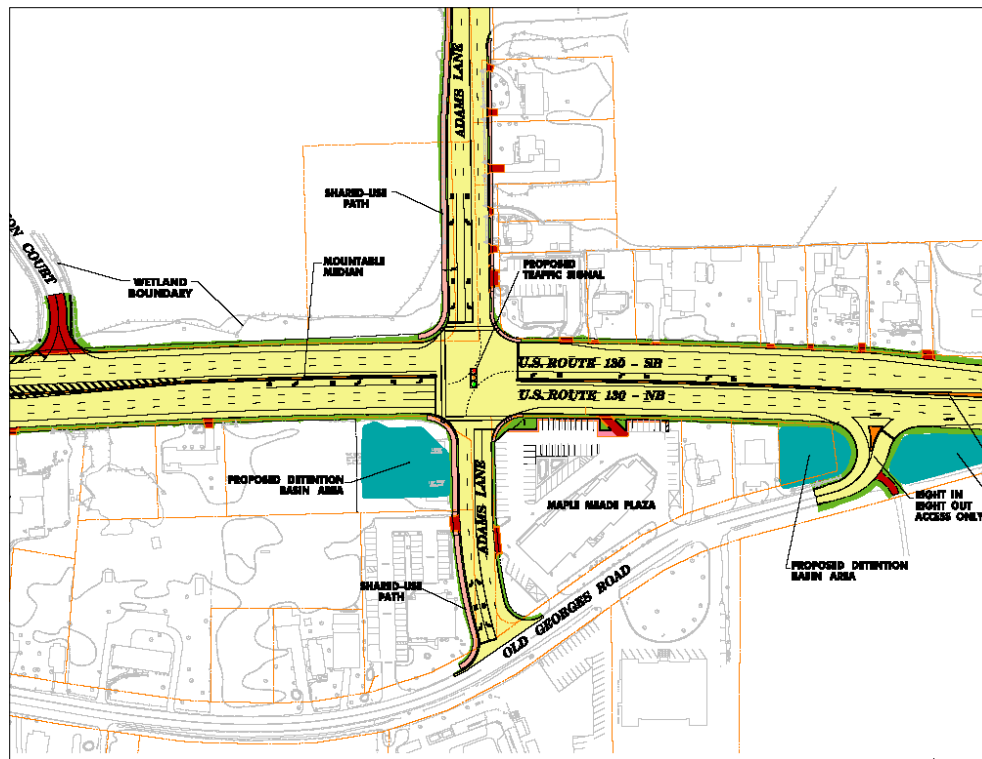


Figure 21 - NJDOT Proposed Improvements @ Route 130 & Adams Lane

**Table 18** summarizes the overall level of service and travel delay at the subject intersection for the 2012 No-Build Conditions and 2012 Full-Build Conditions (with improvements).

Table 18 - 2012 LOS Results @ Route 130 & Adams Lane

Overall Intersection LOS: Route 130 & Adams Lane			
Peak Hour	2012 No-Build LOS (Travel Delay)	2012 Full-Build w/Improvements LOS (Travel Delay)	Change in Travel Delay*
AM	F (82.5 sec.)	D (37.5 sec.)	-45 sec.
PM	F (97.2 sec.)	D (55.3 sec.)	-41.9 sec.
SAT	F (87.4 sec.)	D (45.7 sec.)	-41.7 sec.

\*Negative Number Represents Desirable Change



## **VIII. SUMMARY OF RECOMMENDED DEVELOPER IMPROVEMENTS FOR SITE REZONING**

As discussed with the Township, the developer will not be responsible for improvements to the intersection of Route 1 & Finnegans Lane due to budgetary constraints. Rather, improvements to that intersection will be conducted by the State and/or County in conjunction with ongoing projects. The State is currently conducting a study to widen Route 1 from Aaron Road in North Brunswick to the Princeton area. The County is investigating the construction of a grade-separated interchange at Route 1 and Finnegans Lane. Either of these improvements will, at a minimum, achieve the levels of service outlined within this analysis.

The following summarizes the improvements that the developers will be required to complete prior to the sites being rezoned.

### **Route 1 & Aaron Road**

- Construct two-way far-side jughandle for Route 1 NB
- Reconstruct near-side jughandle to channelized right turn with deceleration for Route 1 NB
- Reconstruct near-side jughandle for Route 1 SB to increase storage length
- Shift intersection to North to reduce impact to Exxon Gas Station
- Convert shoulder/deceleration lane to auxiliary lane for Route 1 NB
- Widen Aaron Road EB to provide the following:
  - One (1) dedicated left turn lane
  - Two (2) dedicated thru lanes
  - One (1) dedicated right turn lane
- Widen the site driveway (WB approach) to provide the following:
  - Two (2) dedicated left turn lanes
  - Two (2) dedicated thru lanes
- Reconstruct Signal

### **Route 1 & Commerce Blvd**

- Construct far-side jughandle for Route 1 SB (Option 2)
- Convert near-side jughandle to channelized right turn with deceleration lane for Route 1 SB
- South of Commerce Blvd
  - Convert shoulder for Route 1 SB to auxiliary lane for jug-handle
- North of Commerce Blvd
  - Widen Route 1 NB to provide acceleration lane for NBTOD exiting traffic
  - Convert shoulder for Route 1 SB to auxiliary lane for jug-handle
- Widen Commerce Blvd EB to provide the following:



- Two (2) dedicated left turn lanes
  - Two (2) dedicated thru lanes
- Widen the site driveway (WB approach) to provide the following:
  - One (1) dedicated left turn lane
  - Two (2) dedicated thru lanes
  - One (1) dedicated right turn lane w/acceleration lane along Route 1 NB
- Reconstruct Signal

#### **Route 1 & Cozzens Lane / Adams Lane**

- Construct two-lane, two-way, Arlington Bypass to connect Cozzens Lane with Route 1 SB jughandle
- Widen Cozzens Lane Cross-Section from three (3) to three (5) lanes as follows:
  - One (1) dedicated left turn lane EB
  - One (1) dedicated thru lane EB
  - One (1) shared thru/right turn lane EB
  - Two (2) receiving lanes WB
- Widen Adams Lane Cross-Section from three (3) to six (6) lanes as follows:
  - One (1) dedicated left turn lane WB
  - One (1) shared left/thru lane WB
  - One (1) dedicated thru lane WB
  - One (1) dedicated right turn lane WB
  - Two (2) receiving lanes EB
- Widen Adams Lane WB between Train Bridge and Route 1 from one (1) to two (2) lanes the maximum distance without impacting the train bridge.
- Reconstruct signal

#### **Route 27 & Finnegans Lane**

- Convert a Finnegans Lane EB receiving lane to a Finnegans Lane WB Left Turn Lane to provide the following:
  - One (1) dedicated left turn lane
  - One (1) dedicated thru lane
  - One (1) dedicated right turn lane
- Retime intersection



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## **IX. COST ANALYSIS FOR “RECOMMENDED IMPROVEMENTS FOR SITE REZONING”**

Preliminary cost estimates have been conducted for the “Recommended Improvements for Site Rezoning.” These estimates have been conducted according to NJDOT Preliminary Cost Estimate guidelines and are intended to provide Order of Magnitude estimates. Refer to **Appendix I** for calculation worksheets corresponding to each cost estimate.

These estimates include the Construction Cost, Engineering and an estimate of ROW acquisition. The ROW acquisition cost is based on a cost of \$2.50 per SF of undeveloped land and \$5.00 per SF of developed land. It will be necessary to provide more refined estimates as engineered plans are developed.

The “recommended improvements for site rezoning” will cost a total of of \$7.8 Million. **Table 19** summarizes the cost for each intersection improvement and the associated fair share cost for each developer. The cost for each developer was determined by distributing the total improvement cost for each intersection according to the percent of total site generated trips correlating to each development that is projected to utilize each intersection.

The cost of the Arlington Bypass is included within the estimate for intersection improvements at Route 1 & Cozzens Lane / Adams Lane. However, the individual cost of the Arlington Bypass would be approximately 2.1 million dollars.



Table 19

Cost Estimate for "Recommended Developer Improvement for Site Rezoning"

DESCRIPTION	NBTOD %	PRESTIGE %	NBTOD COST	PRESTIGE COST	TOTAL COST
<b>Route 1 &amp; Cozzens Ln / Adams Ln</b>	87%	13%			
<b>Total Cost</b>	87%	13%	\$ 2,969,697.16	\$ 443,747.85	\$ 3,413,445.01
Construction Cost	87%	13%	\$ 1,720,038.57	\$ 257,017.26	\$ 1,977,055.83
Mobilization	87%	13%	\$ 137,603.09	\$ 20,561.38	\$ 158,164.47
Progress Schedule	87%	13%	\$ -	\$ -	\$ -
Clearing Site	87%	13%	\$ 26,100.00	\$ 3,900.00	\$ 30,000.00
Construction Layout	87%	13%	\$ 17,400.00	\$ 2,600.00	\$ 20,000.00
Construction Engineering	87%	13%	\$ 385,931.76	\$ 57,667.96	\$ 443,599.72
Right of Way	87%	13%	\$ 682,623.75	\$ 102,001.25	\$ 784,625.00
<b>Route 1 &amp; Commerce Blvd</b>	89%	11%			
<b>Total Cost</b>	89%	11%	\$ 1,488,343.42	\$ 183,952.56	\$ 1,672,295.98
Construction Cost	89%	11%	\$ 1,083,795.08	\$ 133,952.20	\$ 1,217,747.28
Mobilization	89%	11%	\$ 86,703.61	\$ 10,716.18	\$ 97,419.78
Progress Schedule	89%	11%	\$ -	\$ -	\$ -
Clearing Site	89%	11%	\$ 26,700.00	\$ 3,300.00	\$ 30,000.00
Construction Layout	89%	11%	\$ 17,800.00	\$ 2,200.00	\$ 20,000.00
Construction Engineering	89%	11%	\$ 246,644.73	\$ 30,484.18	\$ 277,128.91
Right of Way	89%	11%	\$ 26,700.00	\$ 3,300.00	\$ 30,000.00
<b>Route 1 &amp; Aaron Rd</b>	87%	13%			
<b>Total Cost</b>	87%	13%	\$ 2,351,643.72	\$ 351,395.04	\$ 2,703,038.76
Construction Cost	87%	13%	\$ 1,725,809.87	\$ 257,879.64	\$ 1,983,689.51
Mobilization	87%	13%	\$ 138,064.79	\$ 20,630.37	\$ 158,695.16
Progress Schedule	87%	13%	\$ -	\$ -	\$ -
Clearing Site	87%	13%	\$ 26,100.00	\$ 3,900.00	\$ 30,000.00
Construction Layout	87%	13%	\$ 17,400.00	\$ 2,600.00	\$ 20,000.00
Construction Engineering	87%	13%	\$ 387,197.06	\$ 57,857.03	\$ 445,054.09
Right of Way	87%	13%	\$ 57,072.00	\$ 8,528.00	\$ 65,600.00
<b>Route 1 Corridor</b>					
<b>b/t Finnigans Lane &amp; Aaron Road</b>	86%	14%	\$ -	\$ -	\$ -
Construction Cost	86%	14%	\$ -	\$ -	\$ -
Mobilization	86%	14%	\$ -	\$ -	\$ -
Progress Schedule	86%	14%	\$ -	\$ -	\$ -
Clearing Site	86%	14%	\$ -	\$ -	\$ -
Construction Layout	86%	14%	\$ -	\$ -	\$ -
Construction Engineering	86%	14%	\$ -	\$ -	\$ -
Right of Way	86%	14%	\$ -	\$ -	\$ -
<b>Route 27 &amp; Finnigans Lane</b>	86%	14%			
<b>Total Cost</b>	86%	14%	\$ 17,200.00	\$ 2,800.00	\$ 20,000.00
Construction Cost	86%	14%	\$ 17,200.00	\$ 2,800.00	\$ 20,000.00
Mobilization	86%	14%	\$ -	\$ -	\$ -
Progress Schedule	86%	14%	\$ -	\$ -	\$ -
Clearing Site	86%	14%	\$ -	\$ -	\$ -
Construction Layout	86%	14%	\$ -	\$ -	\$ -
Construction Engineering	86%	14%	\$ -	\$ -	\$ -
Right of Way	86%	14%	\$ -	\$ -	\$ -
<b>Totals</b>	-	-			
<b>Total Cost</b>	-	-	\$ 6,826,884.30	\$ 981,895.45	\$ 7,808,779.75
Construction Cost	-	-	\$ 4,546,843.52	\$ 651,649.09	\$ 5,198,492.62
Mobilization	-	-	\$ 362,371.48	\$ 51,907.93	\$ 414,279.41
Progress Schedule	-	-	\$ -	\$ -	\$ -
Clearing Site	-	-	\$ 78,900.00	\$ 11,100.00	\$ 90,000.00
Construction Layout	-	-	\$ 52,600.00	\$ 7,400.00	\$ 60,000.00
Construction Engineering	-	-	\$ 1,019,773.55	\$ 146,009.18	\$ 1,165,782.72
Right of Way	-	-	\$ 766,395.75	\$ 113,829.25	\$ 880,225.00



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## **X. 2017 FINAL BUILD IMPROVEMENTS**

In addition to the 2012 Full-Build scenario, the 2017 Final Build will include the remaining portion of the NBTOD development and the park and ride (P & R) facility. It is noted that the P & R facility may not be realized until after the year 2017. However, for the purposes of this analysis, the use of a build year 2017 will be sufficient to determine order of magnitude improvements required to support the Final Build, including the train station.

Several of the study intersections will require grade separation during the Final Build. Where grade separation is required, this investigation has identified alternatives to provide grade separation. To evaluate each alternative, the preliminary geometry has been simulated within SimTraffic to determine if proper operation is observed. This report identifies preferred alternatives based on preliminary investigations such as SimTraffic, known wetland areas and other sensitive areas. The 'next step' alternative analysis would identify the extent of wetland impacts, specific ROW requirements, geometric design waivers if necessary and the exact foot print of the project.

### ***Route 1 & Commerce Boulevard***

Based on the current layout of site circulation, Commerce Boulevard will provide the easiest access to parking for the P & R facility during the Final Build. Additionally, the residential units to be constructed between Phase 1 and Final Build will likely favor Commerce Boulevard rather than Aaron Road, independent of arriving from the south or north. Due to the additional NBTOD and P & R facility, this intersection will fail and cannot be mitigated without grade separation.

Four (4) alternatives for grade separation are investigated. Alternative D is the preferred alternative.





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### Alternative A - Route 1 & Commerce Boulevard

Alternative A requires that Commerce Blvd be realigned to the south side of the existing water retention basin. Alternative A would make partial use of the improvements recommended as part of Phase 1. The remaining roadway would be removed. Alternative A is relatively the simplest alternative to construct and will have, relatively, the least impact to existing development. The shopping center containing Bertucci's would need to be acquired. Access to the Commerce Center development north of Commerce Blvd would be significantly impacted under Alternative A.

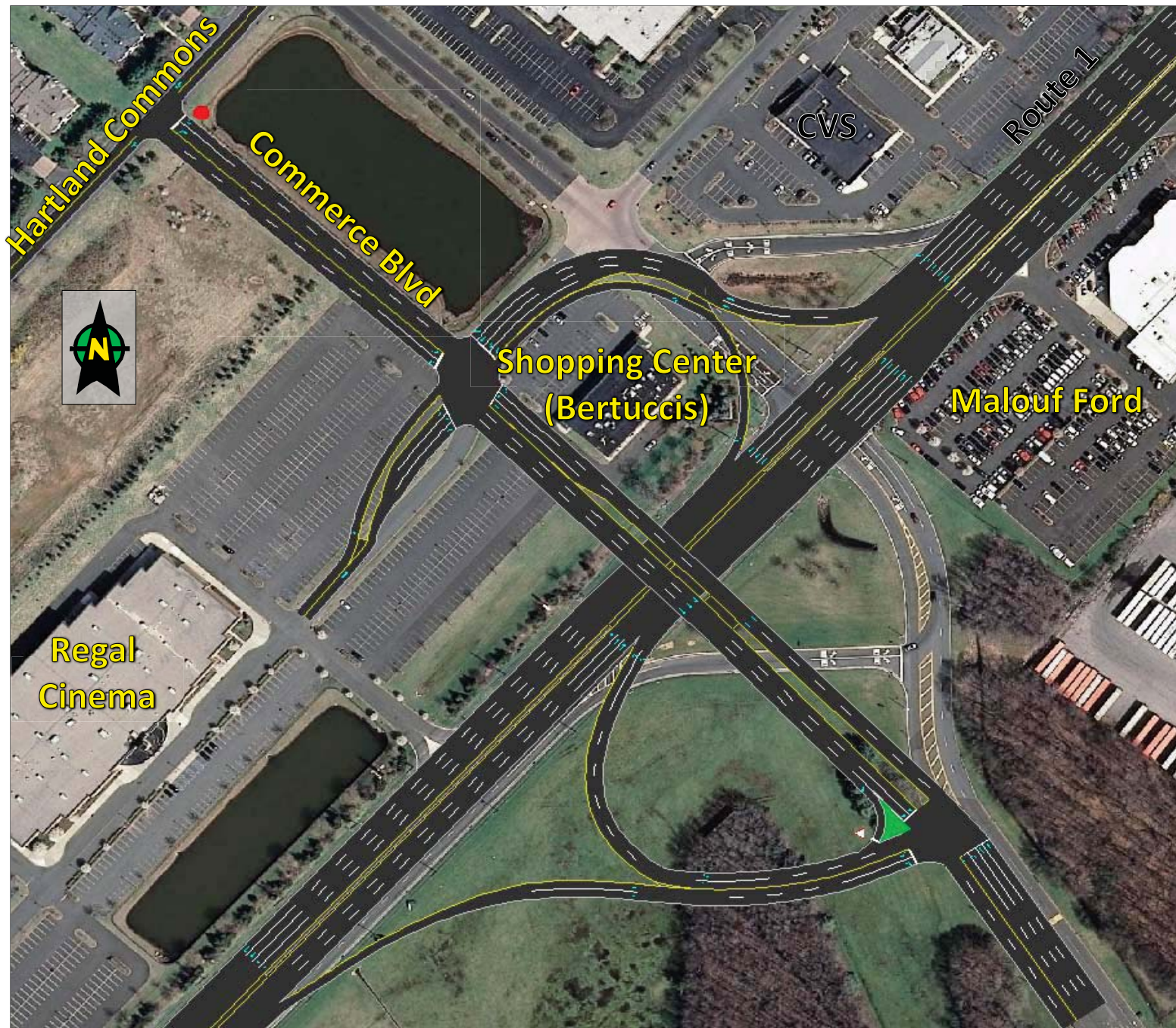
However, based on operations, Alternative A is the least desirable solution. At the time of construction, Alternative A would operate at maximum capacity, without capacity for additional demand due to other future developments within the area that may use this intersection. The highest demand will be placed on the dual left turn lane into NBTOD from Route 1 SB which would operate as an LOS 'E' during the highest AM peak hour, when commuters arrive to the P & R facility. It is typically desirable to provide a LOS of at least 'C' when major projects such as grade separation are undertaken.

The **impact** of Alternative A is summarized as follows:

- Shopping Center containing Bertucci's to be acquired
- Access to be degraded for Commerce Center north of Commerce Blvd

Alternative A is **not recommended** due to the following reasons:

- Does not provide excess capacity; operates at LOS 'E'
- Does not maintain good access to Commerce Center north of Commerce Blvd





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### Alternative B - Route 1 & Commerce Boulevard

Alternative B will provide very good traffic operations, and will provide excess capacity to the system for future development not related to NBTOD. The critical movement from Route 1 SB into NBTOD and the return movement will be provided via free flow ramps, thus eliminating conflicting left turns. However, access to/from Route 1 NB and the Regal Cinema would be eliminated.

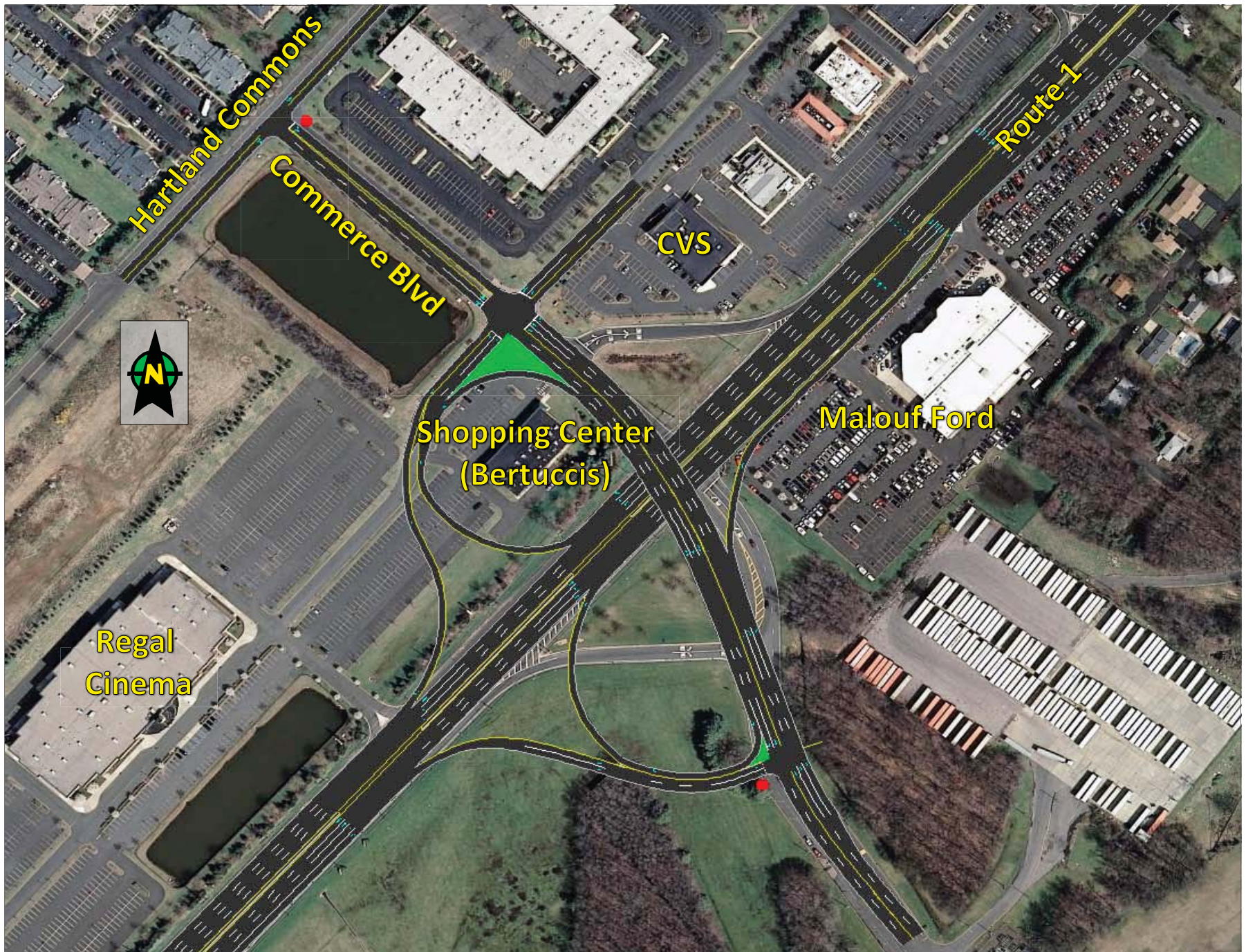
The **impact** of Alternative B is summarized as follows:

- Shopping Center containing Bertucci's to be acquired
- Parking for Regal Theatre to be acquired (In addition to Phase 1)
- Parking for Malouf Auto Dealer to be acquired (In addition to Phase 1)
- Access to/from Route 1 NB and Regal Cinema to be eliminated

Alternative B is **not recommended** due to the following reasons:

- Eliminates access to/from Regal Cinema and Route 1 NB









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### Alternative C - Route 1 & Commerce Boulevard

Alternative C will provide very good traffic operations, and will provide excess capacity to the system for future development not related to NBTOD. The critical movement from Route 1 SB into NBTOD and the return movement will be provided via free flow ramps, thus eliminating conflicting left turns.

The **impact** of Alternative C is summarized as follows:

- Shopping Center containing Bertucci's to be acquired
- Parking for Regal Theatre to be acquired (In addition to Phase 1)
- Parking for Malouf Auto Dealer to be acquired (In addition to Phase 1)
- Access to Route 1 NB from Commerce Center north of Commerce Blvd to be eliminated

Alternative C is **not recommended** due to the following reasons:

- Eliminates access to Route 1 NB from Commerce Center north of Commerce Blvd





### **Alternative D - Route 1 & Commerce Boulevard**

Alternative D will provide a good balance of traffic operations and maintaining access. All developments within the area would maintain access. Alternatives B and C provide superior traffic operations from Route 1 SB into Commerce Center, however, Alternative D maintains access to both developments and still maintains acceptable levels of operation.

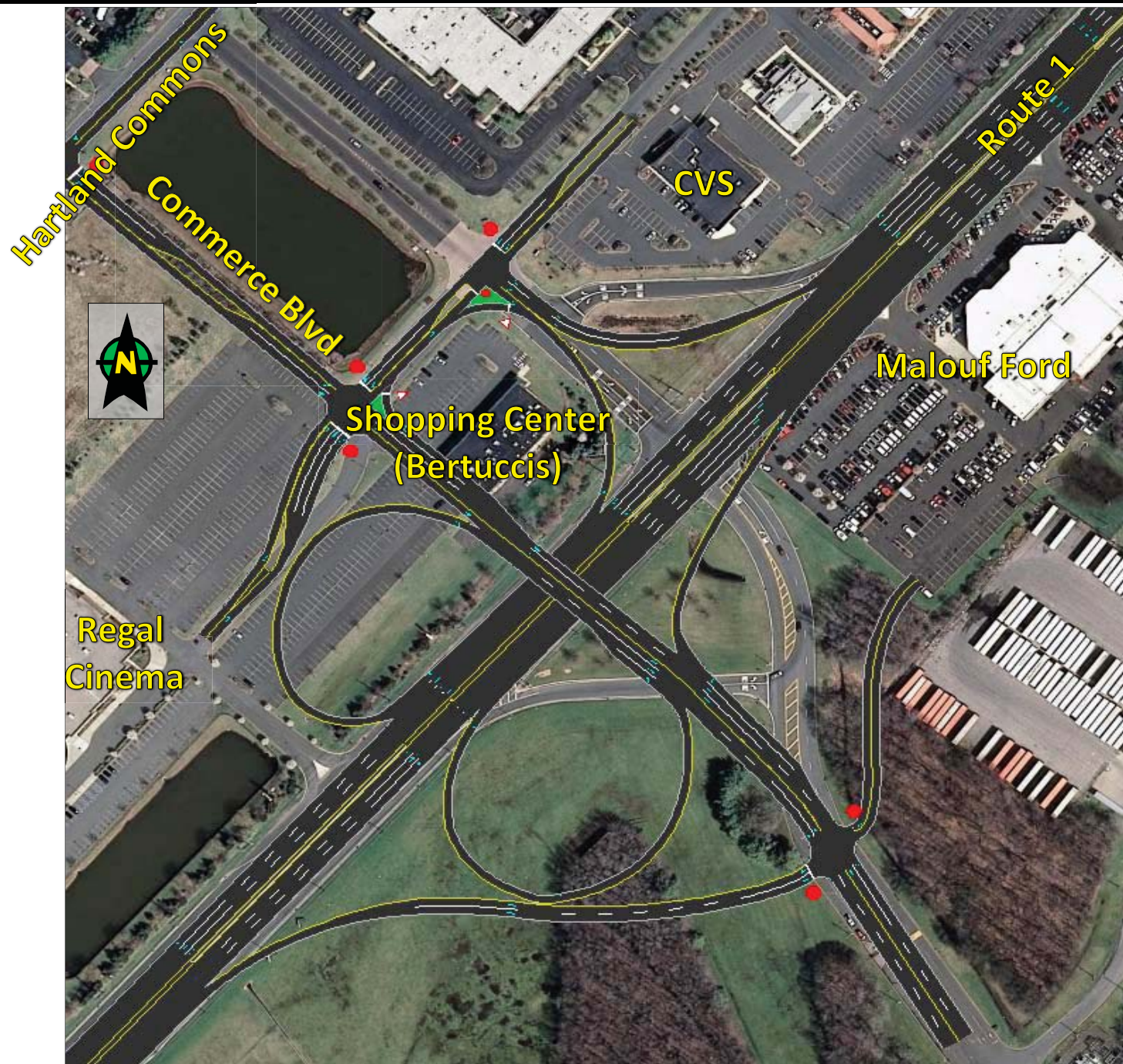
The **impact** of Alternative D is summarized as follows:

- Shopping Center containing Bertucci's to be acquired
- Parking for Regal Theatre to be acquired (In addition to Phase 1)
- Parking for Malouf Auto Dealer to be acquired (In addition to Phase 1)

Alternative D is the **recommended** alternative due to the following reasons:

- Maintains access to all development west of Route 1
- Provides excess capacity for future development





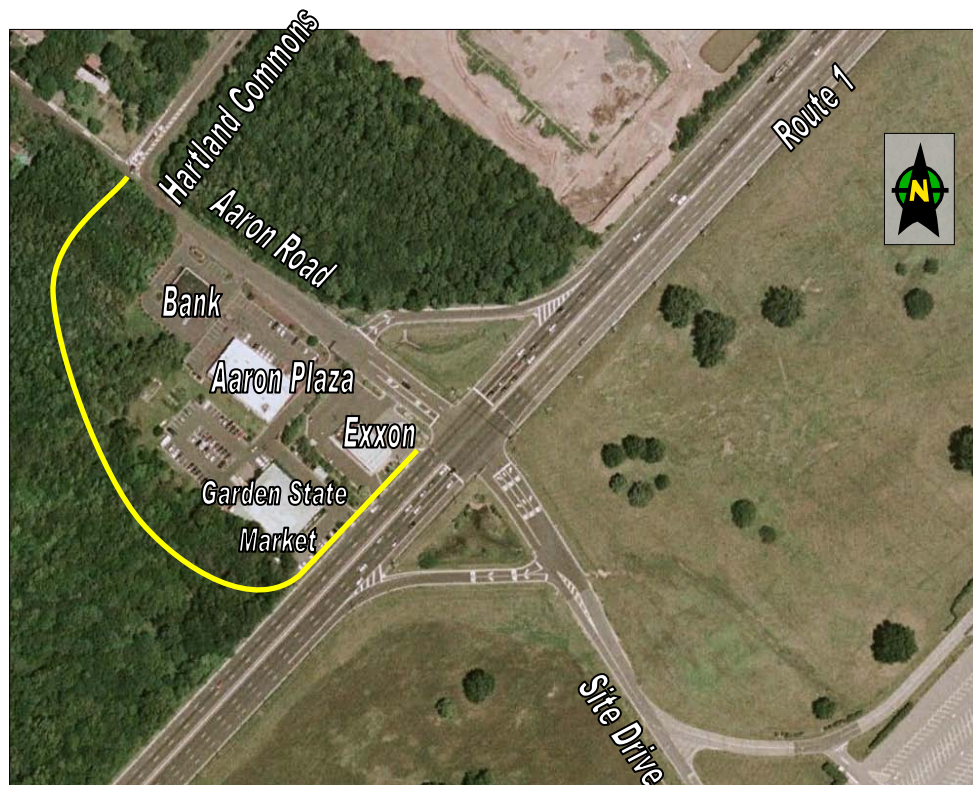




### ***Route 1 & Aaron Road***

Route 1 & Aaron Road will experience a relatively minor increase of traffic to the side streets due to final development of NBTOD and the train station. The site circulation will provide much easier access the P & R facility and residences to be constructed after Phase 1 via Commerce Blvd. Additionally, signage would be installed to direct the P & R users to utilize the Commerce Boulevard overpass.

However, during peak hours for the development, queues may extend further along Aaron Road necessitating the need for a reverse jughandle around the Bank, Aaron Plaza, Exxon Gas Station and Garden State Farm Market.



**Figure 26 - 2017 Final Build Improvements @ Aaron Road & Route 1**



### ***Route 1 & Finnegans Lane***

The County is currently investigating grade separation at this intersection as a project of independent utility. The County may complete the grade separation improvement at this intersection prior to the Final Build for NBTOD, independent of this project. However, in the scenario that it has not been completed, grade separation will be required at Route 1 & Finnegans Lane to support the increased traffic demand.

### **Alternative A - Route 1 & Finnegans Lane**

Alternative A would maintain all movements through the intersection. The Shell gas station located within the southwest quadrant of the intersection would need to be acquired. Additionally, there will likely be wetlands impacted for the new ramps.

In addition to the ramps, there may be the opportunity to provide connectivity with the industrial development located between Aaron Road and Finnegans Lane, along Route 1 NB. During final design, every effort should be made to promote such connectivity.

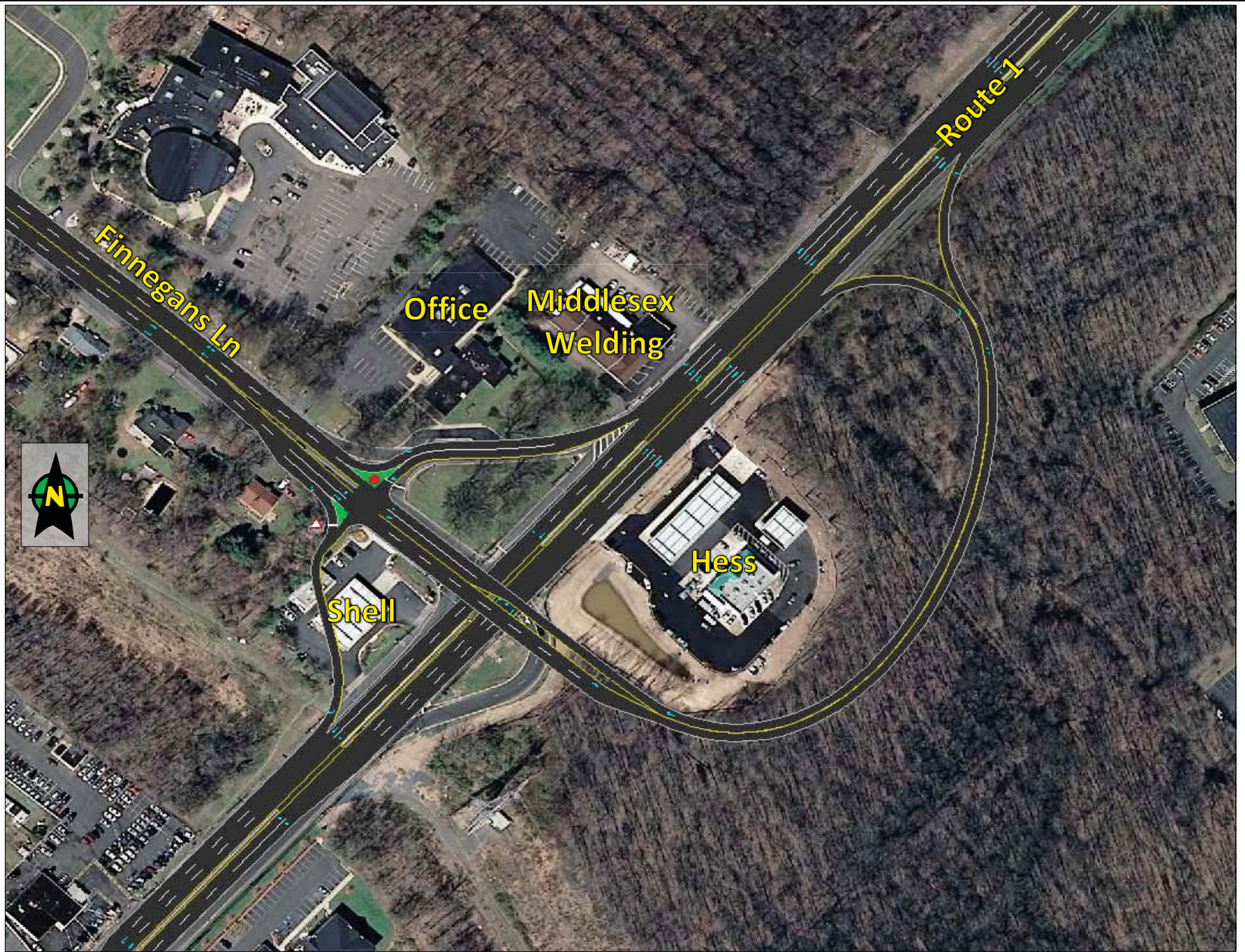
The **impact** of Alternative A is summarized as follows:

- Shell Gas Station to be acquired
- Wetlands

Alternative A is the **recommended** alternative due to the following reasons:

- Provides acceptable traffic operations
- Does not require Holiday Inn Express to be acquired (See Alternative B)









### **Alternative B - Route 1 & Finnegans Lane**

Alternative B would maintain all movements through the intersection, and is functionally identical to Alternative A. The Shell gas station located within the southwest quadrant of the intersection would need to be acquired. The Holiday Inn Express Hotel would need to be acquired. Additionally, there will likely be wetlands impacted for the new ramps.

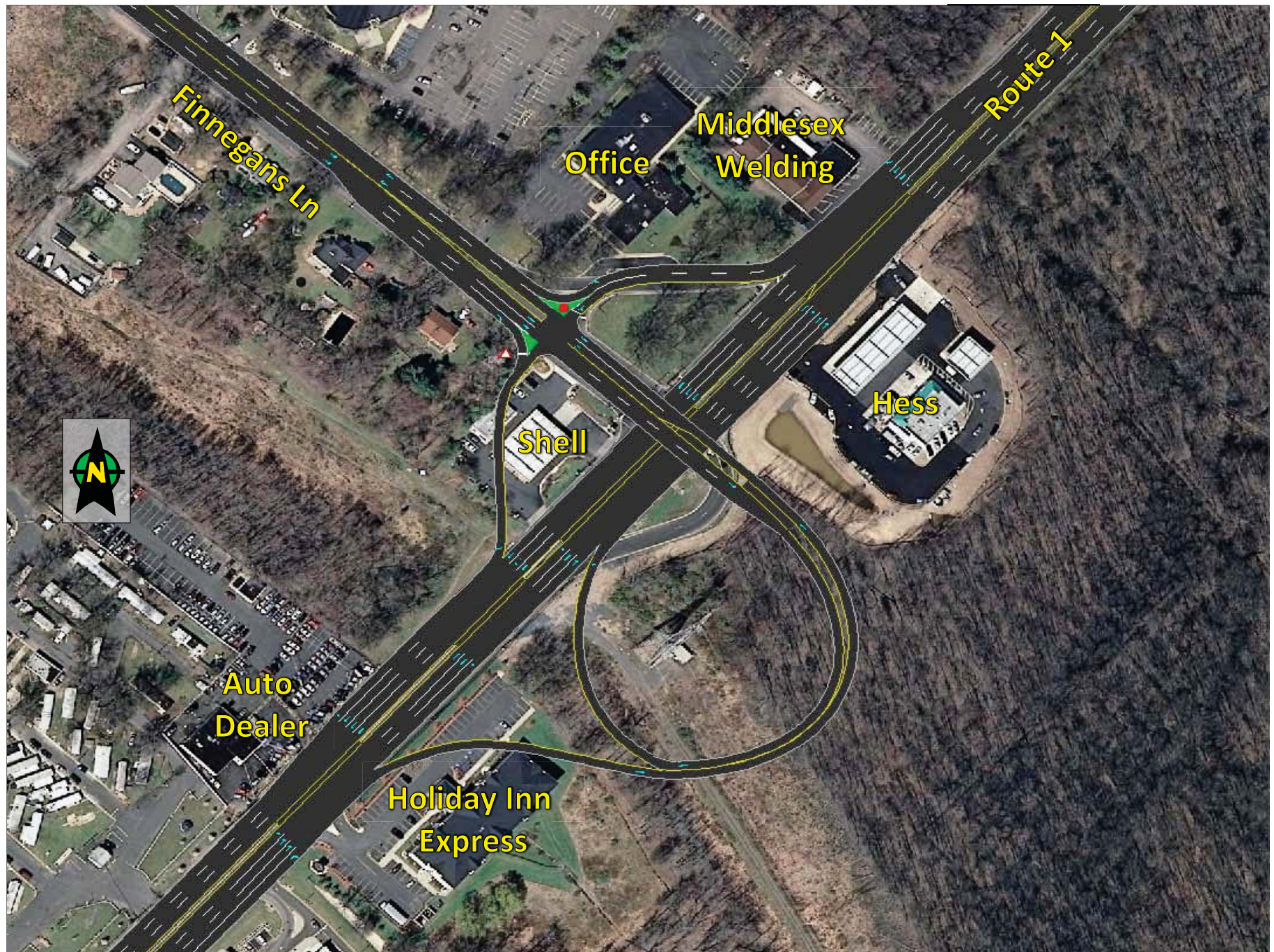
The **impact** of Alternative A is summarized as follows:

- Shell Gas Station to be acquired
- Holiday Inn Express to be acquired
- Wetlands

Alternative B is not **recommended** due to the following reasons:

- Requires that Holiday Inn Express be acquired









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### ***Route 1 & Cozzens Lane / Adams Lane***

Grade separation is arguably required due to the existing traffic conditions. However, the P & R facility will solidify the need for grade separation. Three (3) alternatives have been investigated.

It should be noted that if the Arlington Bypass is constructed, as proposed within the “Recommended Improvements for Site Rezoning”, then Alternative B Should not be constructed.

### **Alternative A - Route 1 & Cozzens Lane**

Alternative A would create grade separation as an extension of Adams Lane across Route 1, flowing directly into the realigned Cozzens Lane. This improvement would provide exceptional E-W movement between Route 130 and Route 27. The two intersections providing access to/from Route 1 on either side of the highway will require signalization. All movements through the intersection would be maintained.

To provide acceptable access to Elizabeth Street, Route 1 may need to be significantly widened along the southbound side to provide local access road between Cozzens Lane and Elizabeth Street.

It should be noted that a portion of the necessary infrastructure such as the realigned Cozzens Lane and the modification to the embankment for the NJTransit bridge would have been completed within the Phase 1 improvements.

The **impact** of Alternative A is summarized as follows:

- Access for BP Gas Station to be significantly modified
- Coppa’s Service Center to be acquired
- Parking for Malouf Dealerships along Adams Lane and Cozzens Lane to be acquired
- Overflow vehicle storage for Malouf to be bisected

Alternative A is the **recommended** alternative due to the following reasons:

- Maintains an improvement of traffic conditions along Arlington Avenue
- Is the logical improvement when considering the Phase 1 improvement









### **Alternative B - Route 1 & Cozens Lane**

Alternative B would create grade separation as an extension of Cozzens Lane across Route 1. Alternative B would provide acceptable levels of service. However, it would not improve conditions along Arlington Avenue and would require that 3-4 residences be acquired.

The **impact** of Alternative B is summarized as follows:

- Coppa's Service Center to be acquired
- 3-4 Residences to be acquired
- Overflow vehicle storage for Malouf to be bisected

Alternative B is the not **recommended** due to the following reasons:

- Does not continue the level of improvement to Arlington Avenue that is achieved by constructing the recommended improvements for Phase 1
- Requires residences to be acquired









### **Alternative C - Route 1 & Cozzens Lane**

Alternative C would create grade separation as an extension of Elizabeth Street. This is functionally the least desirable alternative, as it creates several heavy conflicting movements. Additionally, this would necessitate the widening of the existing NJTransit train bridge.

Alternative C could be tailored to meet the realigned Cozzens Lane, however it would provide a circuitous route for the predominate through movements.

The **impact** of Alternative C is summarized as follows:

- Truck parking for Vertis to be acquired
- NJTransit Train Bridge to be widened

Alternative C is the **not recommended** due to the following reasons:

- Provides circuitous route for predominate thru movements
- Requires widening of Train Bridge
- Will operate at or near capacity at time of construction









### ***Route 130 & Adams Lane***

Route 130 & Adams Lane will require relatively minor improvements for the Final Build which include reconstructing the median to provide dual left turn lanes from Route 1 NB.

## **XI. COST ESTIMATE FOR 2017 FINAL BUILD IMPROVEMENTS**

Preliminary cost estimates have been conducted for the 2017 Final Build Improvements as contained within the previous section. These estimates have been conducted according to NJDOT Preliminary Cost Estimate guidelines and are intended to provide Order of Magnitude estimates. Refer to **Appendix I** for calculation worksheets corresponding to each cost estimate.

**Table 20** summarizes the cost for each alternative and the total cost for the preferred alternatives. These cost projections do not include ROW acquisition which may be significant depending upon the final design.

**Table 20 - Cost Estimate for 2017 Improvements**

Intersection	Alternative	Preferred	Construction Cost
Route 1 & Commerce Blvd	A		\$15.4 Million
	B		\$12.4 Million
	C		\$11.9 Million
	D	X	\$19.1 Million
Route 1 & Finnigans Ln	A	X	\$9.0 Million
	B		\$9.0 Million
Route 1 & Adams Ln / Cozzens Ln	A	X	\$11.4 Million
	B		\$9.3 Million
	C		\$17.5 Million
<b>Total Cost of Preferred Alternatives:</b>			<b>\$39.5 Million</b>

\*\*\* Does not include cost of design, utility relocation, ROW acquisitions or contingencies \*\*\*

## **XII. EAST-WEST CONNECTOR ROADWAY**

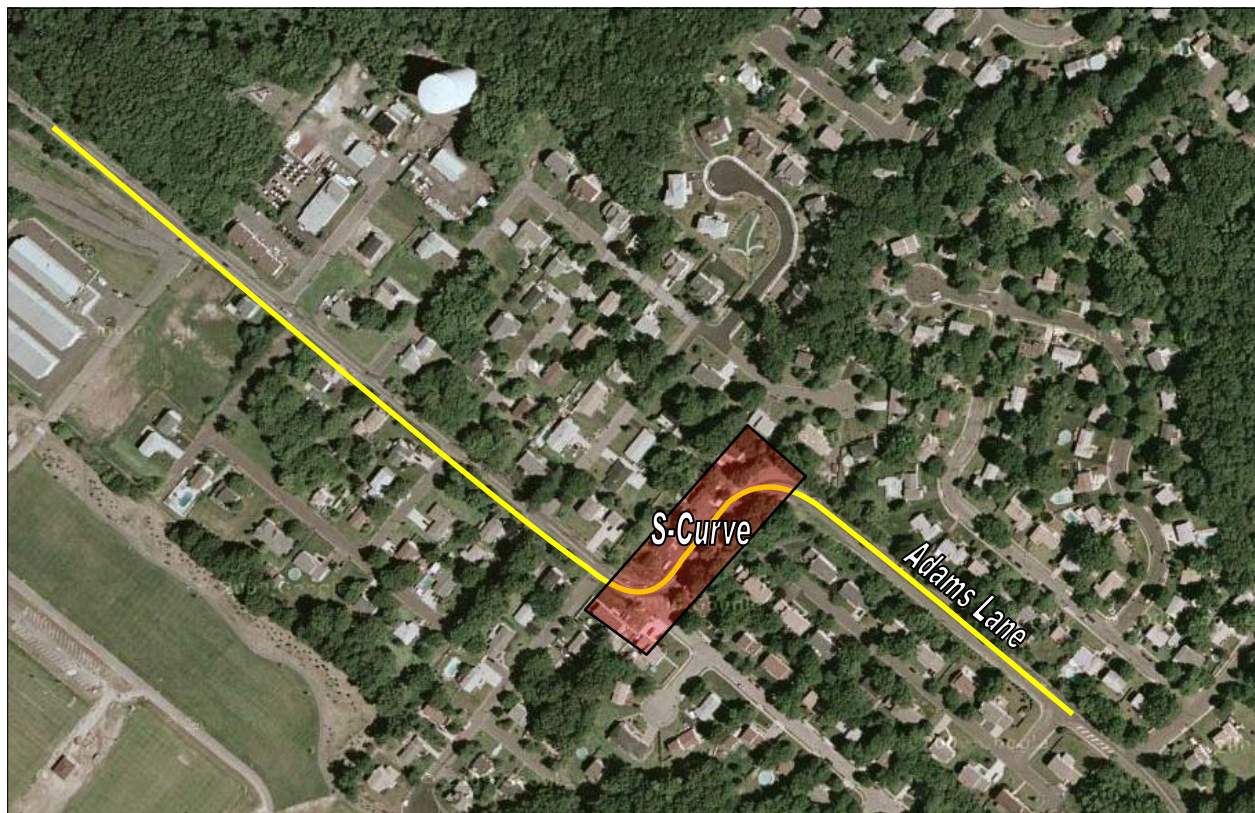
Efficient east-west capacity is needed to support the large number of vehicles traveling between Route 1 and areas east of Route 130 such as East Brunswick, the New Jersey Turnpike and other destinations. However, due to the excessive delay along Cozzens Lane, efficient connectivity currently does not exist.

When the proposed Final Build improvements are realized at Cozzens Lane, and the other intersections along Route 1, the need for an additional, new east-west connection greatly



diminishes. The improvements to these existing intersections will greatly improve their operation, providing efficient movement between Route 27, and points east of Route 130.

Adams Lane / Cozzens Lane will continue to act as an E-W connector. To support this role in the long term, every effort should be made to smooth the existing 'S-Curve' along Adams Lane such that traffic may progress more efficiently. It may not be feasible to provide this improvement in conjunction with this development, however, the Township and County should make a concerted effort to acquire the necessary ROW and funds to make this improvement as opportunities arise to do so. **Figure 32** depicts the existing 'S -Curve.'



**Figure 32 - Adams Lane 'S-Curve'**

If an additional east-west connector is constructed, it should be done in coordination with a proposed turn-back loop, which NJTransit may construct if a train station is constructed at NBTOD. To support such, the crossing for the turn-back loop should be constructed with sufficient width to support vehicular traffic if such an east-west connector is constructed at a future date.





### **XIII. IMPROVEMENTS TO ARLINGTON AVENUE**

A secondary goal of this study was to evaluate the impact any of these improvements would have to Arlington Avenue in the vicinity of the Cozzens Lane / Adams Lane & Route 1 intersection.

The realignment of Cozzens Lane to the jughandle roadway will eliminate the congestion along this Arlington Avenue by significantly reducing the traffic volumes along Cozzens Lane. The significant reduction of traffic volumes along Cozzens Lane will improve the LOS significantly, as tabulated within **Table 21**.

**Table 21 - 2012 LOS @ Cozzens Lane & Arlington Avenue**

<b>Arlington Ave Approach LOS: Cozzens Lane &amp; Arlington Avenue</b>			
<b>Peak Hour</b>	<b>2012 No-Build LOS (Travel Delay)</b>	<b>2012 Full-Build (w/Improvements) LOS (Travel Delay)</b>	<b>Change in Travel Delay*</b>
<b>PM</b>	<b>F (113.8 sec.)</b>	<b>B (11.9 sec.)</b>	<b>-101.9 sec.</b>

\*Negative Number Represents Desirable Change

Furthermore, the 95<sup>th</sup> percentile queue was evaluated to show the reduction of queues along Arlington Avenue. **Table 22** tabulates the reduction in queues along Arlington Avenue as a result of the reduction of traffic volumes along Cozzens Lane.

**Table 22 - 2012 Queue @ Cozzens Lane & Arlington Avenue**

<b>Arlington Ave Approach LOS: Cozzens Lane &amp; Arlington Avenue</b>			
<b>Peak Hour</b>	<b>2012 No-Build 95<sup>th</sup> Queue</b>	<b>2012 Full-Build 95<sup>th</sup> Queue (w/Improvements)</b>	<b>Reduction of Queue</b>
<b>PM</b>	<b>20 veh.</b>	<b>3 veh.</b>	<b>17 veh.</b>

The operation resulting from the Arlington Bypass will significantly improve Arlington Avenue. However, to reduce the number of cut-through vehicles traversing Arlington Avenue, it is recommended that four (4) speed humps be installed. These humps would reduce vehicular speeds to a level which is typically found in residential areas, and would deter motorists from using Arlington Avenue as a cut-through. In addition to speed humps, signage should be installed at the intersection of Jersey Avenue & Orchard Street to direct motorists destined for Cozzens Lane to make a left turn and utilize the intersection of Route 1 & Cozzens Lane.



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## **XIV. SUMMARY & CONCLUSIONS**

### **Phase 1**

Based on the results of this study, both Phase 1 of NBTOD and the BJs may be developed according to the current land use plan outlined within this study. The development of NBTOD and BJs requires that the improvements recommended to be constructed by the developers, as a condition of the rezoning of the properties, are constructed prior to issuance of certificates of occupancy.

The resulting traffic operations along Cozzens Lane, Adams Lane, and Commerce Boulevard will be significantly better than the existing conditions.

For the 2012 proposed improvements, NBTOD will be responsible for approximately 85% of the proposed improvements along the corridor. Prestige will be responsible for the remaining 15%.

The Township should work with NJDOT to expedite the planned widening of Route 1 from Aaron Road to Finnegan Lane.

### **Final Build**

For the Final Build of NBTOD, including the train station and the Park & Ride facility, significant improvements will be required. Grade separation will be required at Finnegan Lane, Commerce Blvd and Cozzens Lane along Route 1. Please note that the County is currently investigating a grade-separated interchange at Finnegan Lane, based on its existing operation. Additional improvements will also be required at Aaron Road & Route 1 and Adams Lane & Route 130.