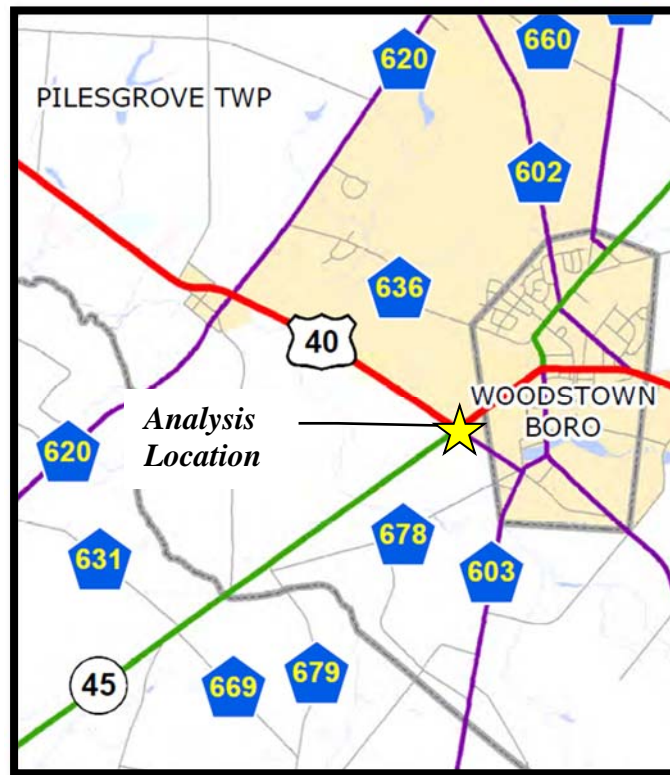


# Traffic Intersection Analysis



**US Route 40, State Highway 45, and Bailey Street (C.R. 616)  
Pilesgrove Township, Salem County, New Jersey**

**December 8, 2017**

**Prepared for:** County of Salem

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ENGINEERS**

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## **I. INTRODUCTION**

Remington & Vernick Engineers has been retained by Salem County to study, analyze and develop an improvement plan for the intersection of US Route 40, State Highway 45, and Bailey Street (C.R. 616) located in Pilesgrove Township in Salem County, New Jersey. This work is associated with the larger Intersection & Road Analyses for the County of Salem.

The study is intended to evaluate potential improvement alternatives including existing signal timing, signage, striping, pavement marking upgrades and other geometric and operational improvements. Figure 1 shows the location of the study intersection. The main objective of this report was to analyze existing conditions, traffic patterns, and improvement alternatives at the intersection and to provide a recommended course of action. In order to complete this study, the following data was collected and utilized during the course of this corridor study:

- Peak period intersection turning movement counts from NJDOT
- Three years of traffic crash reports within the project limits from the New Jersey State Police Department
- Physical inventory of existing pavement condition, roadway/shoulder widths, signage, striping, and pavement markings.
- NJDOT Straight Line Diagrams and aerial photographs and photos from the area.

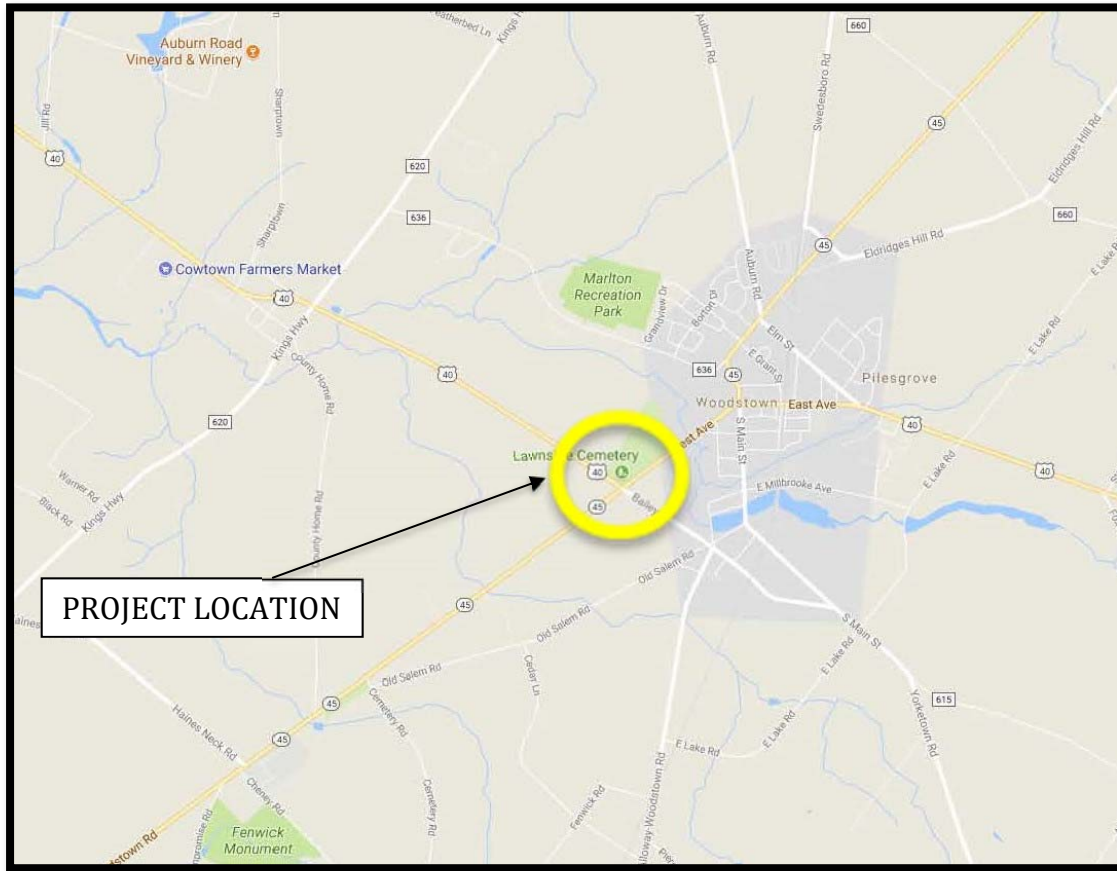
### **I.a. INTERSECTION HISTORY**

This intersection in particular has been a subject of discussion among the community for several years due to its significance as a junction and its irregular lane configurations which cause safety concerns to users. Specifically, the topic of intersection improvements at this location has been spearheaded by the Women's Club of Woodstown. RVE met with the Club on September 22, 2017, to discuss the history of the intersection and to hear concerns. Below is a summary of the documented timeline of the intersection:

- Fall 2010 – Initial correspondence to NJDOT regarding safety concerns at the intersection
- Summer 2012 – Salem County Freeholders issue Resolution #2010 “Urging NJDOT to complete Intersection Improvements at Route 40/45 and Bailey Street, County Road 616”.
- Fall 2014 – Exclusive right-turn lane added along NJ 45 providing access to the Wawa site and an exclusive turn lane added at the intersection.
- Winter 2014 – Letter sent to NJ State Senate requesting the investigation of lead-left turn phasing at the NJ 45 & NJ45/US 40 approaches of the intersection.
- Winter 2015 – letter sent from NJDOT outlining municipal cost share requirements in operationally-based electrical construction projects per NJDOT Policy 346.

## **Figure 1 – Location Map**

US Route #40, State Highway #45, and Bailey Street (CR 616)  
Pilesgrove Township, Salem County, New Jersey



## **II. EXISTING CONDITIONS**

In order to evaluate the safety and operations of the existing intersection and to develop recommendations, RVE conducted a physical inventory of various features that may affect traffic flow and safety characteristics.

The study intersection is a four-legged, signalized intersection with U.S. Route 40, State Highway 45, and Bailey Street (C.R. 616). For the purposes of this study, State Highway 45 will be designated to have a north/south orientation with U.S. Route 40 and Bailey Street (C.R. 616) having an east/west orientation.

U.S. Route 40 is the major route at this intersection and has the largest traffic volumes. The road has a posted speed limit of 45 miles per hour (MPH). The road is a two-lane Urban Principal Arterial with one lane in each direction. The eastbound approach of US Route 40 consists of one 12-foot exclusive left-turn lane and one 14-foot wide shared through and right-turn lane with no shoulder on either side of the travel lanes.

US Route 40, State Highway 45, and Bailey Street (CR 616)

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The westbound approach is shared with State Highway 45's southbound approach and widens at the intersection to form two 12-foot lanes with no shoulder. The two lanes along the westbound approach include one shared through and left-turn lane and one right-turn-only lane. The southbound approach has a 4-foot wide sidewalk on the west side of the roadway and no sidewalk on the east side.

State Highway 45 is a two-lane, Urban Minor Arterial with one lane in each direction. In the northbound direction, the approach widens along the approach to form one 15-foot shared through and left-turn lane and one 12-foot exclusive right-turn lane. The road has a posted speed limit of 50 MPH and can accommodate pedestrians on the east side of the roadway on a 4-foot wide sidewalk.

Bailey Street (CR 616) is a two-lane (one lane in each direction), Urban Major Collector approaching the study intersection in the westbound direction. The approach widens at the intersection to include one 13-foot shared through and right-turn lane, one 12-foot left-turn-only lane, and a 12-foot shoulder on the south side of the traveled way. The road has a posted speed limit of 35 MPH and includes 4-foot wide sidewalk on both sides of the roadway.

The study intersection is located in an urban area surrounded by a mix of retail, recreational and agricultural land uses in the vicinity. US Route 40 and State Highway 45 provide through routes to other major interstates and state routes including Interstate 295, US Route 322, and State Highway 49.

### III. EXISTING TRAFFIC CONDITIONS

In order to study and evaluate the intersection, turning movement counts from the New Jersey Department of Transportation's (NJDOT) database were analyzed. The turning movement counts were conducted in December, 2015 and indicate the morning peak hour occurs between 7:00 AM and 8:00 AM while the afternoon peak hour occurs between 4:15 PM and 5:15 PM. The existing peak hour traffic volumes are depicted in Figure 2 as well as Table 1.

The existing traffic signal operates under a three-phase timing pattern. The first phase allows both the northbound approach of State Highway 45 and southbound approach of State Highway 45/US Route 40 to move simultaneously with permitted left turns. The side street movements then operate with split phasing, where the westbound approach of Bailey Street (CR 616) and the eastbound approach of US Route 40 each move separately. The westbound approach of Bailey Street (CR 616) moves during the second phase and then the opposing approach on US Route 40 moves during the third and final phase of the cycle. During the US Route 40 eastbound green phase the right turn lane on the southbound approach of State Highway 45/US Route 40 receives a protected right-turn arrow. There are no right-turn-on-red restrictions, and video and pedestrian detection is present on all legs of the intersection. Records from the NJDOT indicate a maximum 108 second variable cycle for the intersection.



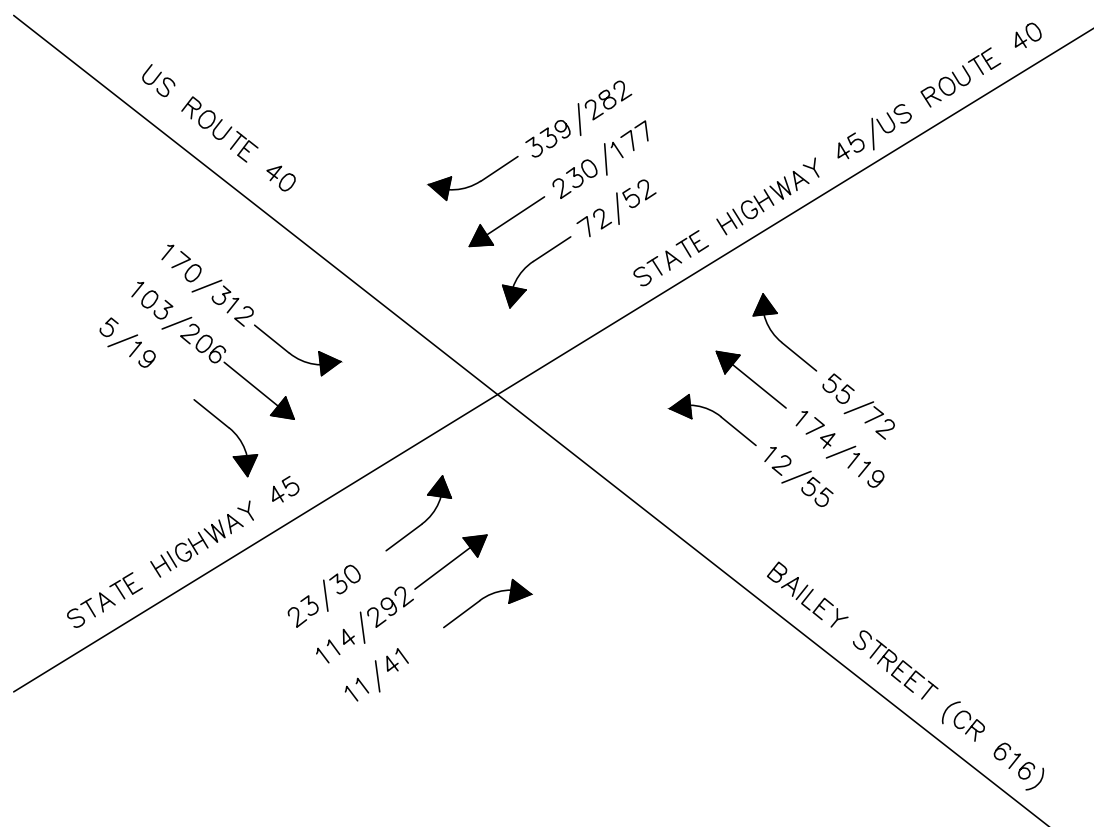


FIGURE 2 – EXISTING 2017 PEAK HOUR VOLUME

LEGEND

#/# – EXISTING AM/PM

DATA COLLECTED BY NJDOT IN DECEMBER, 2015

**Table 1 – Existing Peak Hour Traffic Volumes**

<b>Approach</b>	<b>Movement</b>	<b>AM</b>	<b>PM</b>
US Route 40 Eastbound	Left	107	312
	Thru	103	206
	Right	5	19
State Highway 45 Northbound	Left	23	30
	Thru	114	292
	Right	11	41
State Highway 45 / US Route 40 Southbound	Left	72	52
	Thru	230	177
	Right	339	282
Bailey Street (CR 616) Westbound	Left	12	55
	Thru	174	119
	Right	55	72

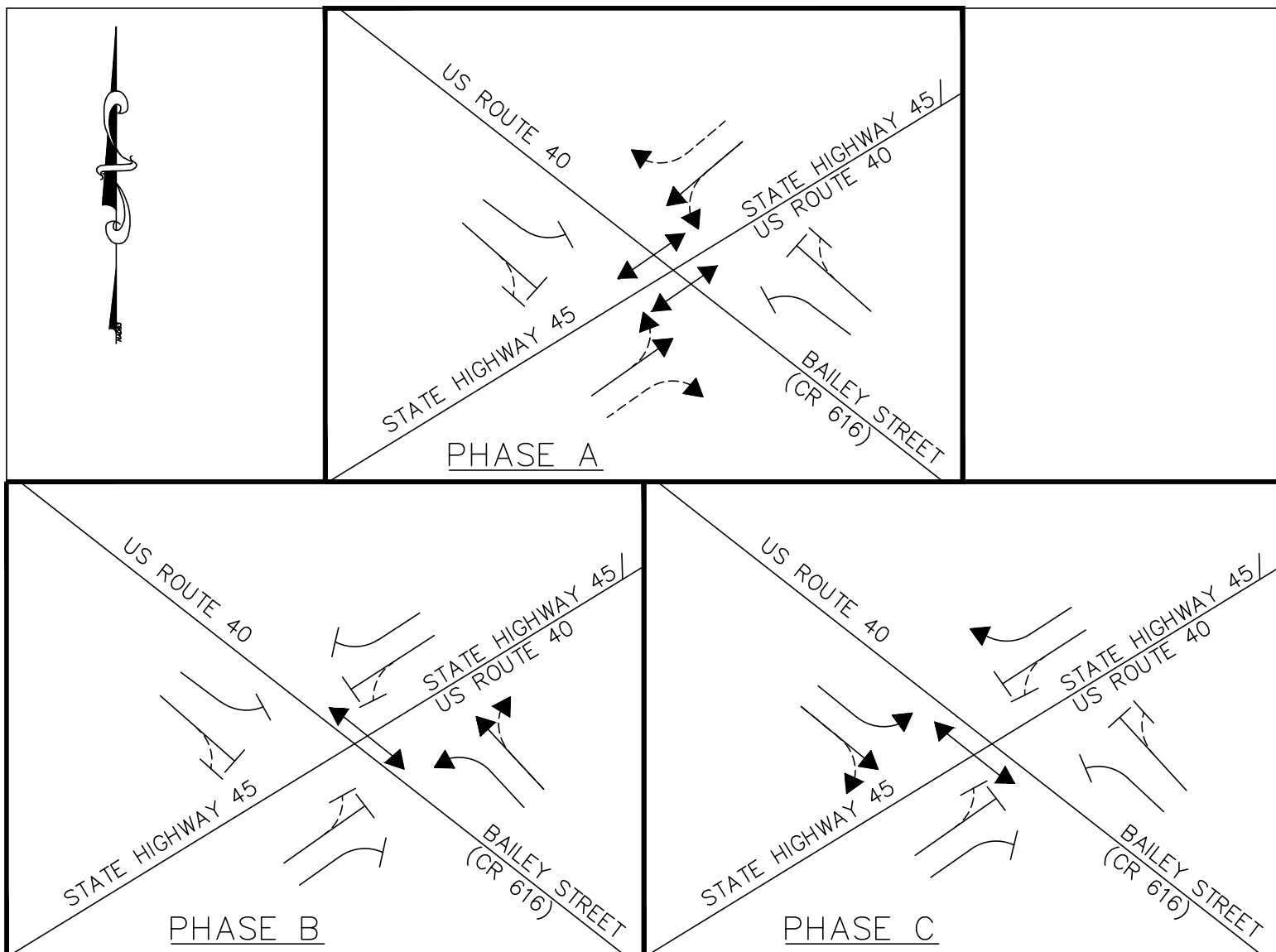


FIGURE 3 – EXISTING 2017 PHASE DIAGRAM

LEGEND

- ↑ PROTECTED MOVEMENT
- ⋈ PERMITTED MOVEMENT
- ⊥ PROHIBITED MOVEMENT
- ↔ PROTECTED PEDESTRIAN MOVEMENT

#### IV. CRASH HISTORY AND EVALUATIONS

The reasons for analyzing traffic crash data are (1) to identify any crash patterns that may exist, (2) to determine the probable causes of crashes with respect to drivers, roadway and vehicles, and (3) to develop countermeasures that will reduce the rate and severity of crashes.

A review of crash data was conducted to identify safety concerns that may exist at a particular location. The data was also used to identify intersection crash patterns, from which possible causes of crashes may be identified, leading to the identification of possible remedial actions.

During a three-year period between October 2014 and October 2017, the study intersection experienced eighteen (18) reported crashes. Table 2 summarizes the reported crashes by type of collision.

**Table 2 – Crash Summary**

Type	Total # of Crashes	% of Total	# of Personal Injuries
Sideswipe	1	6%	0
Overtake	2	11%	0
Head On	0	0%	0
Left Turn	0	0%	0
Rear End	7	39%	1
Right Angle	5	27%	3
Parked Vehicle	1	6%	0
Bike Other	2	11%	0
<b>Total Within Scope</b>	18	100%	4

The crash data was taken directly from police reports prepared by the New Jersey State Police Department. Since the individual crash reports include personal information, they are not included with this report. The crash reports will remain on file for the duration of the study. However, the personal information related to each report are not included analysis.

The data indicates the predominant crash type within the study limits are rear end collisions at 39%. These crashes are likely related to driver inattentiveness while approaching the signalized intersection. Right angle collisions were also among the most predominant crash types at 27%. These crashes are likely related to drivers' failure to obey the traffic signal operations. A total of four (4) personal injuries were recorded during the three-year review period, and there were no fatal crashes during this timeframe. Most of the crashes occurred during the daylight hours, in clear weather and on dry roadway conditions.

## V. TRAFFIC ANALYSIS

A capacity analysis for the study intersection was conducted using Highway Capacity Software, Version 7.1 (HCS7). HCS7 is the most current version of the software which is a widely-accepted traffic analysis tool used by NJDOT and other agencies. The capacity analysis software is used to estimate the roadway's ability to accommodate existing and projected traffic volumes. The results are presented in terms of Level of Service (LOS) as defined by the Highway Capacity Manual, 6<sup>th</sup> Edition (HCM), published by the Transportation Research Board. LOS is a measure of vehicular delay and is used to describe the operational characteristics of intersections and other roadway facilities. The main factors that affect delay at a signalized intersection are traffic volumes, signal operations, and lane configurations. The LOS criteria from the HCM for a signalized intersection, is shown in Table 3.

**Table 3 - Level of Service Criteria for Signalized Intersections**

<b><u>Level of Service</u></b>	<b><u>Delay (sec)</u></b>
A	≤ 10
B	> 10 – 20
C	>20 – 35
D	>35 – 55
E	>55 – 80
F	>80

The LOS analysis was conducted under the AM and PM peak hour conditions for all existing and proposed scenarios. In each case the intersection's volume, geometry, and lane configurations were input into HCS7. Intersection capacity analysis reports were then produced for each turning movement and intersection approach. The HCS7 reports for the existing and proposed alternative conditions are provided in Appendix C of the report.

Collectively the LOS analysis of the existing roadway provides a method of quantifying how the intersection operates today and how it may operate in the future. The traffic count data recorded in December of 2015 was used for existing 2017 as traffic growth was assumed to be flat.

The LOS for the existing conditions and proposed configuration were analyzed and the results are summarized in the Tables 4, 5, 6 and 7, and Figures 4, 6, 7 and 9. These results show the existing and proposed LOS results with the proposed lane configuration. Based on the analysis, the intersection is currently operating at an acceptable level with all movements performing at an LOS C or better.

**Table 4 – Existing Signalized LOS and Delay**

<b>Approach</b>	<b>AM</b>	<b>PM</b>
US Route 40, Eastbound	C (21.7)	C (23.6)
State Highway 45 / US Route 40, Southbound	C (21.4)	C (22.8)
State Highway 45, Northbound	B (16.4)	C (21.7)
Bailey Street (CR 616), Westbound	C (27.6)	C (28.7)
Overall	C (22.0)	C (23.7)

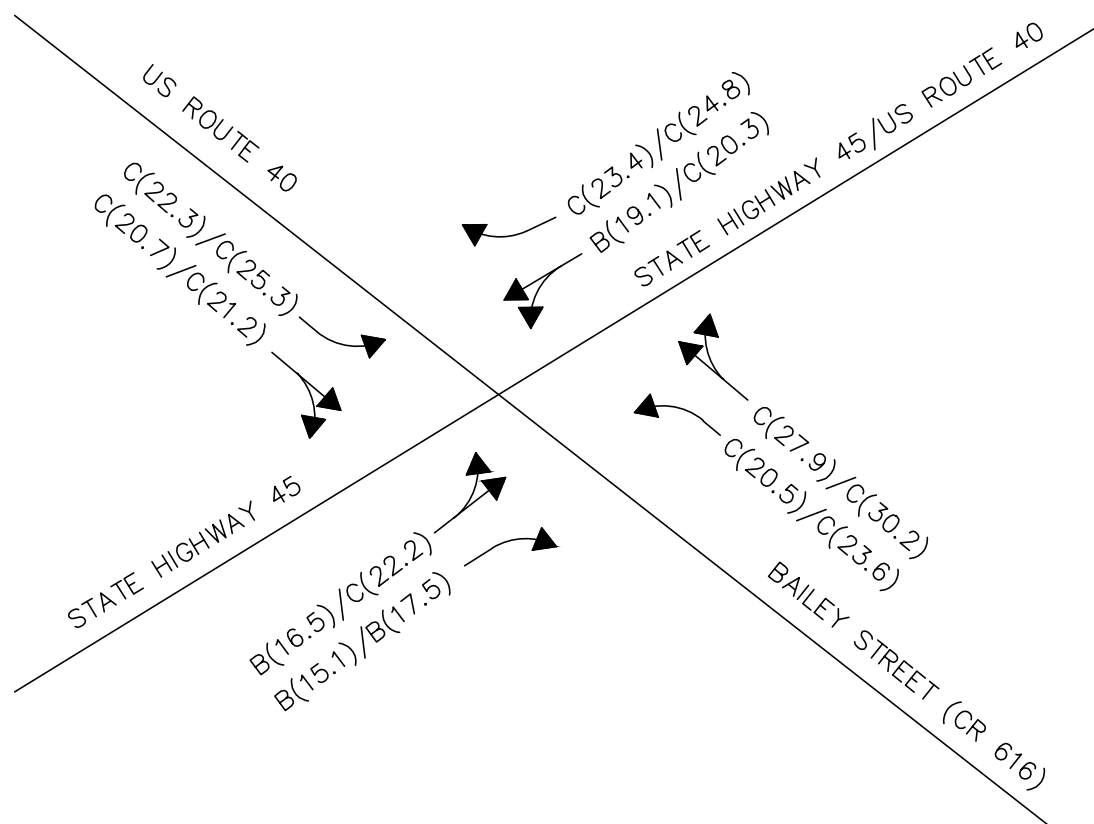


FIGURE 4 –EXISTING LEVEL OF SERVICE  
AND DELAY RESULTS

LEGEND

A(9.8) = APPROACH LOS (DELAY IN SEC.) A.M. PEAK/ P.M. PEAK

## VI. IMPROVEMENT ALTERNATIVE ANALYSIS

Four conceptual improvements have been developed to mitigate the traffic and safety concerns at the intersection. For each improvement, traffic signal timing optimization analysis was performed as applicable. The purpose of timing optimization is to identify the most effective cycle length and phasing for a given set of traffic volumes and conditions. The signal timing optimization analysis procedure employed in this study utilized the latest Highway Capacity Software (Version 7.1). The HCS program allows users to analyze and optimize an intersection's timing plan by varying the available green time for each phase and balancing the ratio of the traffic volume to the capacity of each phase.

This alternative analysis also analyzes construction impacts on right-of-way, utilities, and traffic operations. A conceptual engineer's estimate has been prepared for our recommended alternative. The estimate breaks down the overall cost of construction, professional engineering and inspection services, right-of-way acquisition, stormwater management, environmental remediation, and utility impacts.

The following improvement alternatives were considered and evaluated.

- **Alternative 1** – Revise lane configuration at the NJ 45 northbound and NJ 45/US 40 southbound approaches from Thru-left & Right to Left & Thru-right.
- **Alternative 2** – Revise lane configuration at the NJ 45 northbound and NJ 45/US 40 southbound approaches from Thru-left & Right to Left & Thru-right. Add protected left-turn phases to the northbound and southbound approaches.
- **Alternative 3** – Widen southbound NJ 45/US 40 approach to provide an exclusive right-turn lane. Reconfigure existing two lanes to an exclusive left-turn and exclusive thru lane.

With the exception of pavement marking modifications, traffic signal head replacements and timing revisions, only Alternative 3 will require significant roadway construction and associated relocations.

The improvement plan listed above includes improvements that aim to minimize the need for additional widening or full redesign/construction of the existing intersection. Based on the existing conditions, the improvement scenarios have been developed out of a need to improve the traffic flow and safety characteristics of the intersection.

A detailed summary of each of the recommended intersection improvements is found in the following sections of this report.



## Alternative 1

Alternative 1 involves revising the lane configuration at the NJ 45 northbound and NJ 45/US 40 southbound approaches from Thru-left & Right to Left & Thru-right. This alternative is intended to improve safety at the intersection. Moreover, it is intended to prevent the often-occurring illegal through movements that occur from the exclusive right turn lanes; a result of queueing of the shared thru-left lane. Individually, the signalized intersection currently operates at an overall LOS C with an average delay of 22 seconds or better during the weekday peak periods. A conceptual-level layout is included for reference and is labeled Figure 5.

While this configuration will extend queueing along southbound NJ 45/US 40 due to combining the large volume of right turns with the through movements, timing adjustments will be made to mitigate the effects. Also, this proposed configuration is operationally sounder than the original configuration as through movements will no longer be blocked by left-turn vehicles at the northbound and southbound approaches. The northbound NJ 45 lane markings will be restriped and realigned to better align with the US 40 receiving lane.

### *Traffic*

A traffic analysis for the proposed signal timings was completed using the latest version of HCS, version 7.1. The analysis was completed for the AM and PM peak hours using the existing (2017) volume conditions. The results show an overall LOS C during both the AM and PM peak periods with certain approaches (Bailey Street & US 40 Eastbound) at LOS D during the PM peak. Overall the individual intersection delays increase when compared to the existing conditions.

**Table 5 – Alternative 1 - LOS and Delay**

Approach	AM	PM
US Route 40, Eastbound	C (33.8)	D (37.6)
State Highway 45 / US Route 40, Southbound	C (21.4)	C (26.0)
State Highway 45, Northbound	B (16.1)	C (22.2)
Bailey Street (CR 616), Westbound	C (35.0)	D (38.7)
Overall	C (25.9)	C (30.8)

## Construction Impacts

### *Utilities*

It is anticipated that the proposed alternatives will have no impact on the existing underground or above ground utilities. Select existing traffic signal equipment (signal

heads), signs and pavement markings will be upgraded for the new lane reconfiguration, but with no impact to utilities.

### *Right-of-Way*

The proposed design will require no right-of-way acquisition since the proposed improvements are confined to the existing right-of-way. This assumes the signal will be permitted to be revised without upgrading ADA ramps at the intersection, in which case right-of-way acquisitions or easements will be required for the parcels on the Northwest and Northeast corners.

### *Project cost*

The estimated cost for this alternative is **\$33,000**. The cost estimate is based on a cost of \$26,000 for construction and \$7,000 for engineering design. The cost does not assume ADA improvements at the intersection since there will not be resurfacing or reconstruction of the road. Existing pavement markings will be removed and new markings installed in its place. Detailed cost estimates of each alternative are included in Appendix H.



CR 616 (BAILEY STREET) AND US ROUTE 40/NJ ROUTE 45



PILESGROVE TOWNSHIP  
SALEM COUNTY, NEW JERSEY

NOT TO SCALE  
DATE: 11/27/2017

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ALTERNATIVE 1



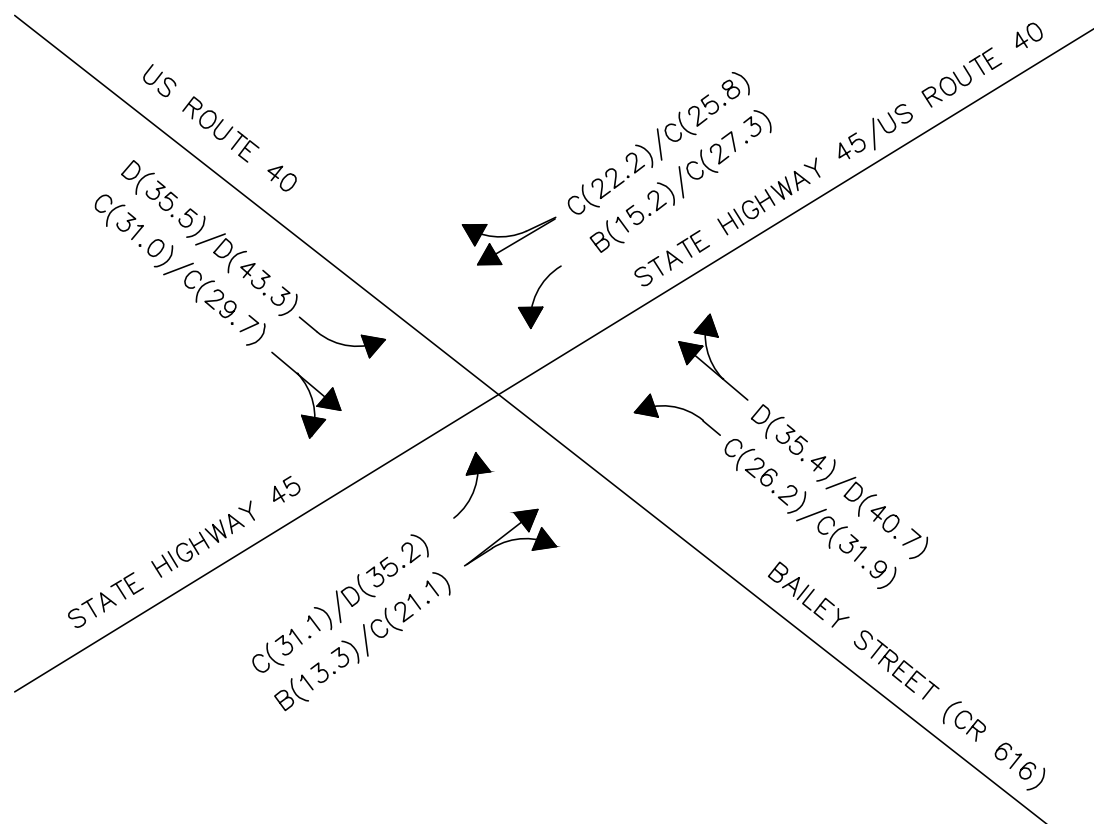


FIGURE 6 – ALTERNATIVE 1 LEVEL OF SERVICE AND DELAY RESULTS

LEGEND

A(9.8) = APPROACH LOS (DELAY IN SEC.) A.M. PEAK/ P.M. PEAK

## Alternative 2

Alternative 2 mirrors the improvements of Alternative 1 with one adjustment; the addition of protected left-turn phases for the northbound and southbound approaches.

The intersection would be optimized to allow opposing protected left-turns in the northbound and southbound directions before allowing through traffic in both directions with permitted left turns. The added left turn lanes would provide separation of the higher volume through movements and the left turns. Currently both movements occur in the same shared lane and the crash reports indicated several rear-end and overtaking collisions as a result of heavy volume through the intersections.

While protected left turns can provide a safety benefit at this intersection, recent crash records do not indicate a preponderance of accidents related to left-turn conflicts that could be remedied by installing turn arrows. In addition, the volume of left-turning vehicles is small in comparison with the through and right-turn movements at the intersection. In this manner, protected left-turns should only be implemented if they provide a significant increase in safety and do not greatly degrade the intersection's traffic flow.

### *Traffic*

A traffic analysis for the proposed signal timings was completed using the latest version of HCS, version 7.1. The analysis was completed for the AM and PM peak hours using the existing (2017) volume conditions. The results show an overall LOS D during both the AM and PM peak periods with US 40 Eastbound at LOS F during the PM peak. Overall the individual intersection delays increase when compared to the existing conditions and Alternative 1.

**Table 6 – Alternative 2 - LOS and Delay**

Approach	AM	PM
US Route 40, Eastbound	D (41.9)	F (92.5)
State Highway 45 / US Route 40, Southbound	C (33.5)	C (31.0)
State Highway 45, Northbound	B (18.8)	C (24.1)
Bailey Street (CR 616), Westbound	D (41.5)	D (38.8)
Overall	D (35.1)	D (50.6)

## Construction Impacts

### *Utilities*

Similar to Alternative 1, it is anticipated that the proposed alternatives will have no impact on the existing underground or above ground utilities.

### *Right-of-Way*

The proposed design will require no right-of-way acquisition since the proposed improvements are confined to the existing right-of-way.

### *Project cost*

The estimated cost for this alternative is **\$39,000**. The cost estimate is based on a cost of \$32,000 for construction and \$7,000 for engineering design. Similar to Alternative 1, the cost does not assume ADA improvements at the intersection. Detailed cost estimates of each alternative are included in Appendix H.

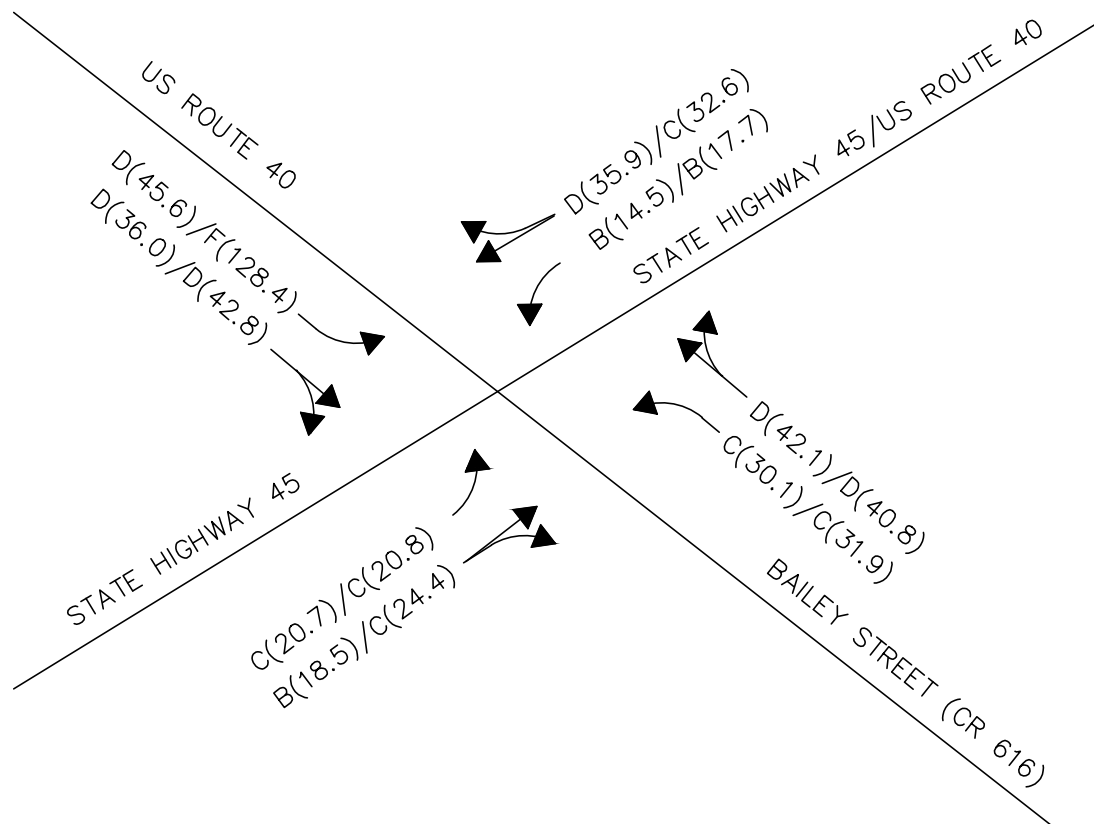


FIGURE 7 – ALTERNATIVE 2 LEVEL OF SERVICE AND DELAY RESULTS

LEGEND

A(9.8) = APPROACH LOS (DELAY IN SEC.) A.M. PEAK/ P.M. PEAK

### Alternative 3

Alternative 3 involves widening the NJ 45/US 40 southbound approach to provide a dedicated left-turn lane in addition to exclusive through and right-turn-only lanes. While this improvement is the costliest, it provides the best design for traffic flow and greatly improves the safety of the intersection. Individually, the signalized intersection currently operates at an overall LOS C with an average delay of 24 seconds or better during the weekday peak periods.

Due to the scope of the proposed improvements, a full resurfacing of the intersection with ADA-compliant curb ramps and push buttons will be required. This is reflected in the cost estimate located in Appendix H.

#### *Traffic*

The results show an overall LOS C during both the AM and PM peak periods with all approaches operating at LOS C or better. Overall the individual intersection delays decrease or remain at current levels when compared to the existing conditions.

**Table 7 – Alternative 3 - LOS and Delay**

Approach	AM	PM
US Route 40, Eastbound	C (23.4)	C (29.7)
State Highway 45 / US Route 40, Southbound	B (18.1)	C (21.5)
State Highway 45, Northbound	B (15.3)	C (21.7)
Bailey Street (CR 616), Westbound	C (25.5)	C (31.1)
Overall	C (20.3)	C (25.6)

### Construction Impacts

#### *Utilities*

It is anticipated that the proposed alternatives will have no impact on the existing underground or above ground utilities. Impacted traffic signal equipment (junction boxes, foundations, standards, etc.) will be replaced during construction, but with no anticipated impact to utilities.

#### *Right-of-Way*

The proposed design will require right-of-way acquisition or dedication on the adjacent parcel on the northwest corner of the intersection, currently owned by Lawnside Cemetery Association. In addition to the parcel acquisition, a large stone arched monument will be need to be relocated as part of the proposed construction.



### *Project Cost*

The estimated cost for this alternative is **\$371,000**. The cost estimate is based on a cost of \$293,000 for construction, \$34,000 for engineering services and \$44,000 for construction management and inspection. This cost estimate includes ADA improvements on the northwest and northeast corners, pavement resurfacing and widening, a new signal pole mast arm, standard and foundation and a new pedestrian pole standard and foundation. Detailed cost estimates of each alternative are included in Appendix H.



CR 616 (BAILEY STREET) AND US ROUTE 40/NJ ROUTE 45



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ALTERNATIVE 3

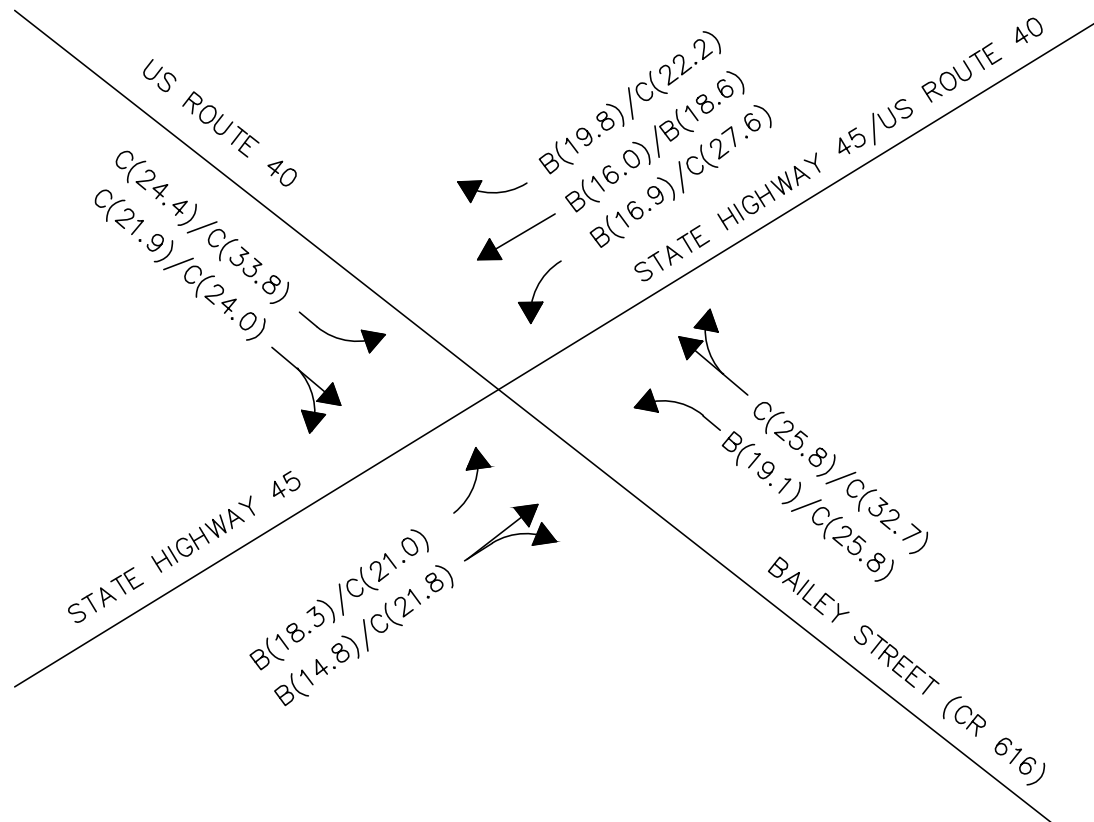


FIGURE 9 – ALTERNATIVE 3 LEVEL OF SERVICE AND DELAY RESULTS

LEGEND

A(9.8) = APPROACH LOS (DELAY IN SEC.) A.M. PEAK/ P.M. PEAK

## VII. RECOMMENDATIONS

After reviewing the existing traffic data and crash reports and after having analyzed potential improvements at this intersection, we recommend the installation of Alternative 1. This improvement will provide a much-needed safety improvement to the intersection without severely affecting traffic operations.

Alternative 2 would provide northbound and southbound left turns with unobstructed opportunities to complete the movements, but the low turning volumes (~ 1 turn/cycle/approach) do not warrant installing arrows that would further degrade the intersection's operation.

Alternative 3 would provide the safety improvement of separating the through and left-turn movements (as in Alternative 1) while maintaining the exclusive right turn lane on the southbound US 40/NJ 45 approach. However, given the anticipated traffic volumes and construction cost it is recommended that Alternative 1 be installed first as it will prove more cost-effective and can be implemented faster than installing Alternative 3.

If traffic volumes drastically increase on US 40 & NJ 45, Alternative 3 may be implemented at any time when funds become available. All three of the alternatives are complimentary to each other. That is to say, each alternative may be installed progressively as it is warranted without removing or replacing the preceding improvements.

### Other Considerations/Recommendations

Although the analysis presented in this report focuses on optimizing existing traffic conditions, through our investigations we have found other design flaws that should be improved either as part of a project that emanates from this study or as a separate project. These deficiencies and proposed improvements are detailed below.

- Pedestrian Access
  - This intersection is not fully compliant with ADA requirements. In particular, access to pedestrian push buttons are not 10" or less from level landings on several corners. Also, sidewalks and pedestrian facilities are discontinuous and do not allow for access to all four corners of the intersection. ADA improvements should be a part of any signal upgrade at this intersection. The cost of these improvements is included only in the Alternative 3 cost estimate since the intersection will be resurfaced and widened.
  - Through our meeting with the Women's Club of Woodstown and through visual inspection we are aware that pedestrians originating from the Bailey Corner apartments along Bailey Street often walk to the shopping center on the southwest corner of the intersection. Since there is no sidewalk access from the westerly side of NJ 45, pedestrians choose to utilize the sidewalk on the easterly



side and then cross illegally at a mid-block location. Sidewalk may be installed from the intersection along the westerly side of NJ 45 to the entrance of the shopping center.

## **Conclusion / Next Steps**

If the County selects Alternative 1, the funds for construction can be supplied by the County to expedite the improvements. However, since the signal is under the jurisdiction of NJDOT the signal alteration will require formal approval.

The County may obtain approval from the State through its Highway Occupancy Permit (HOP) process. The HOP process and submission requirements are outlined in N.J.A.C. 16:41.

If NJDOT determines that an HOP permit will not suffice, a Street Intersection Permit will need to be obtained. According to New Jersey Administrative Code 16:47-4.19 Street Intersection or Street Improvement Permits,

Applications that do not involve an increase in the number of lanes intersecting the State highway are street improvement applications. These applications shall be accompanied by six copies of a plan with the intersection enlarged at a scale of one inch equals 30 feet (1=300 for metric) showing such detail as curb, gutter, sidewalk, curb radii, and drainage structures. These applications shall be signed by a county official, municipal official, or a developer. When the Department responds to the applicant and furnishes permit documents for signature, the permit shall be signed by an official of the county or municipality.

The Street Improvement Application (MT-158) shall be submitted to the Regional Maintenance Office. We recommend submitting this report along with a cover letter to the Office before designing plans.

Conversely, if Alternative 3 is chosen, a Street Intersection Permit (MT-160) will be required to be submitted to the Bureau of Major Access Permits.

This application will likely be reviewed as a minor access. According to N.J.A.C. 16:47-4.8 Minor access permits process,

Minor applications that require modification of traffic signals must be reviewed by the Office of Traffic Signal and Safety Engineering. Minor permits may be issued conditionally, subject to approval of traffic signal work. The final approval may extend the minor application review time by 45 days.

We recommend receiving concurrence from the Department before preparing any application for State Aid (if Alternative 3 is sought). After providing the Department with the contents of this report and gaining the aforementioned permit, we recommend the County prepare an application for County Aid to the District 4 office in Cherry Hill.

Prior to submission, this proposed project must be added to the County's Annual Transportation Program (ATP) and approved by the County Freeholders.

# Appendix A

## Site Photographs







*Looking west towards US Route 40*



*Southbound US Route 40 Approach*



*Looking east towards Bailey Street*



*Looking west at the Eastbound Approach*





*Looking south at Route 45*



*Pedestrian Accommodations on the northeast corner*



*Looking south at Route 45*

# Appendix B

## TRAFFIC COUNT DATA

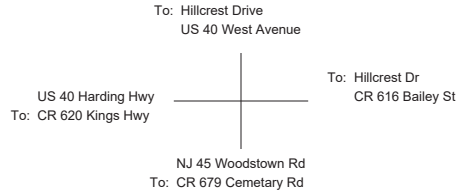


# NEW JERSEY DEPARTMENT OF TRANSPORTATION TRAFFIC COUNT SUMMARY

PROJECT NO: 15t-315  
ROUTE/m.p.: 00000045 /8.80  
ROUTE/m.p.: 00000040 /10.1  
MUNICIPALITY: Pilesgrove Twp  
COUNTY: Salem  
DATE(s): Wed, 12/9/2015  
TIME(s): 06:00 AM - 06:00 PM  
WEATHER: Overcast  
TEMP.: 55  
COMMENT:

SRI NO: 00000045  
N-S STREET: US 40 West Avenue  
E-W STREET: CR 616 Bailey St  
MUN. CODE: 1709  
CO. CODE: 17  
COUNTED FOR: NJDOT  
PERSON: John T  
COUNTED BY: GPI  
ENUMER: AJ S & Pat H

Factors  
for Year  
2012



VEH TYPE: Total Volume(All Classes)

TIME PERIOD	NJ 45 Woodstown Rd				APPR. TOTAL	US 40 West Avenue				APPR. TOTAL	US 40 Harding Hwy				EB RT	APPR. TOTAL	CR 616 Bailey St				WB RT	APPR. TOTAL	GRAND TOTAL
	U	LT	TH	RT		U	LT	TH	RT		U	LT	TH	RT		U	LT	TH	RT				
6:00 - 6:15	0	2	14	0	16	0	15	22	39	76	0	30	24	1	55	0	3	24	11	38	185		
6:15 - 6:30	0	1	13	3	17	0	8	26	63	97	0	36	21	3	60	0	1	40	9	50	224		
6:30 - 6:45	0	3	16	0	19	0	17	39	72	128	0	43	21	1	65	0	4	42	10	56	268		
6:45 - 7:00	0	10	9	3	22	0	15	51	61	127	0	31	22	3	56	0	3	34	11	48	253		
Hour Total:	0	16	52	6	74	0	55	138	235	428	0	140	88	8	236	0	11	140	41	192	930		
7:00 - 7:15	0	4	20	2	26	0	21	47	85	153	0	42	25	1	68	0	1	40	8	49	296		
7:15 - 7:30	0	2	32	1	35	0	17	49	72	138	0	45	26	2	73	0	0	43	15	58	304		
7:30 - 7:45	0	8	30	4	42	0	20	57	84	161	0	53	32	0	85	0	6	45	15	66	354		
7:45 - 8:00	0	9	32	4	45	0	14	77	98	189	0	30	20	2	52	0	5	46	17	68	354		
Hour Total:	0	23	114	11	148	0	72	230	339	641	0	170	103	5	278	0	12	174	55	241	1308		
8:00 - 8:15	0	6	28	3	37	0	14	28	58	100	0	33	12	1	46	0	7	30	11	48	231		
8:15 - 8:30	0	4	32	2	38	0	16	44	78	138	0	47	26	5	78	0	2	37	11	50	304		
8:30 - 8:45	0	4	23	6	33	0	8	41	79	128	0	52	19	3	74	0	4	31	9	44	279		
8:45 - 9:00	0	1	27	2	30	0	9	37	69	115	0	42	25	7	74	0	5	32	19	56	275		
Hour Total:	0	15	110	13	138	0	47	150	284	481	0	174	82	16	272	0	18	130	50	198	1089		
9:00 - 9:15	0	4	37	6	47	0	9	36	68	113	0	46	14	4	64	0	8	31	11	50	274		
9:15 - 9:30	0	7	19	1	27	0	10	30	62	102	0	44	19	4	67	0	5	33	13	51	247		
9:30 - 9:45	0	9	35	4	48	0	7	35	48	90	0	41	20	7	68	0	2	21	11	34	240		
9:45 - 10:00	0	5	32	6	43	0	8	36	61	105	0	43	26	3	72	0	5	18	14	37	257		
Hour Total:	0	25	123	17	165	0	34	137	239	410	0	174	79	18	271	0	20	103	49	172	1018		
10:00 - 10:15	0	4	26	12	42	0	13	38	56	107	0	32	20	3	55	0	6	25	8	39	243		
10:15 - 10:30	0	9	45	9	63	0	10	29	60	99	0	58	28	2	88	0	4	24	15	43	293		
10:30 - 10:45	0	11	31	9	51	0	9	33	47	89	0	50	18	4	72	0	5	34	11	50	262		
10:45 - 11:00	0	8	38	7	53	0	11	47	79	137	0	49	22	6	77	0	5	17	16	38	305		
Hour Total:	0	32	140	37	209	0	43	147	242	432	0	189	88	15	292	0	20	100	50	170	1103		
11:00 - 11:15	0	9	28	2	39	0	17	35	66	118	0	37	13	2	52	0	11	26	15	52	261		
11:15 - 11:30	0	8	40	3	51	0	1	43	51	95	0	55	20	4	79	0	6	28	8	42	267		
11:30 - 11:45	0	6	45	4	55	0	10	26	52	88	0	44	14	2	60	0	10	22	12	44	247		
11:45 - 12:00	0	9	37	6	52	0	21	54	56	131	0	52	35	10	97	0	9	19	13	41	321		
Hour Total:	0	32	150	15	197	0	49	158	225	432	0	188	82	18	288	0	36	95	48	179	1096		
12:00 - 12:15	0	13	41	11	65	0	10	53	67	130	0	41	25	4	70	0	6	29	13	48	313		
12:15 - 12:30	0	13	53	6	72	0	6	26	43	75	0	63	25	2	90	0	9	30	19	58	295		
12:30 - 12:45	0	20	44	6	70	0	12	37	57	106	0	47	28	5	80	0	6	20	10	36	292		
12:45 - 1:00	0	4	45	7	56	0	13	49	50	112	0	38	24	2	64	0	5	28	19	52	284		
Hour Total:	0	50	183	30	263	0	41	165	217	423	0	189	102	13	304	0	26	107	61	194	1184		
1:00 - 1:15	0	10	41	10	61	0	5	45	46	96	0	69	28	2	99	0	7	19	6	32	288		
1:15 - 1:30	0	8	47	13	68	0	6	30	47	83	0	52	23	8	83	0	14	30	8	52	286		
1:30 - 1:45	0	8	49	12	69	0	9	34	55	98	0	56	20	4	80	0	13	31	12	56	303		
1:45 - 2:00	0	6	52	9	67	0	7	42	48	97	0	56	24	1	81	0	10	18	6	34	279		
Hour Total:	0	32	189	44	265	0	27	151	196	374	0	233	95	15	343	0	44	98	32	174	1156		
2:00 - 2:15	0	7	33	7	47	0	13	32	43	88	0	79	35	3	117	0	7	23	14	44	296		
2:15 - 2:30	0	4	42	13	59	0	9	38	58	105	0	54	36	4	94	0	11	24	10	45	303		
2:30 - 2:45	0	12	43	7	62	0	7	31	44	82	0	66	35	3	104	0	5	33	14	52	300		
2:45 - 3:00	0	9	47	8	64	0	10	51	50	111	0	63	25	5	93	0	13	36	9	58	326		
Hour Total:	0	32	165	35	232	0	39	152	195	386	0	262	131	15	408	0	36	116	47	199	1225		
3:00 - 3:15	0	14	54	19	87	0	12	47	42	101	0	91	52	4	147	0	9	26	12	47	382		
3:15 - 3:30	0	11	73	17	101	0	12	44	66	122	0	72	42	6	120	0	8	28	8	44	387		
3:30 - 3:45	0	6	60	14	80	0	12	37	67	116	0	69	44	6	119	0	13	33	14	60	375		
3:45 - 4:00	0	10	71	11	92	0	6	46	70	122	0	80	55	6	141	0	8	18	17	43	398		
Hour Total:	0	41	258	61	360	0	42	174	245	461	0	312	193	22	527	0	38	105	51	194	1542		
4:00 - 4:15	0	4	69	16	89	0	9	36	56	101	0	91	52	4	147	0	7	22	16	45	382		
4:15 - 4:30	0	9	68	11	88	0	8	39	75	122	0	87	52	5	144	0	10	30	16	56	410		
4:30 - 4:45	0	6	68	13	87	0	14	35	66	115	0	78	43	1	122	0	12	26	21	59	383		
4:45 - 5:00	0	7	78	8	93	0	24	47	79	150	0	62	46	8	116	0	14	30	22	66	425		
Hour Total:	0	26	283	48	357	0	55	157	276	488	0	318	193	18	529	0	43	108	75	226	1600		
5:00 - 5:15	0	8	78	9	95	0	6	56	62	124	0	85	65	5	155	0	19	33	13	65	439		
5:15 - 5:30	0	3	57	12	72	0	19	45	63	127	0	72	50	4	126	0	16	41	14	71	396		
5:30 - 5:45	0	13	56	15	84	0	13	45	61	119	0	79	42	7	128	0	14	27	14	55	386		
5:45 - 6:00	0	8	54	14	76	0	11	39	37	87	0	62	32	9	103	0	7	36	15	58	324		
Hour Total:	0	32	245	50	327	0	49	185	223	457	0	298	189	25	512	0	56	137	56	249	1545		
6:00 - 6:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
6:15 - 6:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
6:30 - 6:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
6:45 - 7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Hour Total:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
DAILY TOT.	0	356	2012	367	2735	0	553	1944	2916	5413	0	2647	1425	188	4260	0	360	1413	615	2388	14796		

**COMMENT:**



# TRAFFIC FLOW DIAGRAM

COUNTY: Salem

MUNICIPALITY: Pilesgrove Twp

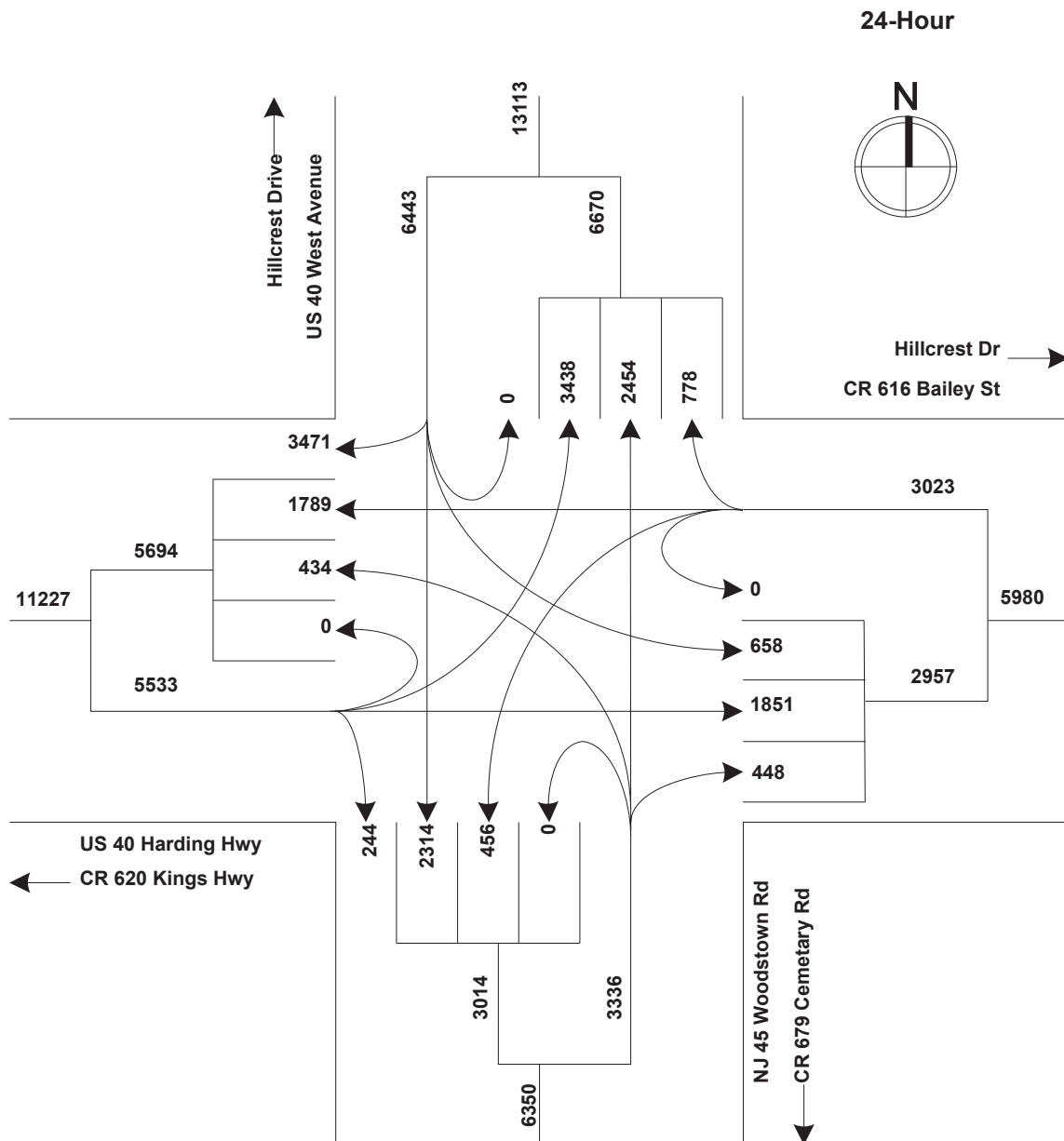
LOCATION: US 40 West Avenue and CR 616 Bailey

INTERVAL: 12 HR COUNT

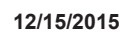
DATE: Wed, 12/9/2015

FROM: 06:00 AM TO: 06:00 PM

COMMENT:



**COMMENT:**





# TRAFFIC FLOW DIAGRAM

COUNTY: Salem

MUNICIPALITY: Pilesgrove Twp

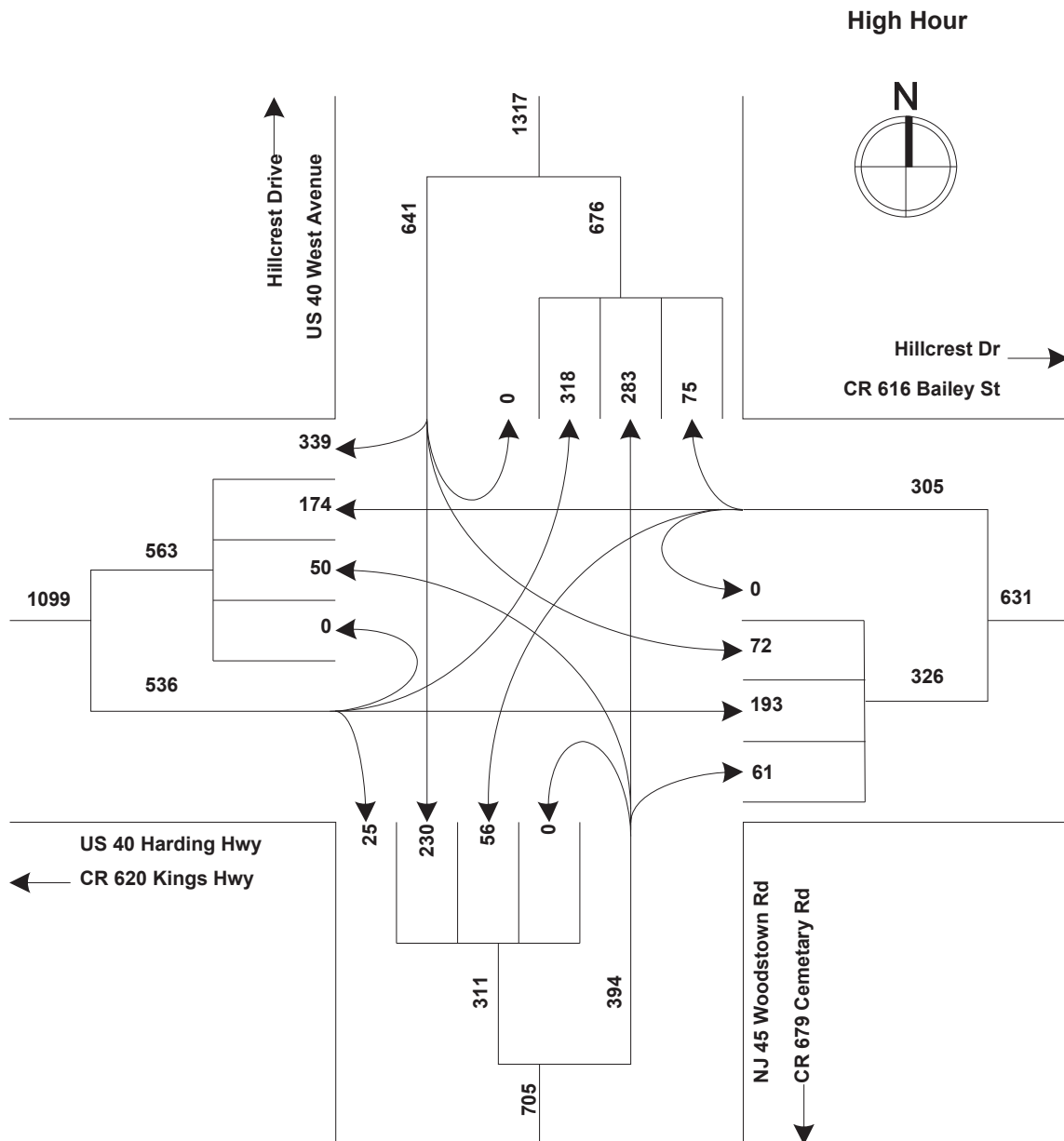
LOCATION: US 40 West Avenue and CR 616 Bailey

INTERVAL: 12 HR COUNT

DATE: Wed, 12/9/2015

FROM: 06:00 AM TO: 06:00 PM

COMMENT:



# TRAFFIC FLOW DIAGRAM

COUNTY: Salem

MUNICIPALITY: Pilesgrove Twp

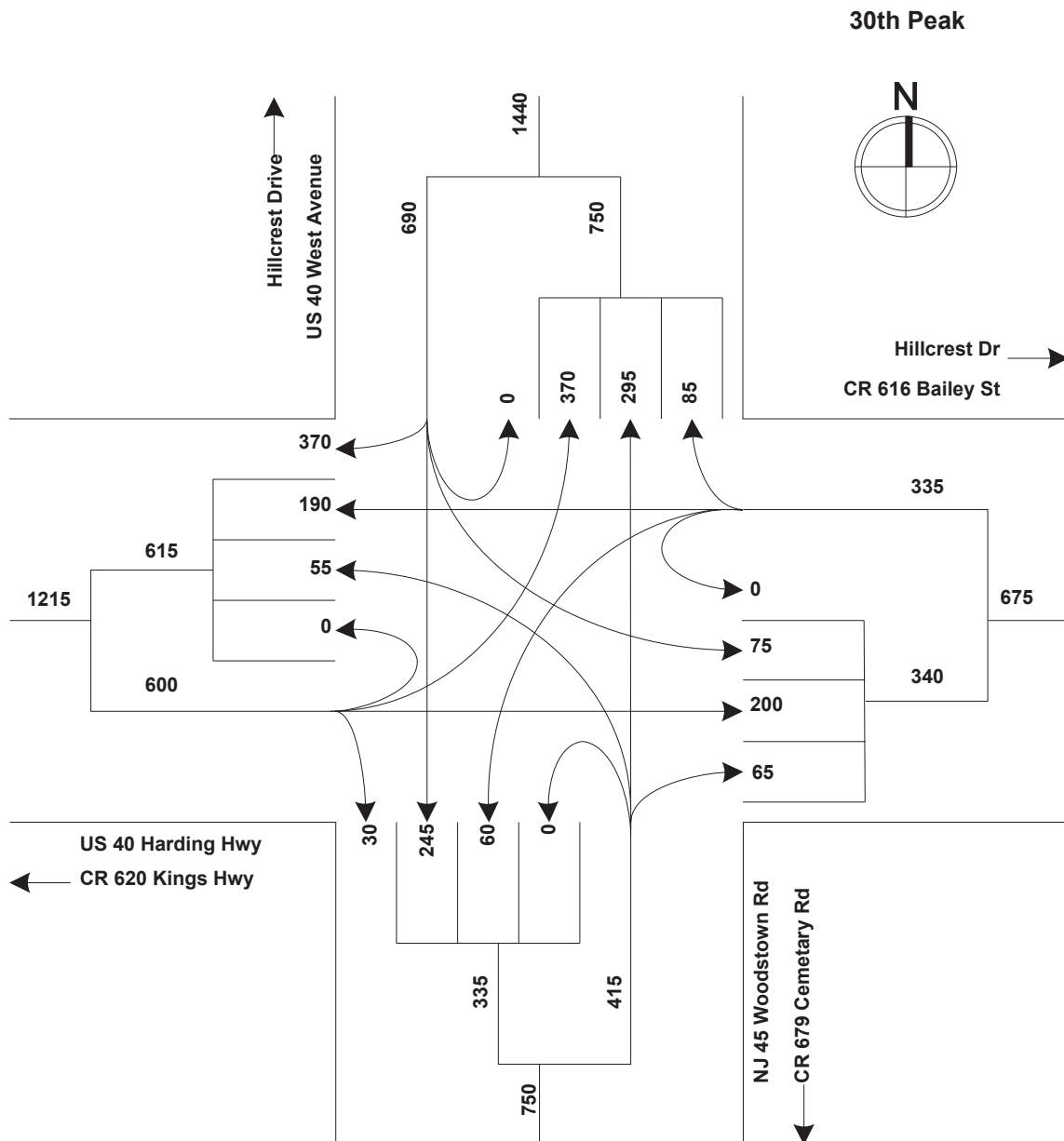
LOCATION: US 40 West Avenue and CR 616 Bailey

INTERVAL: 12 HR COUNT

DATE: Wed, 12/9/2015

FROM: 06:00 AM TO: 06:00 PM

COMMENT:



# TRAFFIC FLOW DIAGRAM

COUNTY: Salem

MUNICIPALITY: Pilesgrove Twp

LOCATION: US 40 West Avenue and CR 616 Bailey

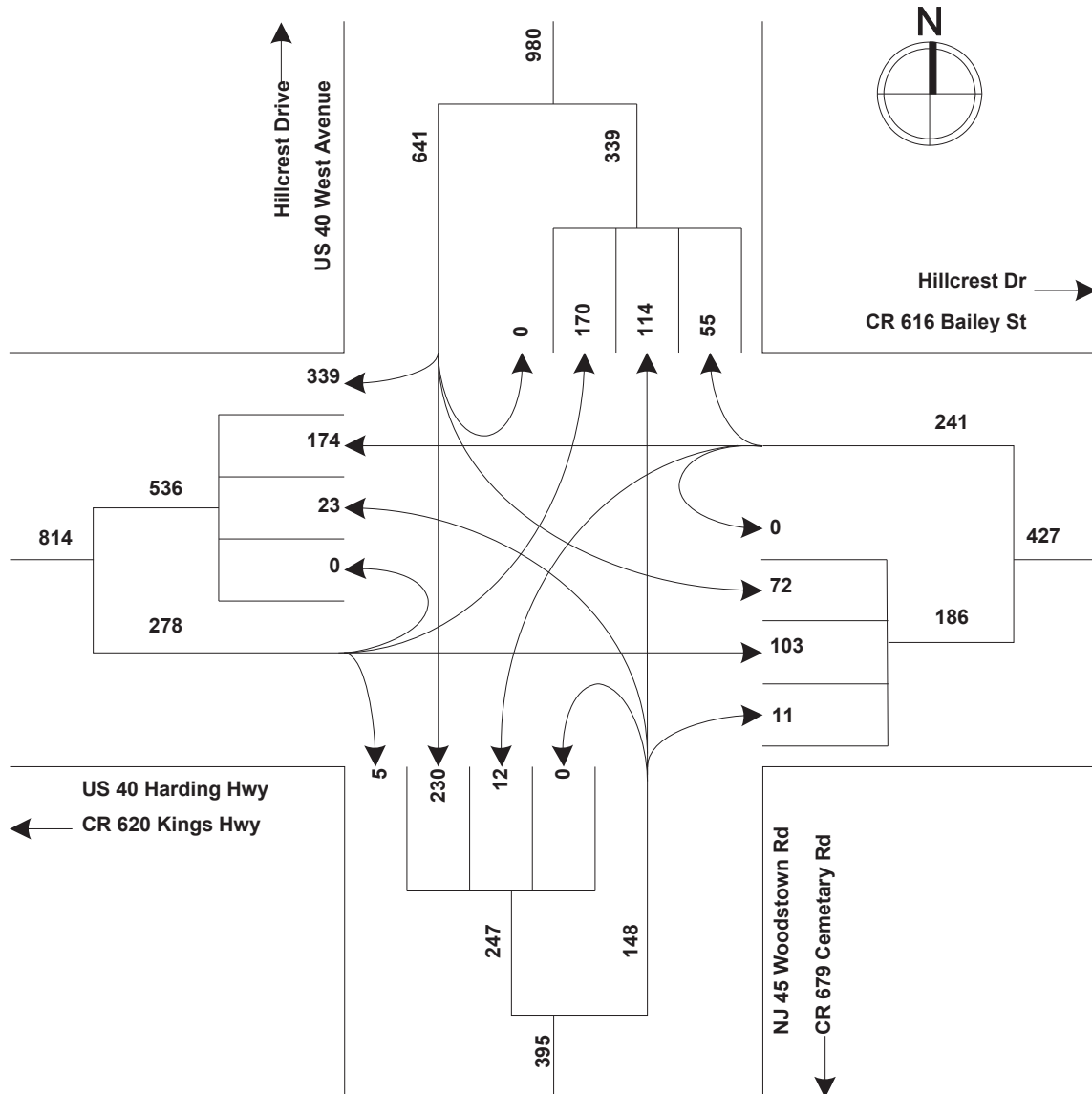
INTERVAL: 12 HR COUNT

DATE: Wed, 12/9/2015

FROM: 06:00 AM TO: 06:00 PM

COMMENT:

AM Peak



# TRAFFIC FLOW DIAGRAM

COUNTY: Salem

MUNICIPALITY: Pilesgrove Twp

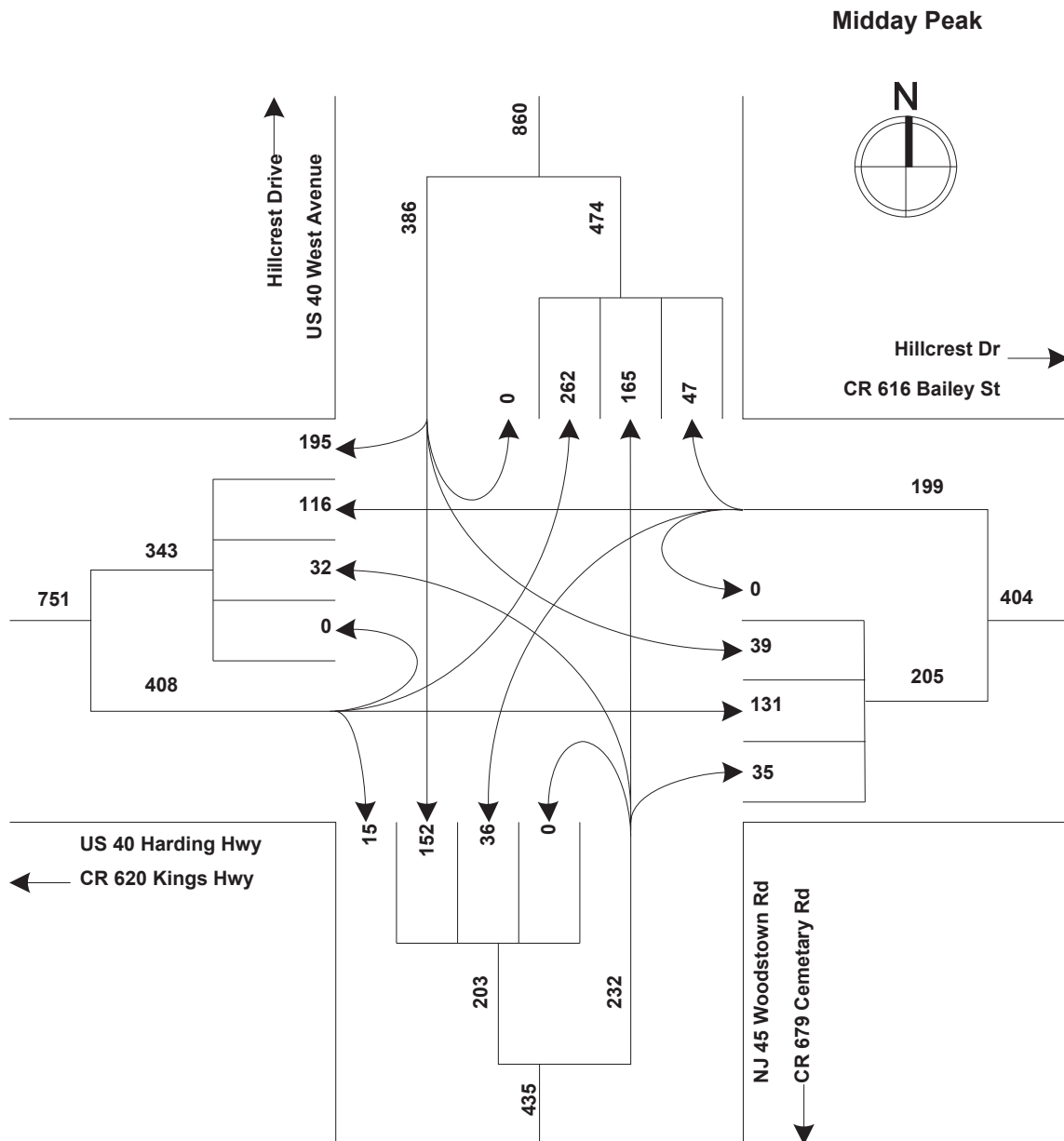
LOCATION: US 40 West Avenue and CR 616 Bailey

INTERVAL: 12 HR COUNT

DATE: Wed, 12/9/2015

FROM: 06:00 AM TO: 06:00 PM

COMMENT:



# TRAFFIC FLOW DIAGRAM

COUNTY: Salem

MUNICIPALITY: Pilesgrove Twp

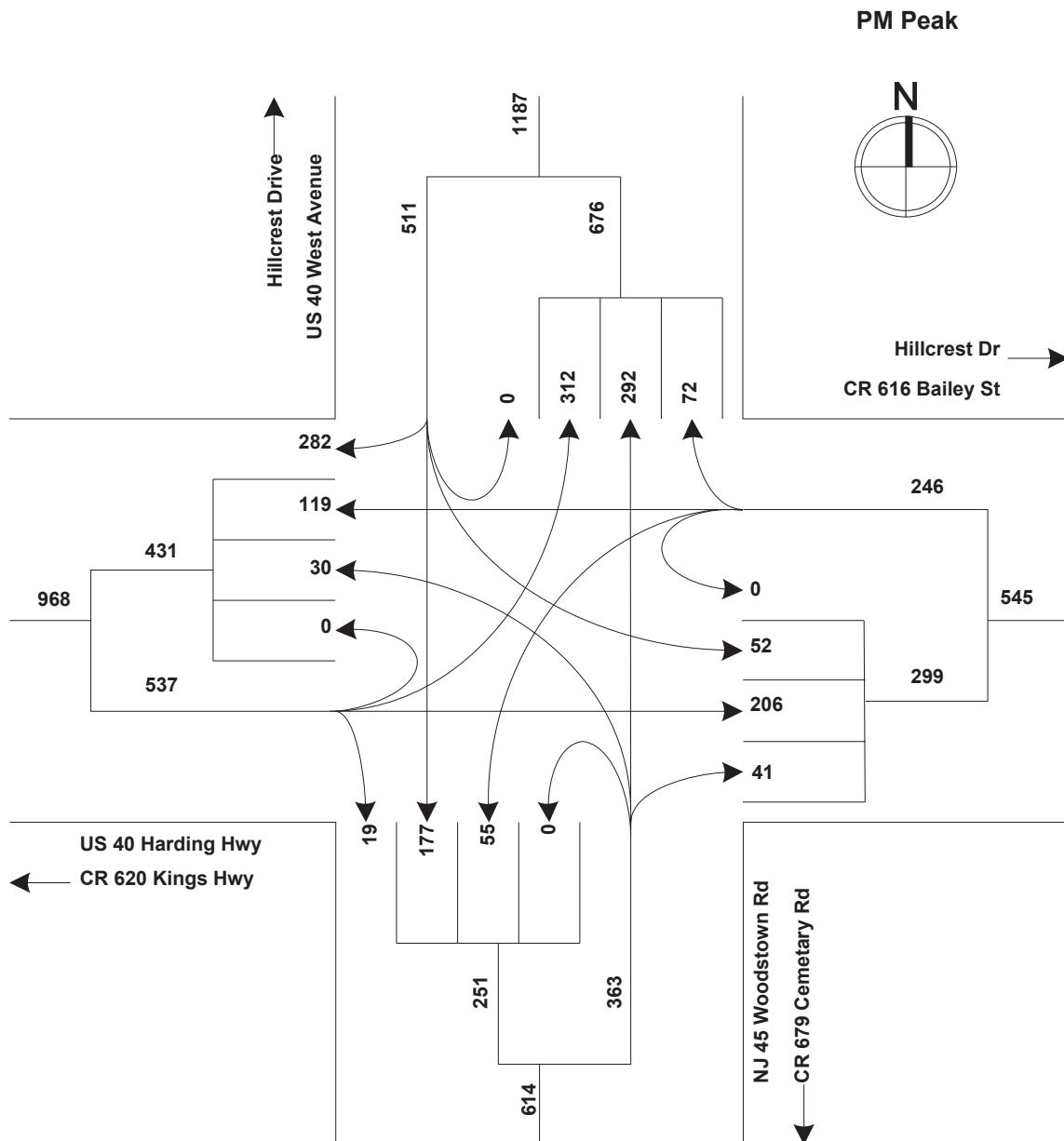
LOCATION: US 40 West Avenue and CR 616 Bailey

INTERVAL: 12 HR COUNT

DATE: Wed, 12/9/2015

FROM: 06:00 AM TO: 06:00 PM

COMMENT:





# Appendix C

## 2017 HIGHWAY CAPACITY SOFTWARE REPORTS

2017 – Existing

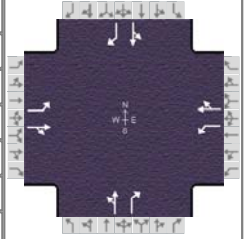


# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	9/8/2017	Duration, h	0.25
Analyst		Area Type	Other	PHF	0.92
Jurisdiction		Analysis Year	2017	Analysis Period	1 > 7:00
Urban Street		File Name	RT 40 AM Peak.xus		
Intersection					
Project Description					

## Intersection Information



## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	170	103	5	12	174	55	23	114	11	72	230	339

## Signal Information

Cycle, s	59.4	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	17.2	10.3	11.9	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	5.0	4.0	5.0	0.0	0.0	0.0		
				Red	2.0	2.0	2.0	0.0	0.0	0.0		

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2		6
Case Number		10.0		10.0		7.0		7.0
Phase Duration, s		18.9		16.3		24.2		24.2
Change Period, ( Y+R <sub>c</sub> ), s		7.0		6.0		7.0		7.0
Max Allow Headway ( MAH ), s		4.1		4.1		4.2		4.2
Queue Clearance Time ( g <sub>s</sub> ), s		7.4		9.8		5.6		14.5
Green Extension Time ( g <sub>e</sub> ), s		1.0		0.6		3.3		2.7
Phase Call Probability		0.99		0.99		1.00		1.00
Max Out Probability		0.00		0.02		0.03		0.25

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate ( v ), veh/h	185	117		13	249			149	12		328	368
Adjusted Saturation Flow Rate ( s ), veh/h/ln	1810	1884		1810	1821			1798	1610		1751	1610
Queue Service Time ( g <sub>s</sub> ), s	5.4	3.2		0.4	7.8			0.0	0.3		5.5	12.5
Cycle Queue Clearance Time ( g <sub>c</sub> ), s	5.4	3.2		0.4	7.8			3.6	0.3		9.5	12.5
Green Ratio ( g/C )	0.20	0.20		0.17	0.17			0.29	0.29		0.29	0.29
Capacity ( c ), veh/h	363	378		314	316			592	467		582	467
Volume-to-Capacity Ratio ( X )	0.509	0.311		0.042	0.789			0.252	0.026		0.564	0.790
Back of Queue ( Q ), ft/ln ( 50 th percentile)	54.8	32.8		3.6	85.7			35.8	2.7		89.9	116
Back of Queue ( Q ), veh/ln ( 50 th percentile)	2.2	1.3		0.1	3.4			1.4	0.1		3.6	4.6
Queue Storage Ratio ( RQ ) ( 50 th percentile)	0.00	0.00		0.00	0.00			0.00	0.00		0.00	0.00
Uniform Delay ( d <sub>1</sub> ), s/veh	21.2	20.3		20.5	23.5			16.3	15.1		18.3	19.4
Incremental Delay ( d <sub>2</sub> ), s/veh	1.1	0.5		0.1	4.4			0.2	0.0		0.9	4.0
Initial Queue Delay ( d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Control Delay ( d ), s/veh	22.3	20.7		20.5	27.9			16.5	15.1		19.1	23.4
Level of Service ( LOS )	C	C		C	C			B	B		B	C
Approach Delay, s/veh / LOS	21.7	C		27.6	C			16.4	B		21.4	C
Intersection Delay, s/veh / LOS	22.0						C					

## Multimodal Results

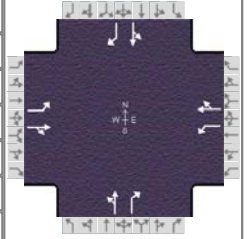
	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	0.9	A	0.8	A	1.6	B

# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	9/8/2017	Duration, h	0.25
Analyst		Area Type	Other	PHF	0.92
Jurisdiction		Analysis Year	2017	Analysis Period	1> 7:00
Urban Street		File Name	RT 40 PM Peak.xus		
Intersection					
Project Description					

## Intersection Information



## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	312	206	19	55	119	72	30	292	41	52	177	282

## Signal Information

Cycle, s	63.2	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	17.1	10.0	16.2	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	5.0	4.0	5.0	0.0	0.0	0.0		
				Red	2.0	2.0	2.0	0.0	0.0	0.0		

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2		6
Case Number		10.0		10.0		7.0		7.0
Phase Duration, s		23.2		16.0		24.1		24.1
Change Period, ( Y+R <sub>c</sub> ), s		7.0		6.0		7.0		7.0
Max Allow Headway ( MAH ), s		4.1		4.1		4.2		4.2
Queue Clearance Time ( g <sub>s</sub> ), s		14.0		9.4		13.2		14.0
Green Extension Time ( g <sub>e</sub> ), s		2.2		0.7		3.1		3.0
Phase Call Probability		1.00		0.99		1.00		1.00
Max Out Probability		0.00		0.02		0.22		0.26

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate ( v ), veh/h	339	245		60	208			350	45		249	307
Adjusted Saturation Flow Rate ( s ), veh/h/ln	1668	1799		1739	1710			1774	1547		1637	1485
Queue Service Time ( g <sub>s</sub> ), s	12.0	7.4		1.9	7.4			3.5	1.4		0.0	12.0
Cycle Queue Clearance Time ( g <sub>c</sub> ), s	12.0	7.4		1.9	7.4			11.2	1.4		7.7	12.0
Green Ratio ( g/C )	0.26	0.26		0.16	0.16			0.27	0.27		0.27	0.27
Capacity ( c ), veh/h	427	461		274	270			541	418		512	401
Volume-to-Capacity Ratio ( X )	0.794	0.531		0.218	0.770			0.647	0.107		0.486	0.765
Back of Queue ( Q ), ft/ln ( 50 th percentile)	125.3	76.5		19.6	80.8			114.6	11.9		75.6	112.1
Back of Queue ( Q ), veh/ln ( 50 th percentile)	4.6	2.9		0.8	3.1			4.4	0.5		2.9	4.2
Queue Storage Ratio ( RQ ) ( 50 th percentile)	0.58	0.00		0.13	0.00			0.65	0.07		0.43	0.64
Uniform Delay ( d <sub>1</sub> ), s/veh	22.0	20.3		23.2	25.5			20.9	17.4		19.6	21.2
Incremental Delay ( d <sub>2</sub> ), s/veh	3.4	1.0		0.4	4.6			1.3	0.1		0.7	3.5
Initial Queue Delay ( d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Control Delay ( d ), s/veh	25.3	21.2		23.6	30.2			22.2	17.5		20.3	24.8
Level of Service ( LOS )	C	C		C	C			C	B		C	C
Approach Delay, s/veh / LOS	23.6	C		28.7	C			21.7	C		22.8	C
Intersection Delay, s/veh / LOS	23.7						C					

## Multimodal Results

	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.5	A	0.9	A	1.1	A	1.4	A

# 2017 Alt 1

## Optimized Timing

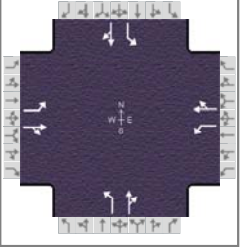
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	9/8/2017	Duration, h	0.25
Analyst		Area Type	Other	PHF	0.92
Jurisdiction		Analysis Year	2017	Analysis Period	1> 7:00
Urban Street		File Name	RT 40 AM Peak Alt1.xus		
Intersection					
Project Description					

## Intersection Information

Duration, h	0.25
Area Type	Other
PHF	0.92
Analysis Period	1> 7:00
File Name	RT 40 AM Peak Alt1.xus



## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( $v$ ), veh/h	170	103	5	12	174	55	23	114	11	72	230	339

## Signal Information

Cycle, s	74.8	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	32.1	12.5	10.2	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	5.0	4.0	5.0	0.0	0.0	0.0		
				Red	2.0	2.0	2.0	0.0	0.0	0.0		

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2		6
Case Number		10.0		10.0		6.0		6.0
Phase Duration, s		17.2		18.5		39.1		39.1
Change Period, ( $Y+R_c$ ), s		7.0		6.0		7.0		7.0
Max Allow Headway ( $MAH$ ), s		4.1		4.1		4.3		4.3
Queue Clearance Time ( $g_s$ ), s		9.4		11.9		28.2		26.1
Green Extension Time ( $g_e$ ), s		0.9		0.7		3.8		3.9
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		0.00		0.01		0.02		0.01

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate ( $v$ ), veh/h	185	117		13	249		25	136		78	618	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1810	1884		1810	1821		818	1870		1273	1716	
Queue Service Time ( $g_s$ ), s	7.4	4.3		0.5	9.9		2.1	3.4		3.0	24.1	
Cycle Queue Clearance Time ( $g_c$ ), s	7.4	4.3		0.5	9.9		26.2	3.4		6.3	24.1	
Green Ratio ( $g/C$ )	0.14	0.14		0.17	0.17		0.43	0.43		0.43	0.43	
Capacity ( $c$ ), veh/h	248	258		303	305		184	802		587	736	
Volume-to-Capacity Ratio ( $X$ )	0.745	0.455		0.043	0.817		0.136	0.169		0.133	0.841	
Back of Queue ( $Q$ ), ft/ln ( 50 th percentile)	84	48.7		4.8	113.8		10.4	32.7		20.6	228.2	
Back of Queue ( $Q$ ), veh/ln ( 50 th percentile)	3.4	1.9		0.2	4.6		0.4	1.3		0.8	9.1	
Queue Storage Ratio ( $RQ$ ) ( 50 th percentile)	0.39	0.00		0.03	0.00		0.06	0.00		0.12	0.00	
Uniform Delay ( $d_1$ ), s/veh	31.1	29.8		26.2	30.1		30.8	13.2		15.1	19.1	
Incremental Delay ( $d_2$ ), s/veh	4.4	1.2		0.1	5.3		0.3	0.1		0.1	3.1	
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay ( $d$ ), s/veh	35.5	31.0		26.2	35.4		31.1	13.3		15.2	22.2	
Level of Service (LOS)	D	C		C	D		C	B		B	C	
Approach Delay, s/veh / LOS	33.8	C		35.0	C		16.1	B		21.4	C	
Intersection Delay, s/veh / LOS	25.9						C					

## Multimodal Results

	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	0.9	A	0.8	A	1.6	B

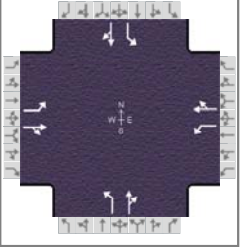
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	9/8/2017	Duration, h	0.25
Analyst		Area Type	Other	PHF	0.92
Jurisdiction		Analysis Year	2017	Analysis Period	1> 7:00
Urban Street		File Name	RT 40 PM Peak Alt1.xus		
Intersection					
Project Description					

## Intersection Information

Duration, h	0.25
Area Type	Other
PHF	0.92
Analysis Period	1> 7:00
File Name	RT 40 PM Peak Alt1.xus



## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	312	206	19	55	119	72	30	292	41	52	177	282

## Signal Information

Cycle, s	83.9	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	31.7	12.5	19.7	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	5.0	4.0	5.0	0.0	0.0	0.0		
				Red	2.0	2.0	2.0	0.0	0.0	0.0		

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2		6
Case Number		10.0		10.0		6.0		6.0
Phase Duration, s		26.7		18.5		38.7		38.7
Change Period, ( Y+R <sub>c</sub> ), s		7.0		6.0		7.0		7.0
Max Allow Headway ( MAH ), s		4.1		4.1		4.3		4.3
Queue Clearance Time ( g <sub>s</sub> ), s		18.4		11.9		27.5		24.8
Green Extension Time ( g <sub>e</sub> ), s		1.3		0.7		4.1		4.2
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		0.42		0.02		0.02		0.01

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate ( v ), veh/h	339	245		60	208		33	362		57	499	
Adjusted Saturation Flow Rate ( s ), veh/h/ln	1668	1799		1739	1710		913	1786		1036	1644	
Queue Service Time ( g <sub>s</sub> ), s	16.4	10.1		2.5	9.9		2.8	13.3		3.8	22.8	
Cycle Queue Clearance Time ( g <sub>c</sub> ), s	16.4	10.1		2.5	9.9		25.5	13.3		17.0	22.8	
Green Ratio ( g/C )	0.23	0.23		0.15	0.15		0.38	0.38		0.38	0.38	
Capacity ( c ), veh/h	392	422		260	256		183	675		314	621	
Volume-to-Capacity Ratio ( X )	0.866	0.579		0.230	0.812		0.178	0.537		0.180	0.804	
Back of Queue ( Q ), ft/ln ( 50 th percentile)	205.8	112.3		27.8	114.2		15.6	137.9		23.2	223.8	
Back of Queue ( Q ), veh/ln ( 50 th percentile)	7.6	4.3		1.1	4.4		0.6	5.3		0.9	8.6	
Queue Storage Ratio ( RQ ) ( 50 th percentile)	0.96	0.00		0.19	0.00		0.09	0.00		0.13	0.00	
Uniform Delay ( d <sub>1</sub> ), s/veh	30.9	28.5		31.5	34.6		34.7	20.4		27.0	23.3	
Incremental Delay ( d <sub>2</sub> ), s/veh	12.4	1.3		0.4	6.1		0.5	0.7		0.3	2.5	
Initial Queue Delay ( d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay ( d ), s/veh	43.3	29.7		31.9	40.7		35.2	21.1		27.3	25.8	
Level of Service ( LOS )	D	C		C	D		D	C		C	C	
Approach Delay, s/veh / LOS	37.6	D		38.7	D		22.2	C		26.0	C	
Intersection Delay, s/veh / LOS	30.8						C					

## Multimodal Results

	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.5	A	0.9	A	1.1	A	1.4	A

# 2017 Alt 2

## Optimized Timings

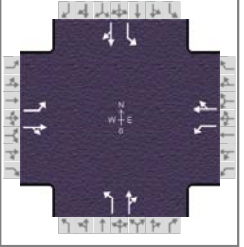
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	9/8/2017	Duration, h	0.25
Analyst		Area Type	Other	PHF	0.92
Jurisdiction		Analysis Year	2017	Analysis Period	1> 7:00
Urban Street		File Name	RT 40 AM Peak Alt2.xus		
Intersection					
Project Description					

## Intersection Information

Duration, h	0.25
Area Type	Other
PHF	0.92
Analysis Period	1> 7:00
File Name	RT 40 AM Peak Alt2.xus



## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( $v$ ), veh/h	170	103	5	12	174	55	23	114	11	72	230	339

## Signal Information

Cycle, s	85.1	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	2.7	2.4	31.3	13.9	10.9	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	0.0	5.0	4.0	5.0	0.0		
				Red	0.0	0.0	2.0	2.0	2.0	0.0		

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2	1	6
Case Number		10.0		10.0	1.1	4.0	1.1	4.0
Phase Duration, s		17.9		19.9	6.7	38.3	9.1	40.7
Change Period, ( $Y+R_c$ ), s		7.0		6.0	4.0	7.0	4.0	7.0
Max Allow Headway ( $MAH$ ), s		4.1		4.1	3.1	4.2	3.1	4.2
Queue Clearance Time ( $g_s$ ), s		10.4		13.3	2.7	6.2	4.2	31.0
Green Extension Time ( $g_e$ ), s		0.4		0.6	0.0	3.4	0.0	2.7
Phase Call Probability		1.00		1.00	0.45	1.00	0.84	1.00
Max Out Probability		0.77		0.06	0.72	0.00	1.00	0.15

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate ( $v$ ), veh/h	185	117		13	249		25	136		78	618	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1810	1884		1810	1821		1810	1870		1810	1716	
Queue Service Time ( $g_s$ ), s	8.4	4.9		0.5	11.3		0.7	4.2		2.2	29.0	
Cycle Queue Clearance Time ( $g_c$ ), s	8.4	4.9		0.5	11.3		0.7	4.2		2.2	29.0	
Green Ratio ( $g/C$ )	0.13	0.13		0.16	0.16		0.40	0.37		0.43	0.40	
Capacity ( $c$ ), veh/h	231	241		295	297		168	688		598	679	
Volume-to-Capacity Ratio ( $X$ )	0.798	0.487		0.044	0.839		0.149	0.197		0.131	0.911	
Back of Queue ( $Q$ ), ft/ln ( 50 th percentile)	105.3	57.3		5.6	135.8		7.2	44.1		21.2	325.1	
Back of Queue ( $Q$ ), veh/ln ( 50 th percentile)	4.2	2.3		0.2	5.4		0.3	1.8		0.8	13.0	
Queue Storage Ratio ( $RQ$ ) ( 50 th percentile)	0.49	0.00		0.04	0.00		0.04	0.00		0.12	0.00	
Uniform Delay ( $d_1$ ), s/veh	36.1	34.5		30.0	34.6		20.5	18.3		14.5	24.3	
Incremental Delay ( $d_2$ ), s/veh	9.5	1.5		0.1	7.5		0.2	0.1		0.0	11.6	
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay ( $d$ ), s/veh	45.6	36.0		30.1	42.1		20.7	18.5		14.5	35.9	
Level of Service (LOS)	D	D		C	D		C	B		B	D	
Approach Delay, s/veh / LOS	41.9	D		41.5	D		18.8	B		33.5	C	
Intersection Delay, s/veh / LOS	35.1						D					

## Multimodal Results

	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	0.9	A	0.8	A	1.6	B

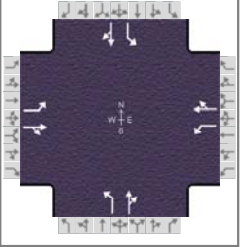
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	9/8/2017	Duration, h	0.25
Analyst		Area Type	Other	PHF	0.92
Jurisdiction		Analysis Year	2017	Analysis Period	1> 7:00
Urban Street		File Name	RT 40 PM Peak Alt2.xus		
Intersection					
Project Description					

## Intersection Information

Duration, h	0.25
Area Type	Other
PHF	0.92
Analysis Period	1> 7:00
File Name	RT 40 PM Peak Alt2.xus



## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	312	206	19	55	119	72	30	292	41	52	177	282

## Signal Information

Cycle, s	83.8	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	3.2	1.2	27.9	12.5	15.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	0.0	5.0	4.0	5.0	0.0		
				Red	0.0	0.0	2.0	2.0	2.0	0.0		

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2	1	6
Case Number		10.0		10.0	1.1	4.0	1.1	4.0
Phase Duration, s		22.0		18.5	7.2	34.9	8.4	36.1
Change Period, ( Y+R <sub>c</sub> ), s		7.0		6.0	4.0	7.0	4.0	7.0
Max Allow Headway ( MAH ), s		4.1		4.1	3.1	4.2	3.1	4.2
Queue Clearance Time ( g <sub>s</sub> ), s		17.0		11.9	3.0	16.2	3.7	25.8
Green Extension Time ( g <sub>e</sub> ), s		0.0		0.7	0.0	3.6	0.0	3.3
Phase Call Probability		1.00		1.00	0.53	1.00	0.73	1.00
Max Out Probability		1.00		0.03	1.00	0.01	1.00	0.06

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate ( v ), veh/h	339	245		60	208		33	362		57	499	
Adjusted Saturation Flow Rate ( s ), veh/h/ln	1668	1799		1739	1710		1810	1786		1810	1644	
Queue Service Time ( g <sub>s</sub> ), s	15.0	10.8		2.5	9.9		1.0	14.2		1.7	23.8	
Cycle Queue Clearance Time ( g <sub>c</sub> ), s	15.0	10.8		2.5	9.9		1.0	14.2		1.7	23.8	
Green Ratio ( g/C )	0.18	0.18		0.15	0.15		0.37	0.33		0.39	0.35	
Capacity ( c ), veh/h	299	322		259	255		191	595		351	572	
Volume-to-Capacity Ratio ( X )	1.136	0.760		0.231	0.814		0.171	0.608		0.161	0.873	
Back of Queue ( Q ), ft/ln ( 50 th percentile)	367.6	141.3		27.7	114.2		9.7	150.7		16.4	253.5	
Back of Queue ( Q ), veh/ln ( 50 th percentile)	13.6	5.4		1.1	4.4		0.4	5.8		0.7	9.7	
Queue Storage Ratio ( RQ ) ( 50 th percentile)	1.71	0.00		0.18	0.00		0.06	0.00		0.09	0.00	
Uniform Delay ( d <sub>1</sub> ), s/veh	34.4	32.7		31.4	34.5		20.6	23.4		17.6	25.6	
Incremental Delay ( d <sub>2</sub> ), s/veh	94.0	10.1		0.4	6.2		0.2	1.0		0.1	6.9	
Initial Queue Delay ( d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay ( d ), s/veh	128.4	42.8		31.9	40.8		20.8	24.4		17.7	32.6	
Level of Service ( LOS )	F	D		C	D		C	C		B	C	
Approach Delay, s/veh / LOS	92.5	F		38.8	D		24.1	C		31.0	C	
Intersection Delay, s/veh / LOS	50.6						D					

## Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.3	B		2.3	B		2.3	B		2.3	B	
Bicycle LOS Score / LOS	1.5	A		0.9	A		1.1	A		1.4	A	



# 2017 Alt 3

## Optimized Timings

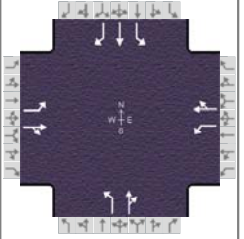
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	9/8/2017
Analyst		Time Period	
Jurisdiction		Analysis Year	2017
Urban Street		File Name	RT 40 AM Peak Alt3.xus
Intersection			
Project Description			

## Intersection Information

Duration, h	0.25
Area Type	Other
PHF	0.92
Analysis Period	1> 7:00



## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( $v$ ), veh/h	170	103	5	12	174	55	23	114	11	72	230	339

## Signal Information

Cycle, s	55.9	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2		6
Case Number		10.0		10.0		6.0		5.0
Phase Duration, s		15.9		15.9		24.1		24.1
Change Period, ( $Y+R_c$ ), s		7.0		6.0		7.0		7.0
Max Allow Headway ( $MAH$ ), s		4.1		4.1		4.2		4.2
Queue Clearance Time ( $g_s$ ), s		7.3		9.3		8.8		13.5
Green Extension Time ( $g_e$ ), s		0.9		0.8		3.6		3.5
Phase Call Probability		0.99		0.98		1.00		1.00
Max Out Probability		0.00		0.00		0.00		0.00

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate ( $v$ ), veh/h	185	117		13	249		25	136		78	250	368
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1810	1884		1810	1821		1148	1870		1273	1900	1610
Queue Service Time ( $g_s$ ), s	5.3	3.1		0.3	7.3		1.0	3.0		2.7	5.9	11.5
Cycle Queue Clearance Time ( $g_c$ ), s	5.3	3.1		0.3	7.3		6.8	3.0		5.7	5.9	11.5
Green Ratio ( $g/C$ )	0.16	0.16		0.18	0.18		0.31	0.31		0.31	0.31	0.31
Capacity ( $c$ ), veh/h	289	301		321	323		359	571		450	581	492
Volume-to-Capacity Ratio ( $X$ )	0.640	0.391		0.041	0.771		0.070	0.238		0.174	0.431	0.749
Back of Queue ( $Q$ ), ft/ln ( 50 th percentile)	55.9	32.9		3.3	78.6		6.1	29		18.3	57.2	99.8
Back of Queue ( $Q$ ), veh/ln ( 50 th percentile)	2.2	1.3		0.1	3.1		0.2	1.2		0.7	2.3	4.0
Queue Storage Ratio ( $RQ$ ) ( 50 th percentile)	0.26	0.00		0.02	0.00		0.04	0.00		0.10	0.00	0.00
Uniform Delay ( $d_1$ ), s/veh	22.0	21.1		19.1	21.9		18.2	14.5		16.7	15.5	17.5
Incremental Delay ( $d_2$ ), s/veh	2.4	0.8		0.1	3.9		0.1	0.2		0.2	0.5	2.3
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay ( $d$ ), s/veh	24.4	21.9		19.1	25.8		18.3	14.8		16.9	16.0	19.8
Level of Service (LOS)	C	C		B	C		B	B		B	B	B
Approach Delay, s/veh / LOS	23.4	C		25.5	C		15.3	B		18.1	B	
Intersection Delay, s/veh / LOS	20.3						C					

## Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.3	B		2.4	B		2.3	B		2.3	B	
Bicycle LOS Score / LOS	1.0	A		0.9	A		0.8	A		1.6	B	

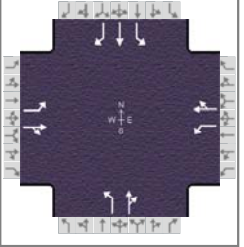
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	9/8/2017	Duration, h	0.25
Analyst		Area Type	Other	PHF	0.92
Jurisdiction		Analysis Year	2017	Analysis Period	1> 7:00
Urban Street		File Name	RT 40 PM Peak Alt3.xus		
Intersection					
Project Description					

## Intersection Information

Duration, h	0.25
Area Type	Other
PHF	0.92
Analysis Period	1> 7:00



## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( $v$ ), veh/h	312	206	19	55	119	72	30	292	41	52	177	282

## Signal Information

Cycle, s	68.8	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	21.4	10.8	16.6	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	5.0	4.0	5.0	0.0	0.0	0.0		
				Red	2.0	2.0	2.0	0.0	0.0	0.0		

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2		6
Case Number		10.0		10.0		6.0		5.0
Phase Duration, s		23.6		16.8		28.4		28.4
Change Period, ( $Y+R_c$ ), s		7.0		6.0		7.0		7.0
Max Allow Headway ( $MAH$ ), s		4.1		4.1		4.2		4.2
Queue Clearance Time ( $g_s$ ), s		15.3		10.0		14.0		17.4
Green Extension Time ( $g_e$ ), s		1.3		0.8		4.0		3.9
Phase Call Probability		1.00		0.99		1.00		1.00
Max Out Probability		0.41		0.00		0.01		0.01

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate ( $v$ ), veh/h	339	245		60	208		33	362		57	192	307
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1668	1799		1739	1710		1210	1786		1036	1826	1485
Queue Service Time ( $g_s$ ), s	13.3	8.2		2.1	8.0		1.5	12.0		3.4	5.6	12.3
Cycle Queue Clearance Time ( $g_c$ ), s	13.3	8.2		2.1	8.0		7.0	12.0		15.4	5.6	12.3
Green Ratio ( $g/C$ )	0.24	0.24		0.16	0.16		0.31	0.31		0.31	0.31	0.31
Capacity ( $c$ ), veh/h	403	435		272	267		384	556		246	568	462
Volume-to-Capacity Ratio ( $X$ )	0.841	0.563		0.220	0.776		0.085	0.651		0.230	0.339	0.663
Back of Queue ( $Q$ ), ft/ln ( 50 th percentile)	157.9	87.3		21.7	89.2		10	123.6		20.8	57.6	110.5
Back of Queue ( $Q$ ), veh/ln ( 50 th percentile)	5.8	3.4		0.8	3.4		0.4	4.8		0.8	2.2	4.1
Queue Storage Ratio ( $RQ$ ) ( 50 th percentile)	0.73	0.00		0.14	0.00		0.06	0.00		0.12	0.00	0.63
Uniform Delay ( $d_1$ ), s/veh	24.8	22.9		25.4	27.9		20.9	20.5		27.1	18.2	20.6
Incremental Delay ( $d_2$ ), s/veh	9.0	1.1		0.4	4.8		0.1	1.3		0.5	0.3	1.6
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay ( $d$ ), s/veh	33.8	24.0		25.8	32.7		21.0	21.8		27.6	18.6	22.2
Level of Service (LOS)	C	C		C	C		C	C		C	B	C
Approach Delay, s/veh / LOS	29.7	C		31.1	C		21.7	C		21.5	C	
Intersection Delay, s/veh / LOS	25.6						C					

## Multimodal Results

	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.5	A	0.9	A	1.1	A	1.4	A

# Appendix D

## COLLISION DIAGRAMS



## DETAILS OF ACCIDENT HISTORY

Page 1 of 1

PERIOD STUDIED: FROM: <u>1/1/2015</u> TO: <u>7/31/2017</u> <u>31</u> MONTHS			# V E H I C L E S	S E V E R I T Y	L I G H T C O N D	R O A D C H A R	S U R F A C E	W E A T H E R	ROUTE NUMBER/STREET NAME: <u>SR 40/CR 616-Route 45</u>			CASE No. _____	
LOCATION: <u>SR 40/CR 616-Route 45</u>									FILE: <u>RT45RT40</u>				
MUNICIPALITY: <u>Woodstown</u> COUNTY: <u>Salem</u>			REFERENCE MARKERS / NODES: _____			BY: <u>AZ</u>			DATE: <u>11/28/2017</u>				
No.	DATE	TIME							CONTRIB. FACTORS	ACC. TYPE	ACCIDENT DESCRIPTION	KEY #	
3	5/11/2017	14:23	2	N/R	1	1	2	3	7 0 0	LTRN	Failure to Yield	3	
12	10/23/2015	17:27	2	N/R	3	1	1	1	17 18	LTRN	Failure to Stop at Stop line. Improper turn	3	
7	5/27/2016	7:17	2	N/R	1	1	1	1	17 4 0	Rang	Failure to Yield	3	
9	1/31/2016	3:36	2	N/R	4	1	1	1	17 7	Rang	Failure to Yield	3	
10	1/9/2016	10:28	2	N/R	1	1	1	1	17 7	Rang	Failure to Yield	3	
14	6/8/2015	15:31	2	N/R	1	1	1	1	17	Rang	Failure to Yield	3	
15	1/1/2015	10:41	2	INJ	1	1	1	1	17	Rang	Failure to Yield	3	
15	3/6/2015	7:49	2	N/R	1	1	1	1	17	Rang	Failure to Yield	3	
2	7/5/2017	6:49	2	N/R	1	1	1	1	4 9 0	REN	Failure to Yield	3	
4	3/10/2017	13:31	2	N/R	1	1	1	1	4 0 0	REN	Cell Phone Distraction	3	
5	3/5/2017	17:47	2	N/R	1	1	1	1	4 0 0	REN	Cell Phone Distraction	3	
6	2/18/2017	10:20	2	N/R	1	1	1	1	4 9 0	REN	Failure to Yield	3	
11	1/4/2016	8:58	2	N/R	1	1	1	1	17	REN	Failure to Yield. Ambulance Arrival caused car 1 stop	3	
1	7/18/2017	20:51	2	N/R	4	1	1	1	4 13 20	Side	Careless Driving	3	
8	3/26/2016	19:25	2	N/R	1	1	1	1	60	Side	Driver failure to secure boat	3	
13	8/5/2015	12:57	2	N/R	1	1	1	1	18	Side	Improper Turning	3	

# ACCIDENT SUMMARY SHEET

**ROUTE:** SR 40/CR 616-Route 45      **LOCATION:** SR 40/CR 616-Route 45  
**MUNICIPALITY:** Woodstown      **COUNTY:** Salem  
**TIME PERIOD COVERED:** 1/1/2015 - 7/31/2017      **REFERENCE MARKERS / NODES:** -  
**REMARKS:** All Accidents      **DATE:** 11/28/2017

<b>TIME OF DAY</b> 6 AM - 10 AM      4      25.0% 10 AM - 4 PM      7      43.8% 4 PM - 7 PM      2      12.5% 7 PM - 12 AM      2      12.5% 12 AM - 6 AM      1      6.3% Unspecified      0      0.0% <b>Total</b> <b>16</b>	<b>DIRECTION</b> North      6      18.8% South      6      18.8% East      8      25.0% West      12      37.5% <b>Total</b> <b>32</b>	<b>DIRECTION</b> Northeast      0      0.0% Northwest      0      0.0% Southeast      0      0.0% Southwest      0      0.0% Unspecified      0      0.0%
<b>WEATHER</b> Clear      15      93.8% Cloudy      0      0.0% Rain      1      6.3% Snow      0      0.0% Sleet/Hail/Freezing Rain      0      0.0% Fog/Smog/Smoke      0      0.0% Unspecified      0      0.0% <b>Total</b> <b>16</b>	<b>ACCIDENT TYPE</b> Rear End      5      31.3% Overtake      0      0.0% Right Angle      6      37.5% Left Turn      2      12.5% Right Turn      0      0.0% Fixed Object      0      0.0% Head On      0      0.0% Sideswipe      3      18.8% <b>Total</b> <b>16</b>	<b>ACCIDENT TYPE</b> Pedestrian      0      0.0% Bicycle      0      0.0% Parked Vehicle      0      0.0% Backing      0      0.0% Run Off The Road      0      0.0% Driveway      0      0.0% Other      0      0.0% Unspecified      0      0.0%
<b>SURFACE</b> Dry      15      93.8% Wet      1      6.3% Mud/Slush      0      0.0% Snow/Ice      0      0.0% Unspecified      0      0.0% <b>Total</b> <b>16</b>	<b>ACCIDENT SEVERITY</b> Fatal      0      0.0% Injury      1      6.3% Property Damage      0      0.0% Non-Reportable      15      93.8% <b>Total</b> <b>16</b>	
<b>TIME OF YEAR</b> Winter (Dec-Feb)      5      31.3% Spring (Mar-May)      6      37.5% Summer (Jun-Aug)      4      25.0% Fall (Sep-Nov)      1      6.3% <b>Total</b> <b>16</b>	<b>TYPE OF VEHICLE</b> Passenger Cars      28      87.5% Commercial Vehicles      4      12.5% <b>Total</b> <b>32</b>	
<b>DAY OF WEEK</b> Sunday      2      12.5% Monday      3      18.8% Tuesday      1      6.3% Wednesday      2      12.5% Thursday      1      6.3% Friday      4      25.0% Saturday      3      18.8% <b>Total</b> <b>16</b>	<b>LIGHT CONDITION</b> Daylight      13      81.3% Dawn/Dusk      1      6.3% Night      2      12.5% Unspecified      0      0.0% <b>Total</b> <b>16</b>	

## SUMMARY OF ACCIDENT SEVERITY BY YEAR:

	2015	2016	2017
Fatal Accidents	0	0	0
Injury Accidents	1	0	0
Property Damage Accidents	0	0	0
Non-Reportable Accidents	4	5	6
<b>Total Accidents</b>	<b>5</b>	<b>5</b>	<b>6</b>

# COLLISION DIAGRAM

Key Number =

MUNICIPALITY: <u>Woodstown</u>	COUNTY: <u>Salem</u>	FILE: <u>RT45RT40</u>
INTERSECTION: <u>SR 40/CR 616-Route 45</u>		CASE #: _____
PERIOD: <u>2</u> YEARS <u>7</u> MONTHS	FROM <u>1/1/2015</u> TO <u>7/31/2017</u>	BY: <u>AZ</u> DATE: <u>11/28/2017</u>



SYMBOLS		MANNER OF COLLISION	
MOVING VEHICLE	PARKED VEHICLE	REAR END	HEAD ON
MOTORCYCLE	PEDESTRIAN	OVERTAKE	LEFT TURN
BACKING VEHICLE	BICYCLE	OUT OF CONTROL	RIGHT TURN
STOPPED VEHICLE	FIXED OBJECT	SKIDDING	RIGHT ANGLE
TRAFFIC SIGNAL	Fatal	OVERTURNED	SIDE SWIPE



<b>1. L O C A T I O N</b>	CASE NO.: _____		<b>HIGHWAY SAFETY INVESTIGATION REPORT</b>			FOR OFFICIAL USE:																									
	<input checked="" type="checkbox"/> TOWN <input type="checkbox"/> CITY OF <u>Woodstown</u> <input type="checkbox"/> VILLAGE					DIVISION FILE _____ REVIEWED BY _____ SCHEDULED FOR B&A <input type="checkbox"/>																									
	ROUTE NO. OR STREET NAME <u>SR 40/CR 616-Route 45</u>			STATE HIGHWAY NO.		FROM OR AT REF. MARKER / NODE																									
	AT INTERSECTION WITH			ROUTE NO. OR STREET NAME		STATE HIGHWAY NO.		TO REFERENCE MARKER / NODE																							
			<u>SR 40/CR 616-Route 45</u>																												
<b>2. REASON FOR INVESTIGATION</b> <input type="checkbox"/> (a) IDENTIFIED BY ACCIDENT SURVEILLANCE SYSTEM <input checked="" type="checkbox"/> (b) POLICE HAZARD REPORT <input type="checkbox"/> (c) RESPONSE TO COMPLAINT OR INJURY <input type="checkbox"/> (d) REGIONALLY INITIATED <input type="checkbox"/> (e) OTHER (Explain) _____								<b>3. RECOMMENDATION</b> <input type="checkbox"/> (a) CAPITAL IMPROVEMENT (Initiate Proj. Devel. Study) <input type="checkbox"/> (b) TRAFFIC CONTROL IMPROVEMENT <input checked="" type="checkbox"/> (c) MAINTENANCE IMPROVEMENT <input type="checkbox"/> (d) OTHER <input type="checkbox"/> (e) NONE																							
<b>4. DISCUSSION</b> (a) PROBLEMS IDENTIFIED Lack of compliance to the traffic signal control. Pavement markings appeared to be faded. Lane use control signs are not paired.																															
(b) PROPOSED SOLUTION See Safety analysis and Recommendations.																															
(c) ACTION TAKEN																															
<b>5. ACCIDENT EXPERIENCE</b>																<b>6. BENEFIT/COST ANALYSIS</b>															
Number of Months		PERIOD BEGINNING		NUMBER OF ACCIDENTS						Check box if Benefit/Cost Calculations are attached <input type="checkbox"/> PRINCIPAL INVESTIGATOR <u>AZ</u>										TITLE <u>Traffic Engineer</u>											
		MONTH	YEAR	Fatal Accidents	Injury Accidents	Property Damage+ N/R Accidents																									
12		1	2015	0	1	0 + 4																									
12		1	2016	0	0	0 + 5																									
7		1	2017	0	0	0 + 6																									
APPROVED BY _____																DATE: <u>11/28/2017</u>															



# Appendix E

## TRAFFIC SIGNAL TIMING DIRECTIVES



49-108 sec. Variable CycleNormal Operation

<u>Phase</u>	<u>Highway &amp; Street Name</u>	<u>Signal Faces</u>										<u>Time (sec.)</u>
		<u>1-3</u>	<u>4,5</u>	<u>6,7</u>	<u>8,9</u>	<u>10</u>	<u>11,12</u>	<u>13</u>	<u>14-17</u>	<u>18,21</u>	<u>19,20</u>	
A.	Rt.45 NB & Rt. US 40 EB/Rt.45 SB ROW	G	G	G	R	R	R	R	DW	DW	DW	10-25
	Change	Y	Y	Y	R	R	R	R	DW	DW	DW	5
	Clearance	R	R	R	R	R	R	R	DW	DW	DW	2
B.	Bailey Street (CR 616) ROW	R	R	R	G/<G-	G	R	R	DW	DW	DW	7-20
	Change	R	R	R	Y	Y	R	R	DW	DW	DW	4
	Clearance	R	R	R	R	R	R	R	DW	DW	DW	2
C.	Rt. US 40 ROW	R	R	R/-G>	R	R	G/<G-	G	DW	DW	DW	12-40
	Change	R	R	R/-Y>	R	R	Y	Y	DW	DW	DW	5
	Clearance	R	R	R	R	R	R	R	DW	DW	DW	2
	Emergency Flash	Y	Y	Y	R	R	R	R	DARK	DARK	DARK	-

With Pedestrian Actuation

<u>Phase</u>	<u>Highway &amp; Street Name</u>	<u>Signal Faces</u>										<u>Time (sec.)</u>
		<u>1-3</u>	<u>4,5</u>	<u>6,7</u>	<u>8,9</u>	<u>10</u>	<u>11,12</u>	<u>13</u>	<u>14-17</u>	<u>18,21</u>	<u>19,20</u>	
A.	Rt.45 NB & Rt. US 40 EB/Rt.45 SB ROW	G	G	G	R	R	R	R	W	DW	DW	7
	Pedestrian Clearance	G	G	G	R	R	R	R	FDW	DW	DW	20
	Change	Y	Y	Y	R	R	R	R	DW	DW	DW	5
	Clearance	R	R	R	R	R	R	R	DW	DW	DW	2
B.	Bailey Street (CR 616) ROW	R	R	R	G/<G-	G	R	R	DW	DW	W	7
	Pedestrian Clearance	R	R	R	G/<G-	G	R	R	DW	DW	FDW	14
	Change	R	R	R	Y	Y	R	R	DW	DW	DW	4
	Clearance	R	R	R	R	R	R	R	DW	DW	DW	2
C.	Rt. US 40 ROW	R	R	R/-G>	R	R	G/<G-	G	DW	W	DW	7
	Pedestrian Clearance	R	R	R/-G>	R	R	G/<G-	G	DW	FDW	DW	22
	Vehicle Extension	R	R	R/-G>	R	R	G/<G-	G	DW	DW	DW	0-11
	Change	R	R	R/-Y>	R	R	Y	Y	DW	DW	DW	5
	Clearance	R	R	R	R	R	R	R	DW	DW	DW	2
	Emergency Flash	Y	Y	Y	R	R	R	R	DARK	DARK	DARK	-

**NOTES:**

1. The controller shall rest in Phase “C” with a minimum recall on Phase “C”.
2. The vehicle extension interval shall be set at 3 seconds.
3. The manual control shall be disconnected.
4. The memory circuits shall be “OFF”.
5. Actuation of pedestrian push button PPB-1 shall call Phase “A”.
6. Actuation of pedestrian push button PPB-2 shall call Phase “C”.
7. Actuation of pedestrian push button PPB-3 shall call Phase “B”.

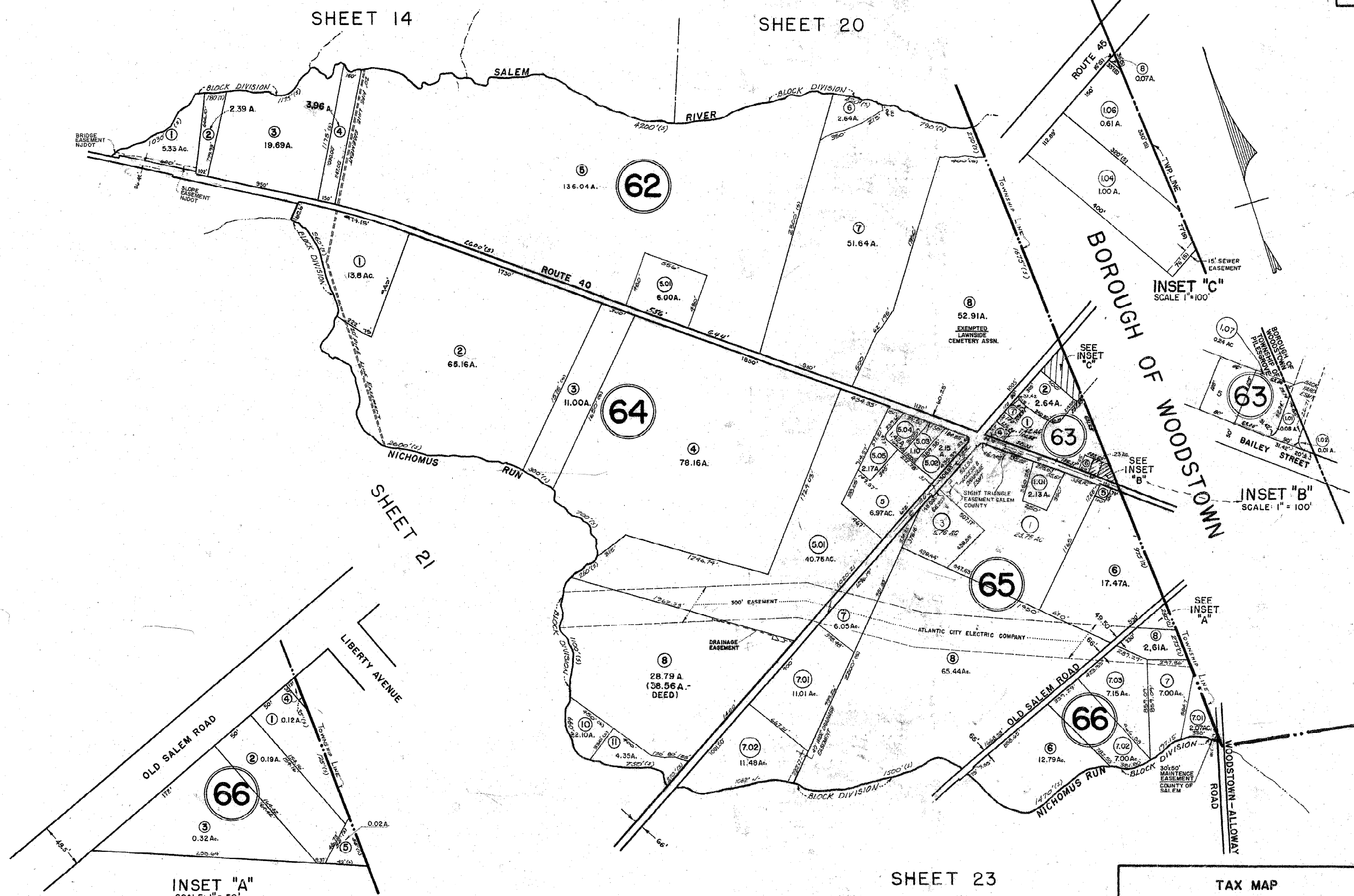


# Appendix F

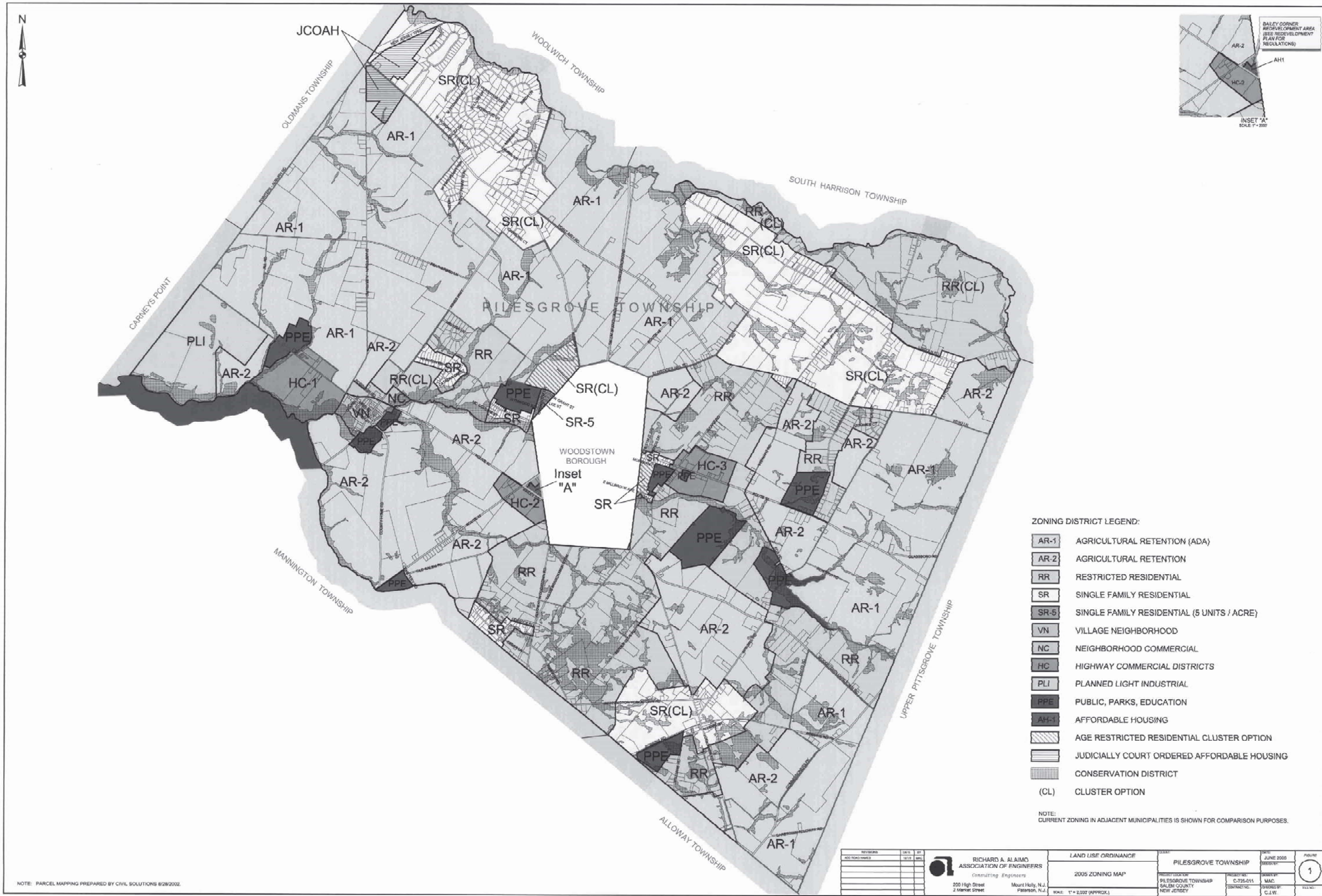
## TAX MAP & ZONING MAP



22



22



NOTE: PARCEL MAPPING PREPARED BY CIVIL SOLUTIONS 8/28/2002.

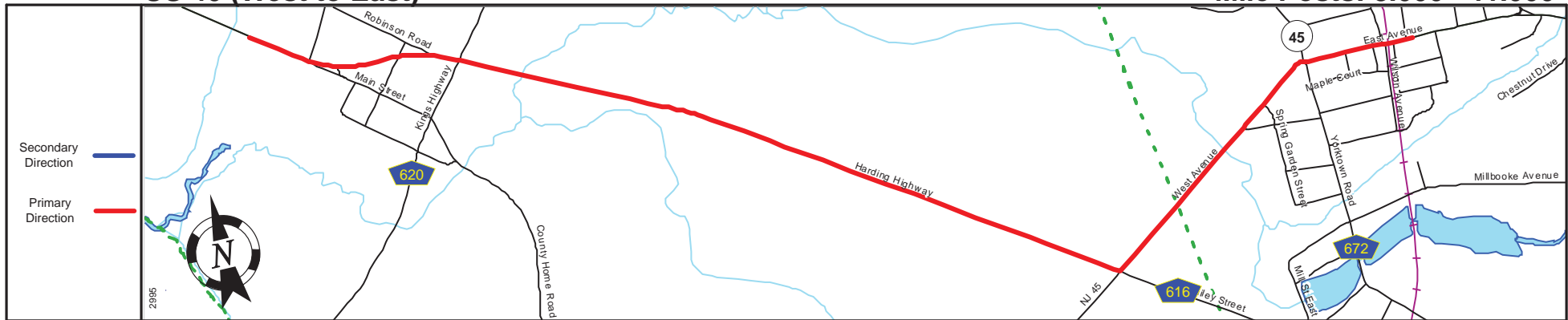
# Appendix G

## NJDOT STRAIGHT LINE DIAGRAMS (SLD)

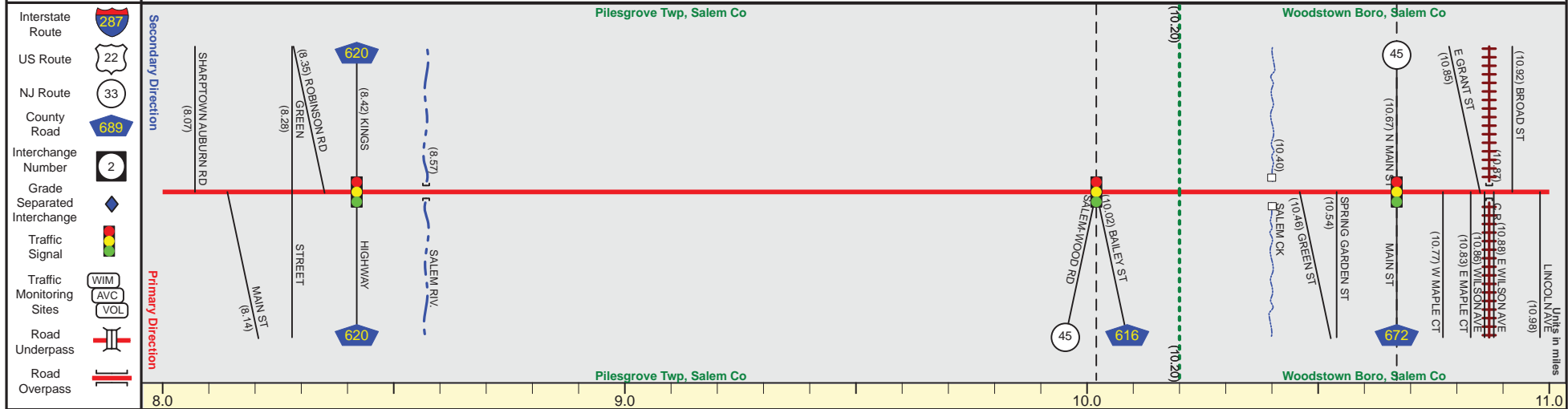


# US 40 (West to East)

Mile Posts: 8.000 - 11.000



Pavement	
Shoulder	
Number of Lanes	
Speed Limit	
Street Name	

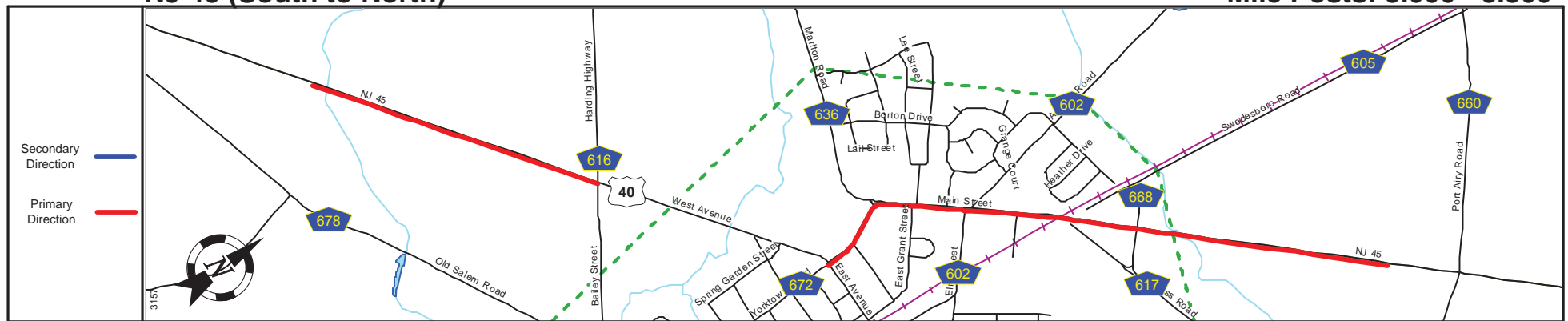


Street Name	Harding Highway				West Avenue		East Avenue	
Jurisdiction	N.J.D.O.T.							
Functional Class	Rural Principal Arterial				Urban Principal Arterial			
Federal Aid - NHS Sy	NHS							
Control Section	1702				1717		1703	
Speed Limit	50	45	40	50	45			35
Number of Lanes	2							
Med. Type	None							
Med. Width	0							
Pavement	24				36		40	
Shoulder	6		3	6	8		0	
Traffic Volume	12,564 (2012) 13,906 (2013)							
Traffic Sta. ID	091702 131716							
Structure No.	1702154				1717150		N/A	
Enlarged Views								

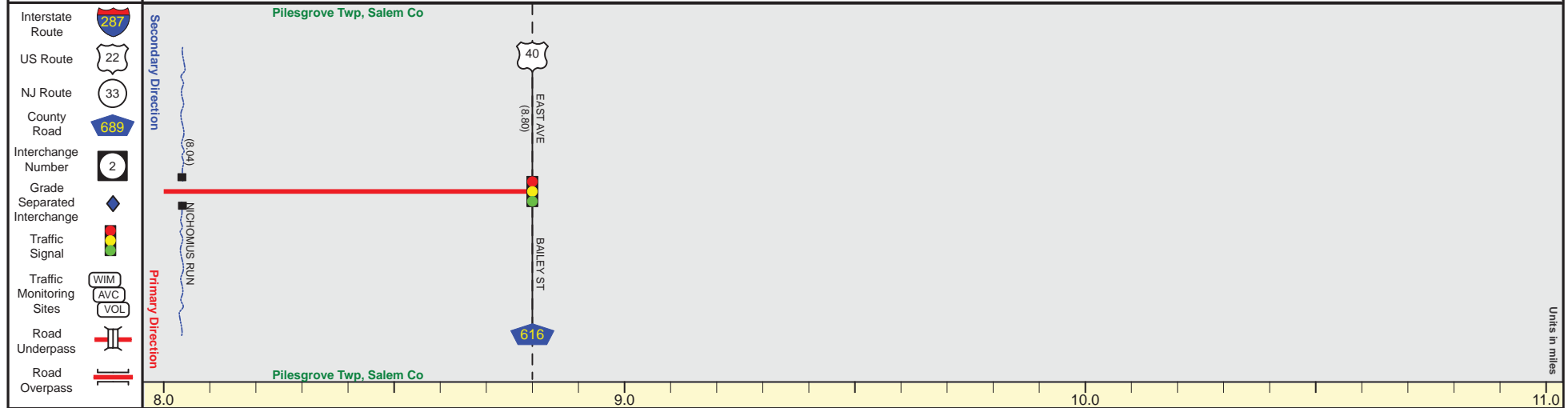
SRI = 00000040

Date last inventoried: March 2015





Pavement	
Shoulder	
Number of Lanes	
Speed Limit	
Street Name	



Street Name	NJ 45
Jurisdiction	N.J.D.O.T.
Functional Class	Urban Minor Arterial
Federal Aid - NHS Sy	STP
Control Section	1704
Speed Limit	50
Number of Lanes	2
Med. Type	None
Med. Width	0
Pavement	24
Shoulder	8
Traffic Volume	5,001 (2011)
Traffic Sta. ID	7-8,184
Structure No.	1704154
Enlarged Views	

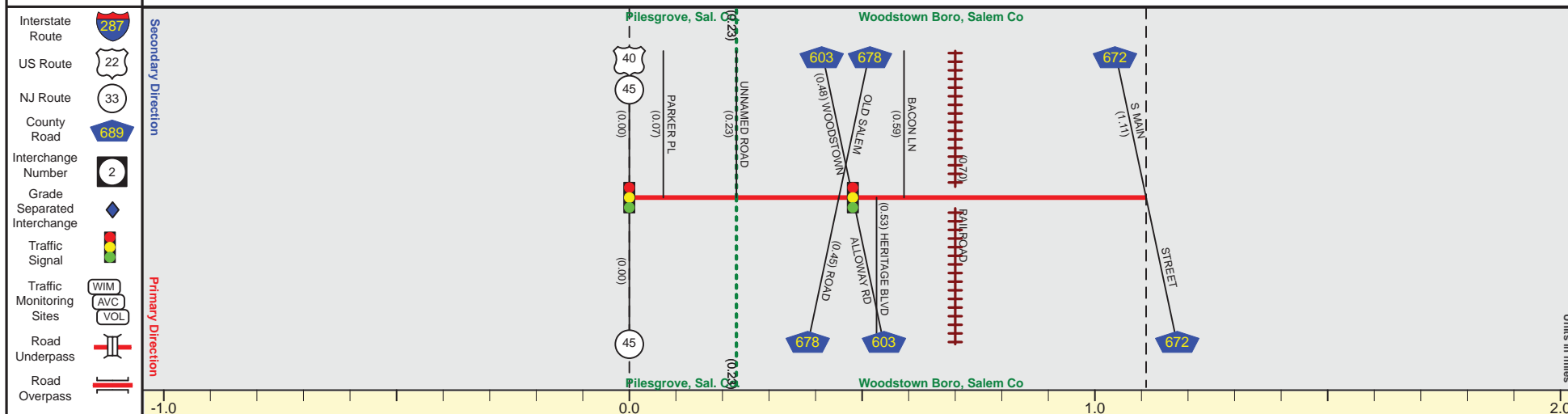


## SALEM COUNTY 616 (West to East)

Mile Posts: 0.000 - 1.110



Pavement	
Shoulder	
Number of Lanes	
Speed Limit	
Street Name	



Street Name	Bailey Street	
Jurisdiction	County	
Functional Class	Urban Major Collector	Urban Local
Federal Aid - NHS Sy	STP	Non-Federal Aid
Control Section		
Speed Limit	35	
Number of Lanes	3	2
Med. Type	None	
Med. Width	0	
Pavement	36	32
Shoulder	16	1
Traffic Volume	6,297 (2012)	
Traffic Sta. ID	111713	
Structure No.		
Enlarged Views		

SRI = 17000616\_\_

Date last inventoried: June 2011

# Appendix H

## COST ESTIMATES





## US Route 40, State Highway 45, and Bailey Street (CR 616) - Alternative 1

COUNTY OF SALEM

[illegible]



## US Route 40, State Highway 45, and Bailey Street (CR 616) - Alternative 2

COUNTY OF SALEM

[illegible]

**REMINGTON & VERNICK ENGINEERS  
PROJECT COST ESTIMATE****PROJECT NAME:**

US Route 40, State Highway 45, and Bailey Street (CR 616) - Alternative 3

**CLIENT:**

COUNTY OF SALEM

7-Dec-17

#	DESCRIPTION	UNITS	ESTIMATED QUANTITY	EST. UNIT PRICE	AMOUNT
1	MAINTENANCE AND PROTECTION OF TRAFFIC	LS	1	\$15,000.00	\$15,000.00
2	MOBILIZATION	LS	1	\$10,000.00	\$10,000.00
3	SOIL EROSION AND SEDIMENT CONTROL	LS	1	\$10,000.00	\$10,000.00
4	CLEARING SITE	LS	1	\$5,000.00	\$5,000.00
5	EXCAVATION, UNCLASSIFIED	CY	134	\$65.00	\$8,710.00
6	DENSE-GRADED AGGREGATE BASE COURSE, 6" THICK	SY	402	\$15.00	\$6,030.00
7	HOT MIX ASPHALT 19M64 BASE COURSE, 4" THICK	TON	95	\$95.00	\$9,025.00
8	HOT MIX ASPHALT 9.5M64 SURFACE COURSE, 2" THICK (FULL LIMITS)	TON	750	\$110.00	\$82,500.00
9	TACK COAT	GAL	61	\$1.00	\$61.00
10	PRIME COAT	GAL	141	\$1.00	\$141.00
11	CONCRETE SIDEWALK, 4" THICK	SY	181	\$80.00	\$14,480.00
12	9" X 18" CONCRETE VERTICAL CURB	LF	250	\$30.00	\$7,500.00
13	DETECTABLE WARNING SURFACE	SY	4	\$230.00	\$920.00
14	FOUNDATION, TYPE SFK	UN	1	\$3,000.00	\$3,000.00
15	TRAFFIC SIGNAL STANDARD, ALUMINUM	UN	1	\$2,500.00	\$2,500.00
16	TRAFFIC SIGNAL MAST ARM, ALUMINUM	UN	1	\$2,500.00	\$2,500.00
17	FOUNDATION, TYPE SPF	UN	1	\$2,000.00	\$2,000.00
18	PEDESTRIAN SIGNAL STANDARD	UN	1	\$1,000.00	\$1,000.00
19	PUSH BUTTON	UN	2	\$600.00	\$1,200.00
20	TRAFFIC STRIPES, LONG LIFE EPOXY RESIN, 4"	LF	1600	\$2.00	\$3,200.00
21	TRAFFIC MARKINGS, SYMBOLS	SF	720	\$5.00	\$3,600.00
22	REGULATORY AND WARNING SIGN	SF	56	\$40.00	\$2,240.00
23	TRAFFIC SIGNAL HEAD	UN	6	\$900.00	\$5,400.00
24	TRAFFIC SIGNAL CABLE, 10 CONDUCTOR	LF	800	\$2.50	\$2,000.00
25	3" RIGID METALLIC CONDUIT	LF	135	\$45.00	\$6,075.00
26	HMA MILLING, 3" OR LESS (FULL LIMITS)	SY	6000	\$6.00	\$36,000.00
27	18"x36" JUNCTION BOX	UN	2	\$1,500.00	\$3,000.00
28	TOPSOILING, 4" THICK	SY	111	\$4.00	\$444.00
29	FERTILIZING AND SEEDING, TYPE A-3	SY	111	\$1.00	\$111.00

**ESTIMATED CONSTRUCTION COST: \$244,000.00****20% CONTINGENCIES: \$49,000.00****TOTAL ESTIMATED CONSTRUCTION COST: \$293,000.00****Engineering Design: \$34,000.00****Contact Administration and Inspection: \$44,000.00****Total Estimated Project Cost: \$371,000.00**