

TRAFFIC IMPACT STUDY

For

**Iron Ore Properties, LLC
Proposed Mixed-Use Development**

Property Located at:

**Block 478 – Lots 2-6
Block 483 – Lot 18
Township of Cranford, Union County, NJ**

Prepared by:



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A handwritten signature in black ink, appearing to read 'NV', written over a horizontal line.

Nick Verderese, PE
NJ PE License #38991

A handwritten signature in black ink, appearing to read 'Justin P. Taylor', written over a horizontal line.

Justin P. Taylor, PE, PTOE
NJ PE License #45988

November 8, 2022

2956-99-004TE

INTRODUCTION

It is proposed to construct a mixed-use development consisting of 55 apartments and approximately 5,700 SF of retail space on a parcel of land currently developed with four buildings totaling approximately 12,600 SF, located in the southwest corner of the intersection of South Avenue (CR 610) and High Street in the township of Cranford, Union County, New Jersey (see Figure 1 in Appendix A). It is also proposed to expand a parking lot on a parcel of land currently developed with a residential building adjacent to an existing parking lot, located on 2 Chestnut Street. The site is designated as Block 478 – Lots 2-6 and Block 483 – Lot 18 on the Township of Cranford Tax Maps. The existing uses of the lots include mixed retail, a medical office, and general office uses. More specifically, Lot 2 is currently developed as a parking lot. Lot 3 is currently developed with an approximate 2,500 SF restaurant (The Garrison Bar & Restaurant). Lot 4 is currently developed with a building consisting of an approximate 2,000 SF medical office (Cranford OB-GYN) and an approximate 2,600 SF office (Communication Workers of America). Lot 5 is currently developed with a building consisting of an approximate 2,000 SF medical office (Chiropractic Center), an approximate 1,900 SF salon (Hinas Salon), and an approximate 1,000 SF spa (Oriental Day Spa). Lot 6 is currently developed with a building containing three garages totaling approximately 600 SF. Lastly, Lot 18 is currently developed with a 3 dwelling residential building which will be demolished and converted into 15 additional parking spaces. It is proposed to raze the existing site and construct a mixed-use development consisting of 55 apartments and approximately 5,700 SF of retail space (The Project). The site is located across from the NJ Transit Cranford Station. Access to the site is currently provided via an enter only driveway at the northern end of the site along South Avenue and two full movements at the eastern end of the site along High Street. It is proposed to close the existing access points and provide access to the site via a full movement driveway along South Avenue and a full movement driveway along High Street.

Dynamic Traffic LLC has been retained to prepare this study to assess the traffic impact associated with the construction of The Project on the adjacent roadway network. This study documents the methodology, analyses, findings and conclusions of our study and includes:

- A detailed field inspection was conducted to obtain an inventory of existing roadway geometry, traffic control, and location and geometry of existing driveways and intersections.
- Existing traffic data was collected via a manual turning movement (MTM) count during the weekday AM and weekday PM peak periods at the intersection of South Avenue (CR 610) and High Street.
- Projections of traffic to be generated by the proposed development were prepared utilizing trip generation data as published by the Institute of Transportation Engineers. Site traffic was then assigned to the adjacent street system based upon the anticipated directional distribution.
- Capacity analyses were conducted for the Existing, No Build, and Build conditions for the study intersections.
- The proposed points of ingress and egress were inspected for adequacy of geometric design, spacing and/or alignment to streets and driveways on the opposite side of the street, relationship to other driveways adjacent to the development, and conformance with accepted design standards.

- The site plan as designed was reviewed for sufficiency in accommodating the anticipated vehicle mix.
- The parking layout and supply was assessed based on accepted design standards, local requirements, and demand experienced at similar developments.
- The proposed site circulation and parking as shown on the site plan were reviewed for conformance with the South Avenue & Chestnut Street Redevelopment Plan.

EXISTING CONDITIONS

A review of the existing roadway conditions near the proposed site was conducted to provide the basis for assessing the traffic impact of the development. This included field investigations of the surrounding roadways and intersections, collection of traffic volume data, and extensive analyses.

Existing Roadway Conditions

The following are descriptions of the roadways in the study area:

South Avenue (CR 610) is an Urban Minor Arterial roadway under County jurisdiction with a general east/west orientation. In the vicinity of the site the posted speed limit is 35 MPH and the roadway provides one travel lane in each direction. On the eastern side of the intersection with High Street, the posted speed limit of South Avenue reduces to 30 MPH. On-street parking is permitted along both sides of the roadway along with curb and sidewalk. South Avenue provides a straight horizontal alignment along the site frontage, and a relatively flat vertical alignment. The land uses along South Avenue in the vicinity of The Project are a mix of commercial and residential.

High Street is local roadway under municipal jurisdiction with a general north/south orientation. In the vicinity of the site the posted speed limit is 25 MPH and the roadway provides one travel lane in each direction. On-street parking is permitted along the east side of the roadway. Curb and sidewalk are provided along both sides of the roadway. High Street provides a straight horizontal alignment along the site frontage. High Street provides a relatively flat vertical alignment. The land uses along High Street in the vicinity of The Project are a mix of commercial and residential.

Existing Traffic Volumes

A manual turning movement (MTM) count was conducted on Thursday, May 5, 2022 from 7:00 to 9:00 AM and from 4:30 to 6:30 PM at the intersection of South Avenue (CR 610) and High Street. Review of the collected traffic data reveals that the weekday morning peak street hour (PSH) occurs between 7:45 - 8:45 AM and the weekday evening PSH occurs between 4:45 - 5:45 PM. Figure 2, located in Appendix A, shows the existing peak hour traffic volumes at the study intersections. All traffic counts are contained in Appendix B.

Existing Capacity Analysis

The methodology utilized in the capacity analyses is described in the *Highway Capacity Manual*, published by the Transportation Research Board. In general, the term Level of Service (LOS) is used to provide a “qualitative” evaluation of capacity based upon certain “quantitative” calculations related to empirical values, such as traffic volume and intersection control.

At signalized intersections, factors that affect the various approach capacities include width of approach, number of lanes, signal “green time”, turning percentages, truck volumes, etc. However, delays cannot be related to capacity in a simple one-to-one fashion. For example, it is possible to have delays in the Level of Service “F” range without exceeding roadway capacity. Substantial delays can exist without exceeding capacity if one or more of the following conditions exist: long signal cycle lengths; a particular traffic movement experiences a long red time; or progressive movement for a particular lane group is poor. Table I describes the level of service ranges for signalized intersections.

An unsignalized (STOP sign controlled) driveway or side street along a through route is seldom critical from an overall capacity standpoint, however, it may be of great significance to the capacity of the minor cross-route, and it may influence the quality of traffic flow on both. When analyzing an unsignalized intersection, it is assumed that both the major street through and right turn movements are unimpeded and have the right-of-way over all side street traffic and left turns from the major street. All other turning movements in the intersection cross, merge with, or are otherwise impeded by major street movements. Traffic delays at unsignalized intersections are determined by sequentially processing these impeded movements. Table II describes the level of service ranges for unsignalized (stop controlled) intersections.

**Table I
Level of Service Criteria
for Signalized Intersections**

Level of Service	Average Control Delay (seconds per vehicle)
A	0.0 to 10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	greater than 80.0

**Table II
Level of Service Criteria
for Unsignalized Intersections**

Level of Service	Average Control Delay (seconds per vehicle)
a	0.0 to 10.0
b	10.1 to 15.0
c	15.1 to 25.0
d	25.1 to 35.0
e	35.1 to 50.0
f	greater than 50.0

It should be noted that the analyses within the *Highway Capacity Manual* assume a random arrival for all the movements, which may not be the case if an adjacent traffic signal is present that platoons vehicles, such as the signalized intersection of South Avenue and Walnut Avenue.

All capacity analyses were performed utilizing Synchro 11 software. It should be noted that the existing percentage of trucks and peak hour factors were used in the existing analysis. Table III summarizes the existing levels of service (LOS) and delays. All capacity analysis calculation worksheets are contained in Appendix C.

**Table III
Existing Levels of Service**

Intersection	Direction/ Movement		AM PSH	PM PSH
	South Avenue (CR 610) & High Street/NJ Transit Cranford Station Driveway	EB	LTR	A (4)
WB		LTR	A (4)	A (4)
NB		LT	D (48)	D (48)
		R	B (13)	B (14)
SB		LTR	C (30)	C (30)
Overall		A (7)	A (7)	

A (#) - Signalized Intersection Level of Service (seconds of delay per vehicle)

The following is a discussion pertaining to the existing intersection analyzed.

South Avenue (CR 610) & High Street/NJ Transit Cranford Station Driveway

South Avenue (CR 610) intersects High Street and the NJ Transit Cranford Station Driveway to form a four-leg intersection controlled by a traffic signal. The signal timing directive was obtained from the County of Union which indicates that a two-phase 90-second background cycle is utilized (the traffic signal timing directive is included in Appendix B).

South Avenue (CR 610) provides one lane for all movements. High Street provides one shared left turn/through lane and one dedicated right turn lane. The NJ Transit Cranford Station Driveway is a full-movement driveway permitting all movements with a median between ingress and egress lanes.

A review of the existing analysis reveals that the intersection operates at level of service “A” and all movements operate at levels of service “D” or better during the analyzed peak periods. See Table III for the individual movement levels of service and delays.

FUTURE CONDITIONS

Traffic volumes and operational analyses were developed for both the 2024 No Build and Build conditions. The No Build conditions provide a baseline for assessing the impact of the site development traffic on the roadway system. The process of developing the No Build and Build traffic volumes and the subsequent analyses is outlined below.

Regardless of whether the subject site is developed or not, traffic volumes on the surrounding roadways are expected to increase as a result of developments throughout the region. A growth rate for roadways within the study area was obtained from the NJDOT Annual Background Growth Rate Table, which indicates a growth rate of 1.0% per year.

Through consultation with the Township of Cranford Planning Board staff, there are no other developments in the vicinity of the site that have been approved but not yet constructed that are identified as significant traffic generators. It was assumed that the background growth rate was adequate to account for the traffic associated with all developments not listed.

Future 2024 No Build traffic volumes were developed by applying the background growth rate of 1.0% for two (2) years to the study area roadways existing traffic volumes. Figure 3, in Appendix A, shows the 2024 No Build traffic volumes.

Traffic Generation

Trip generation projections for The Project were prepared utilizing trip generation research data as published under Land Use Code 220 – Multifamily Housing (Low-Rise) Close to Rail Transit and Land Use Code 822 – Strip Retail Plaza (<40K SF) in the Institute of Transportation Engineers' (ITE) publication, *Trip Generation, 11th Edition*. This publication sets forth trip generation rates based on empirical traffic count data conducted at numerous research sites.

The ITE publication *Trip Generation Handbook, 3rd Edition*, recognizes that when land uses are proximate to each other, individual land uses tend to interact, reducing the overall trip generation for the site. It is anticipated that there will be an overall reduction in site generated trips due to the opportunities for tenants of the residential units to visit the retail space. These trips can be made without accessing the regional roadway network and are considered “internal” to the overall development. Based on the ITE internal capture methodology, a reduction rate of 23.3% has been applied to the site generated trips during the weekday evening peak hour to account for this effect. All internal capture calculation worksheets are contained in Appendix D. The following table summarizes the trip generation projections associated with the proposed development taking into account the internal capture credits.

**Table IV
Proposed Trip Generation**

Land Use	Trip Type	AM PSH			PM PSH		
		In	Out	Total	In	Out	Total
55 Apartments	Total	6	15	21	20	14	34
	Internal	-	-	-	7	3	10
	External	6	15	21	13	11	24
5,700 SF Retail	Total	8	5	13	26	26	52
	Internal	-	-	-	3	7	10
	External	8	6	14	23	19	42
Total	Total	14	20	34	46	40	86
	Internal	-	-	-	10	10	20
	External	14	20	34	36	30	66

Once the magnitude of traffic to be generated by the site is known, it is necessary to assign that traffic to the adjacent street system. The distribution of new traffic to the surrounding roadways is based on the location of primary arterial roadways, major signalized intersections and existing traffic patterns. Figures 4 and 5, located in Appendix A, illustrate the Site Generated Trip Distribution and the Site Generated Trips, respectively. The Site Generated Trips assigned to the study area network were added to the No Build traffic volumes to generate the Build traffic volumes, which are shown in Figure 6.

Future Capacity Analysis

Operational conditions at the study intersections were analyzed under the No Build and Build conditions and are summarized in Table V below.

**Table V
Future Levels of Service**

Intersection	Direction/ Movement		AM PSH		PM PSH	
			No Build	Build	No Build	Build
South Avenue (CR 610) & High Street/NJ Transit Cranford Station Driveway	EB	LTR	A (4)	A (4)	A (3)	A (3)
	WB	LTR	A (4)	A (4)	A (4)	A (4)
	NB	LT	D (48)	D (48)	D (48)	D (48)
		R	B (13)	B (13)	B (14)	B (14)
	SB	LTR	C (30)	C (30)	C (29)	C (29)
	Overall		A (7)	A (7)	A (7)	A (7)
South Avenue (CR 610) & Site Driveway	WB	L	-	a (9)	-	a (9)
	NB	LR	-	c (19)	-	c (21)
High Street & Site Driveway	EB	LR	-	a (10)	-	a (10)
	NB	L	-	a (7)	-	a (8)

a (#) - Unsignalized Intersection Level of Service (seconds of delay per vehicle)

A (#) - Signalized Intersection Level of Service (seconds of delay per vehicle)

South Avenue (CR 610) & High Street/NJ Transit Cranford Station Driveway

With the addition of site generated traffic, the intersection is anticipated to continue to operate at No Build overall intersection level of service “A” during the analyzed peak hours. Additionally, each movement is anticipated to continue to operate at No Build levels of service “D” or better. See Table V for the individual movement levels of service and delays.

South Avenue (CR 610) & Site Driveway

The site driveway is proposed to intersect South Avenue to form an unsignalized T-intersection with the northbound approach of the site driveway operating under stop control. The eastbound approach of South Avenue is proposed to provide a shared through/right turn lane. The westbound approach of South Avenue is proposed to provide a shared left turn/through lane. The northbound approach of the site driveway is proposed to provide a shared left turn/right turn lane.

As designed, the driveway is anticipated to operate at levels of service “C” or better during the studied peak hours. See Table V for the individual movement levels of service and delays.

High Street & Site Driveway

The site driveway is proposed to intersect High Street to form an unsignalized T-intersection with the eastbound approach of the site driveway operating under stop control. The northbound approach of High Street is proposed to provide a shared left turn/through lane. The southbound approach of High Street is proposed to provide a shared through/right turn lane. The eastbound approach of the site driveway is proposed to provide a shared left turn/right turn lane.

As designed, the driveway is anticipated to operate at a level of service “A” during the studied peak hours. See Table V for the individual movement levels of service and delays.

SITE PLAN

Site Access and Circulation

The site plan was reviewed with respect to the site access and on-site circulation design. As noted previously, access to The Project will be provided via a full movement driveway along South Avenue and a full movement driveway along High Street.

The parking lot will be serviced by parking aisles with widths of 24', which satisfies the Ordinance requirement of 24' aisles with 90-degree parking. It should be noted that the proposed aisle widths also satisfy the Residential Site Improvement Standards (RSIS) requirement of 24' wide parking aisles with 90-degree parking. Review of the site plan design indicates that the site can sufficiently accommodate the anticipated vehicle mix.

Parking

It is proposed to provide 57 off-street parking spaces (inclusive of 2 ADA spaces and 12 electric vehicle make-ready parking spaces) on Block 478 – Lots 2-6 as well as provide 9 off-street parking spaces on Block 483 – Lot 18. Additionally, it is proposed to restripe the existing on-street parking supply along South Avenue to provide 3 additional on-street parking spaces, along High Street to provide 2 additional on-street parking spaces, as well as along Chestnut Street to provide 6 additional on-street parking spaces. The RSIS sets forth a parking requirement of 1.8 parking spaces for one-bedroom units, 2.0 parking spaces for two-bedroom units, and 2.1 parking spaces for three-bedroom units. With 32 one-bedroom units, 21 two-bedroom units, and two (2) three-bedroom units, this equates to a parking requirement of 104 parking spaces for the proposed 55-unit residential development. Consequently, the RSIS parking requirements are not satisfied and a de minimis exception is requested. It should be noted that the RSIS states;

“Alternative parking standards to those shown in ... shall be accepted if the applicant demonstrates these standards better reflect local conditions. Factors affecting minimum number of parking spaces include household characteristics, availability of mass transit, urban versus suburban location, and available off-site parking resources.”

Specifically, the South Avenue and Chestnut Street Redevelopment Plan was referenced in order to better reflect local conditions (close proximity to transit and mixed-use character of neighborhood). The Redevelopment Plan sets forth a parking requirement of 1.4 parking spaces per multi-family unit and 0 parking spaces for all other uses. Additionally, the Redevelopment Plan states that newly created on-street parking spaces shall count towards meeting the minimum parking requirement. Further, the Redevelopment Plan states that, “Parking ratios shall be applied on a site-wide basis, meaning parking for one subdistrict may be provided within another subdistrict.” It should be noted that the redevelopment plan defines the subject site as subdistrict 1 and defines subdistrict 2 as Block 484 – Lot 19.01.

With 55 multi-family units and approximately 5,700 SF of retail space, this equates to a parking requirement of 77 parking spaces for the proposed 55-unit residential development. As noted above, it is proposed to provide 57 off-street parking spaces (inclusive of 12 electric vehicle make-ready parking spaces) on Block 478 – Lots 2-6, 9 off-street parking spaces on Block 483 – Lot 18, as well as restripe the existing parking supplies along South Avenue, High Street, and Chestnut Street to provide 11 additional on-street parking spaces. Additionally, as outlined in *Traffic Impact and Parking Assessment* prepared by this firm, dated March 21, 2022, and last revised September 19, 2022, the redevelopment program on Block 484 – Lot 19.01 will result in a surplus of 11 parking spaces relative to the Redevelopment Plan requirement (inclusive of 5 electric vehicle make-ready parking spaces). As per the current Municipal Land Use Law (MLUL) (N.J.A.C. 40:55-D), electric vehicle charging stations count as two spaces for the purposes of complying with parking supply requirements, up to a maximum of 10% of the requirement. As such, the effective proposed parking supply for the subject site is calculated to be 95 parking spaces. Consequently, the Redevelopment Plan parking requirements are exceeded by 18 parking spaces and the Board can feel comfortable granting the de minimis exception.

It is proposed to provide standard parking stalls with dimensions of 9'x18' and compact parking stalls with dimensions of 8'x18', which satisfy the Redevelopment Plan requirements of 9'x18' for standard parking stalls and 8'x16' for compact parking stalls. It should be noted that the Redevelopment Plan allows a maximum of 20% of the total parking provided to be compact stalls. It is proposed to provide 14 compact parking spaces, or 14.7% of the total parking supply, which satisfies the Redevelopment Plan requirement.

FINDINGS & CONCLUSIONS

Findings

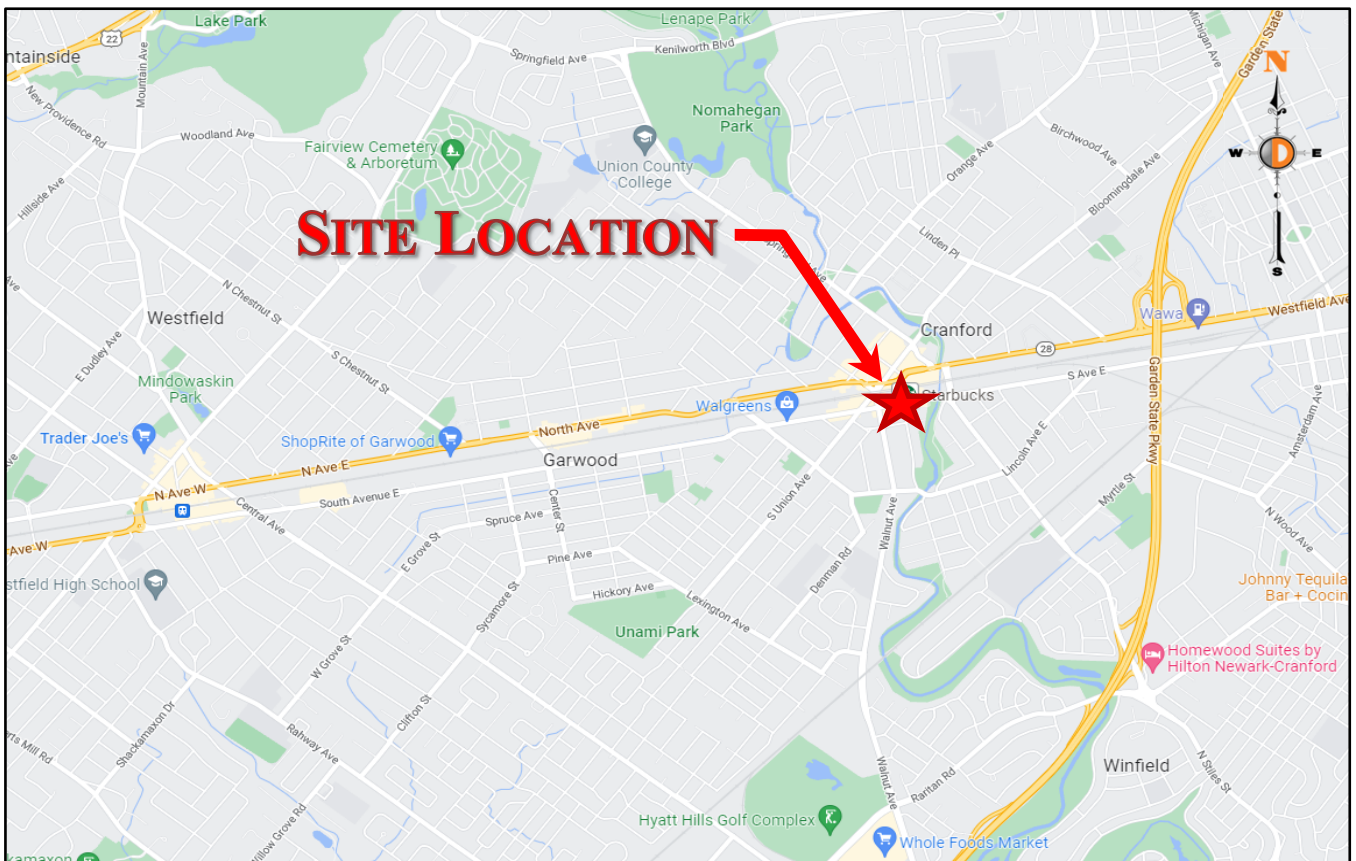
Based upon the detailed analyses as documented herein, the following findings are noted:

- The proposed mixed-use development is projected to generate 14 entering trips and 20 exiting trips during the weekday morning peak hour and 36 entering trips and 30 exiting trips during the weekday evening peak hour that are “new” to the adjacent roadway network.
- Access to the site will be provided via a full movement driveway along South Avenue and a full movement driveway along High Street.
- With the addition of site generated traffic, the intersection of South Avenue (CR 610) and High Street and the NJ Transit Cranford Station Driveway is anticipated to continue to operate at No Build overall intersection level of service “A”. Additionally, each movement is anticipated to continue to operate at No Build levels of service “D” or better during the peak hours studied.
- As designed, the intersection of South Avenue (CR 610) and the site driveway is anticipated to operate at levels of service “C” or better during the peak hours studied.
- As designed, the intersection of High Street and the site driveway is anticipated to operate at level of service “A” during the peak hours studied.
- As proposed, The Project’s site driveways and internal circulation have been designed to provide for safe and efficient movement of the anticipated vehicle mix.
- The proposed parking supply and design is sufficient to support the projected demand and satisfies the South Avenue & Chestnut Street Redevelopment Plan requirements.
- The Project’s site access points, internal circulation, and parking supply have been designed in accordance with the South Avenue & Chestnut Street Redevelopment Plan.

Conclusions

Based upon our Traffic Impact Study as detailed in the body of this report, it is the professional opinion of Dynamic Traffic LLC that the adjacent street system of the Township of Cranford and Union County will not experience any significant degradation in operating conditions with the construction of The Project. The site driveways are located to provide safe and efficient access to the adjacent roadway system. The site plan as proposed provides for good circulation throughout the site and provides adequate parking to accommodate The Project’s needs

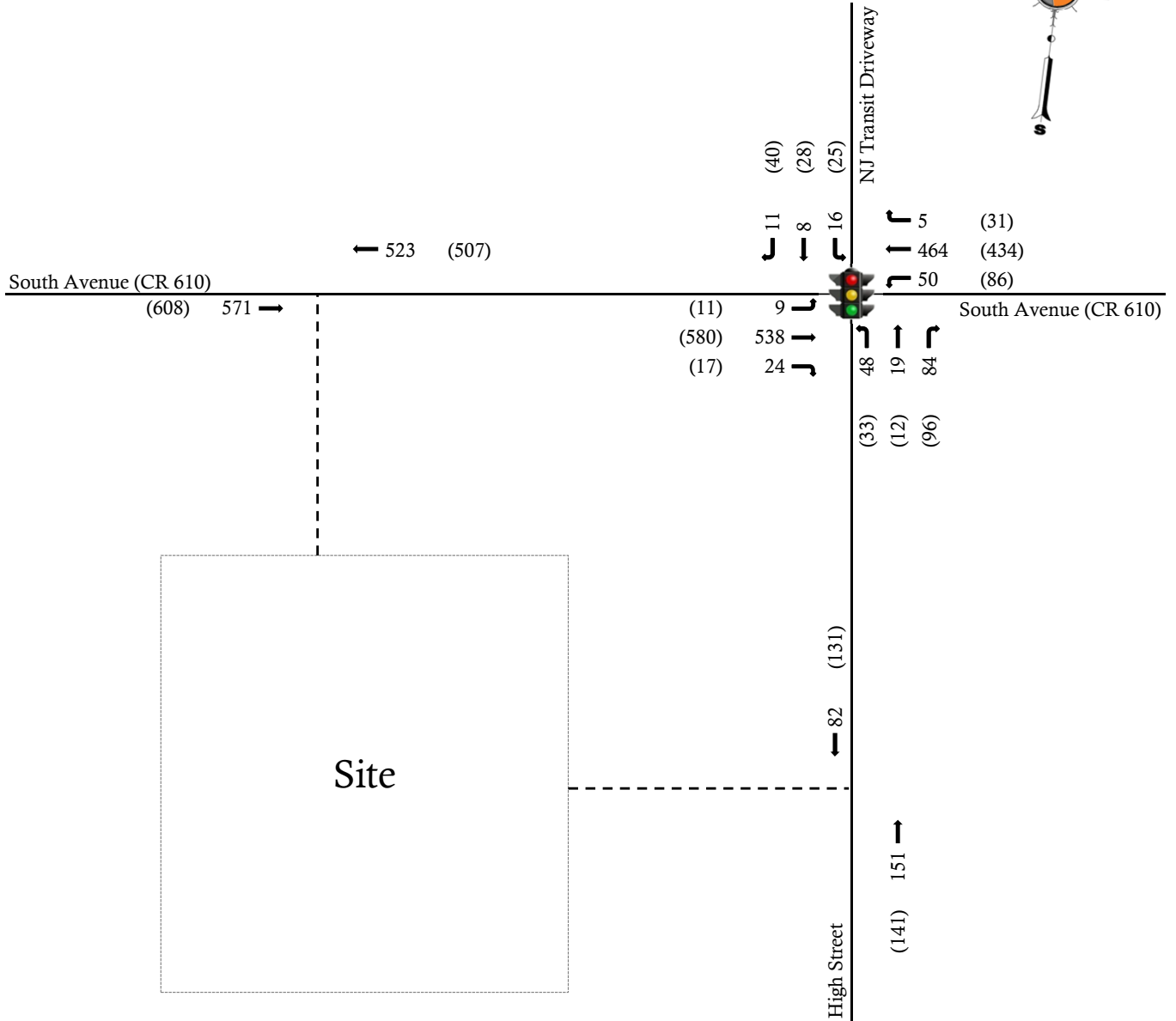
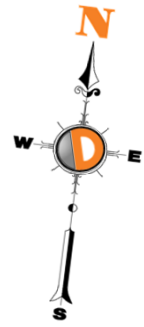
Appendix A
Traffic Volume Figures



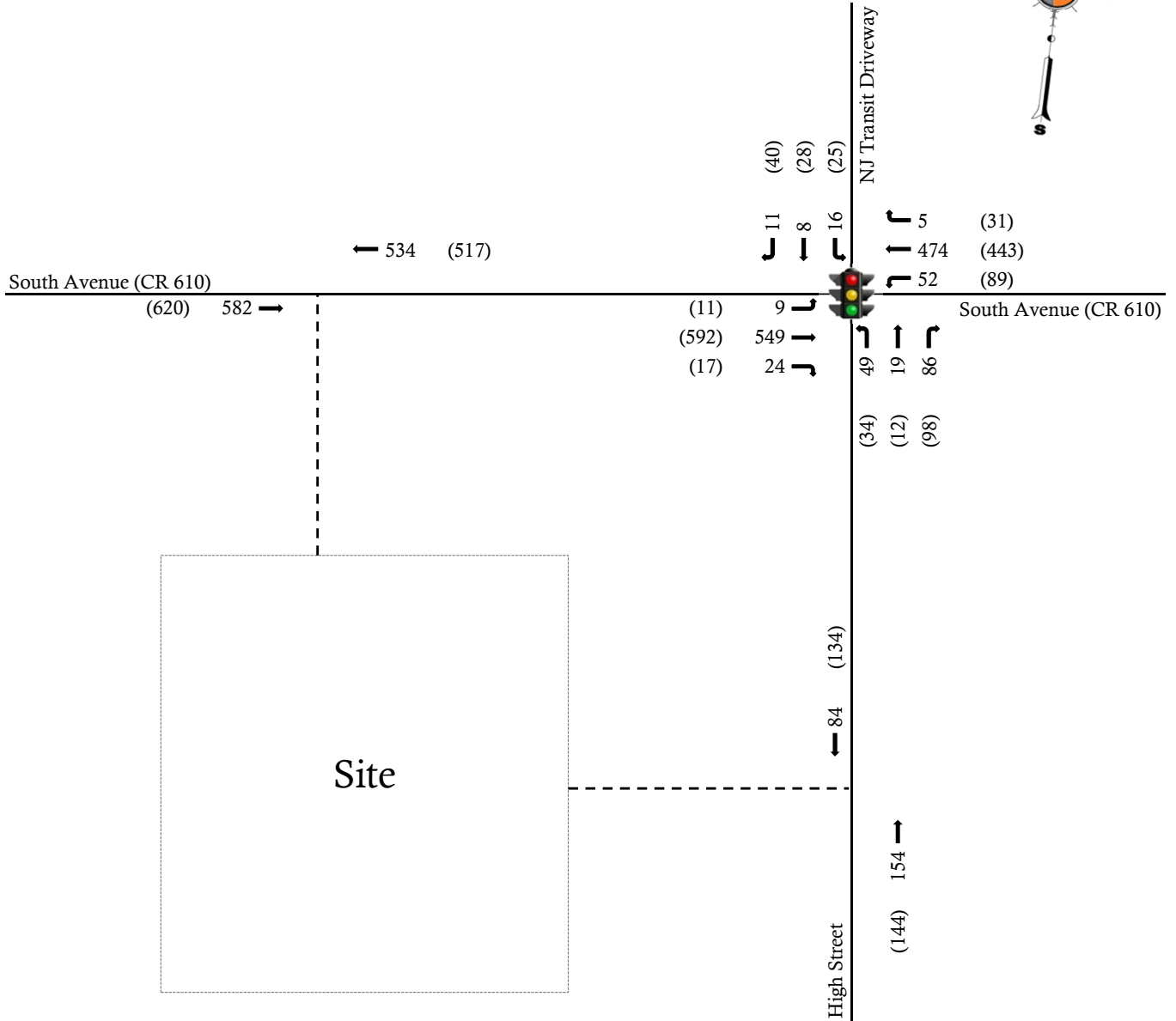
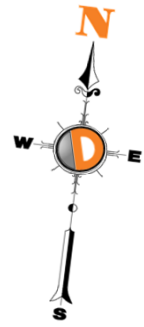
Proposed Mixed-Use Development
 Traffic Impact Study
 2956-99-004TE

Figure 1

Site Location Map



- LEGEND**
- Existing Roadway
 - Proposed Driveway
 - AM (PM)
 - Signalized Intersection



LEGEND

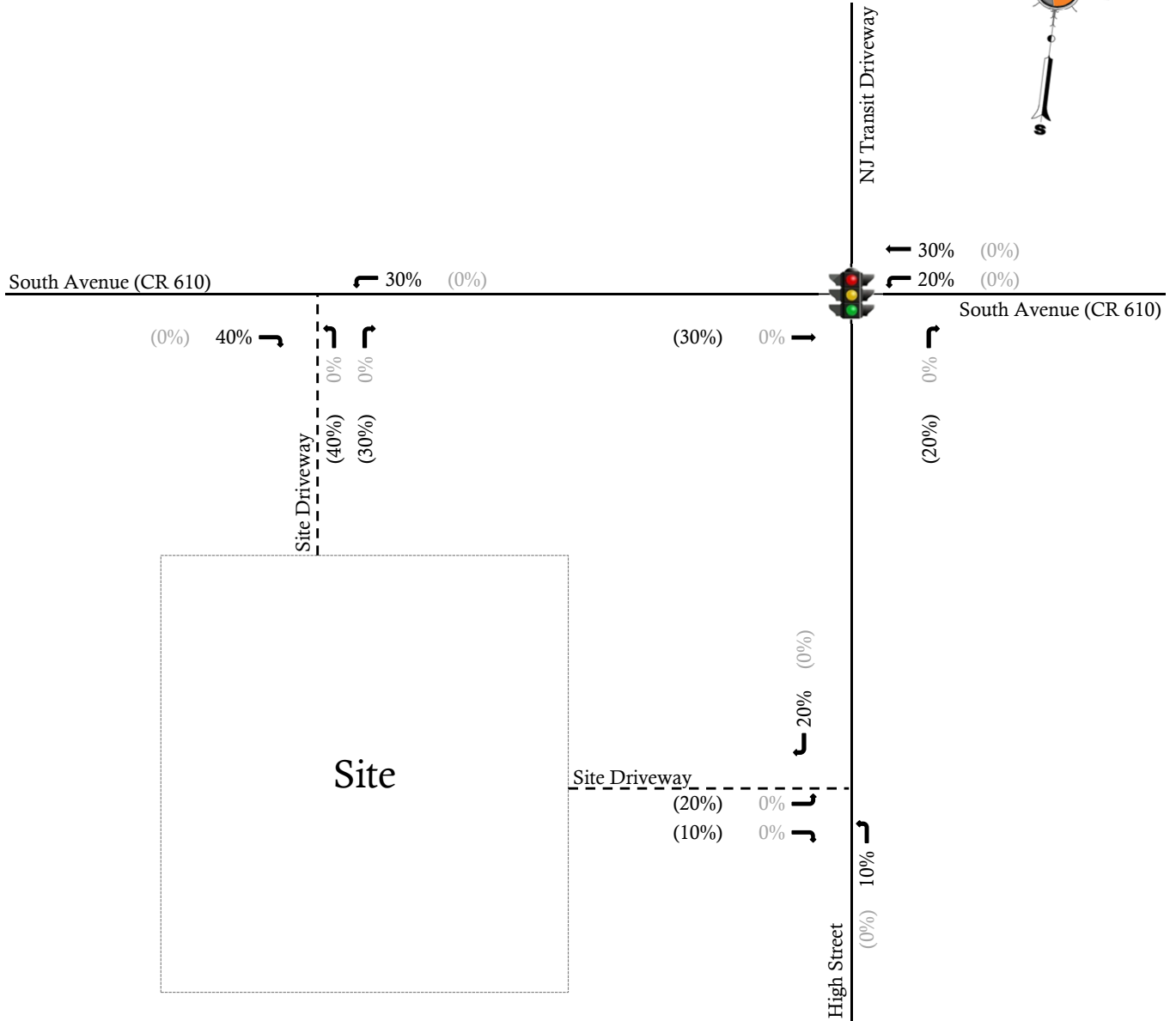
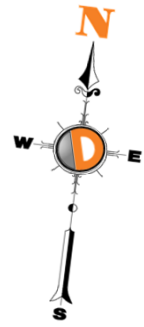
- Existing Roadway
- Proposed Driveway
- AM (PM)
- Signalized Intersection







Proposed Mixed-Use Development
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Figure 3

No Build Traffic Volumes



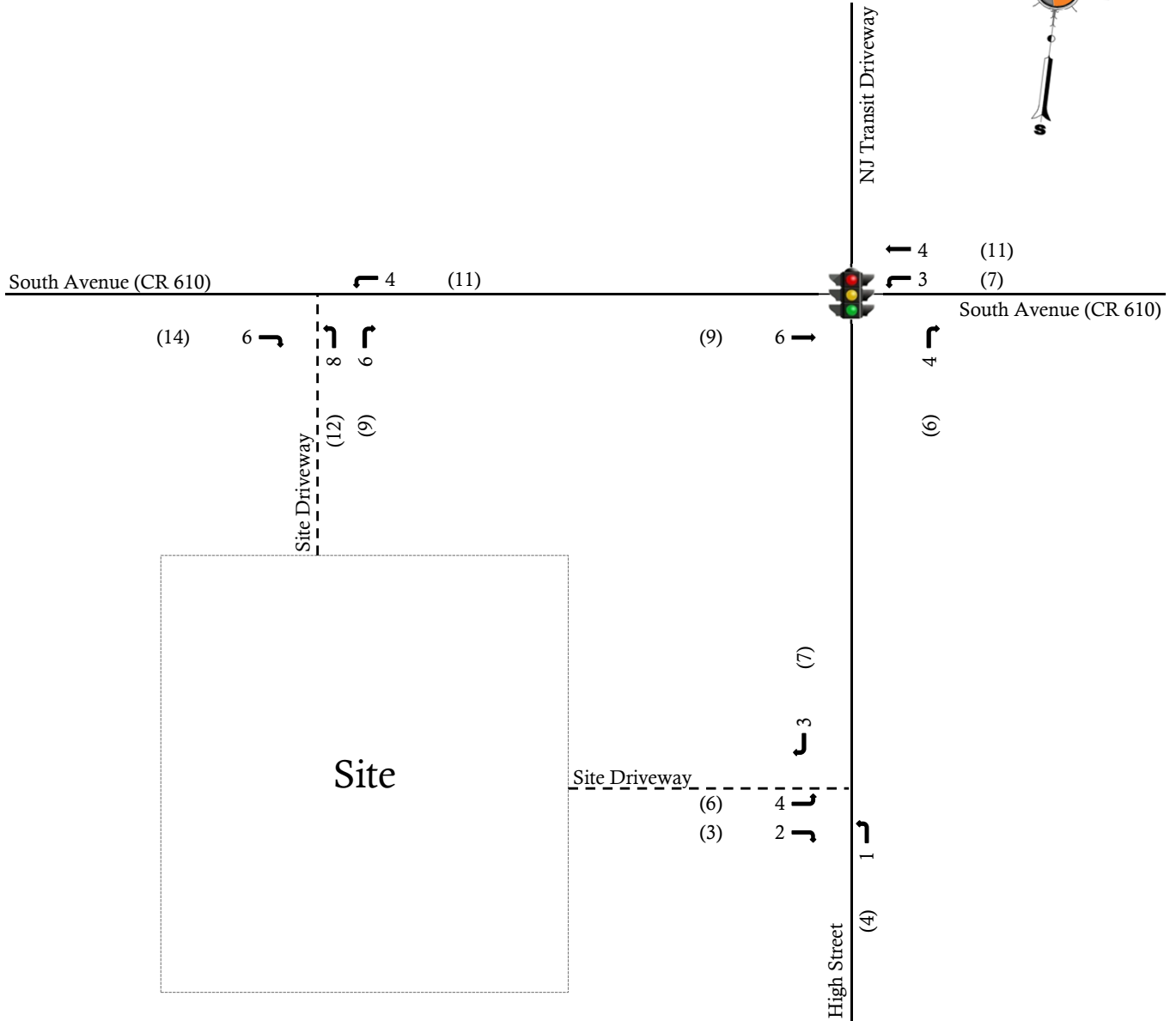
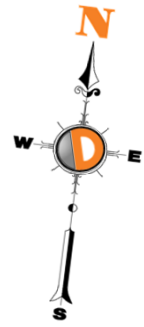
LEGEND

-  Existing Roadway
-  Proposed Driveway
-  IN (OUT)
-  Signalized Intersection


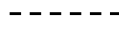




Proposed Mixed-Use Development
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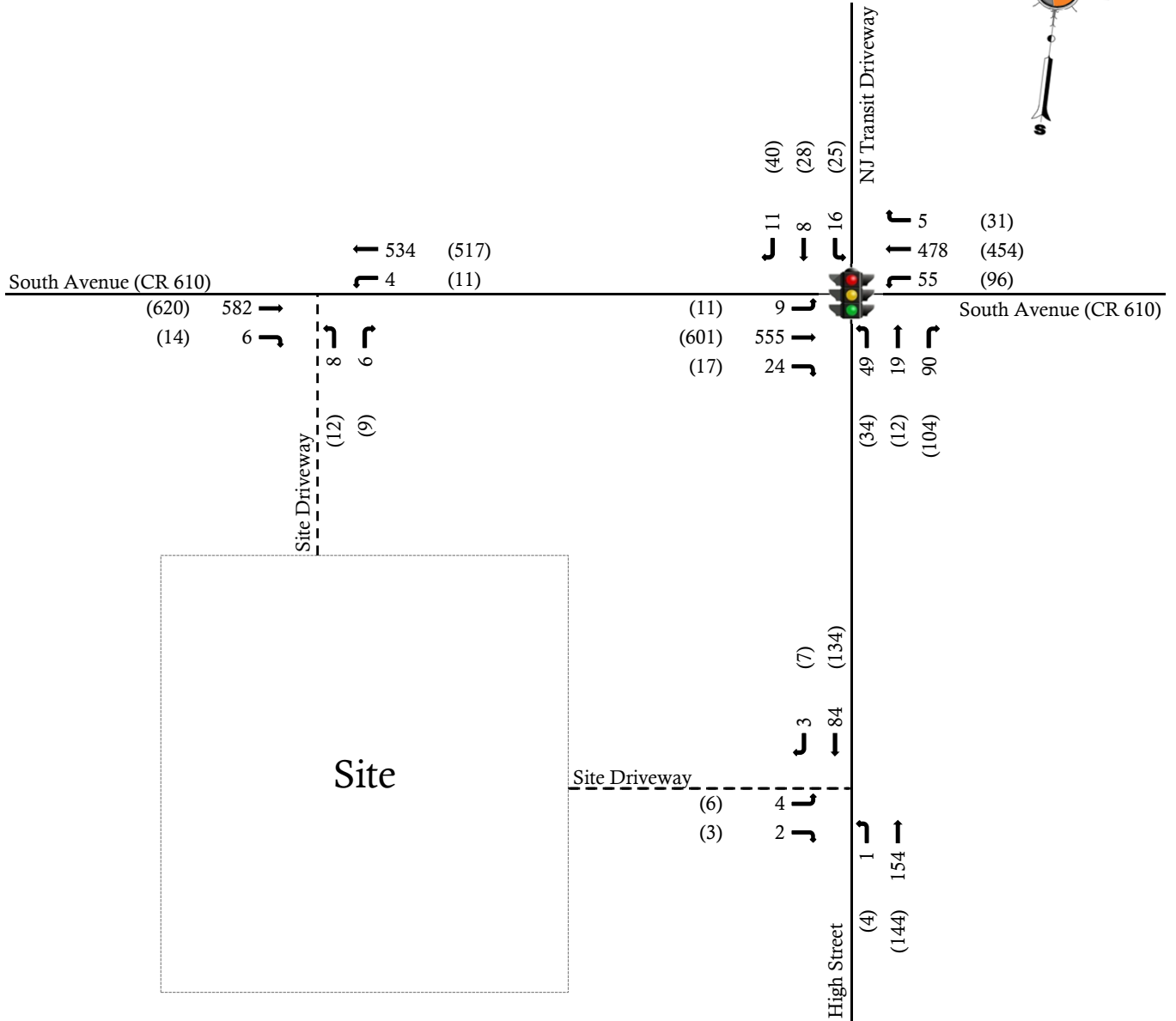
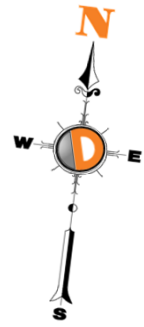
Figure 4
Percent Distribution
(Site Generated Trips)







LEGEND

-  Existing Roadway
-  Proposed Driveway
-  AM (PM)
-  Signalized Intersection





LEGEND

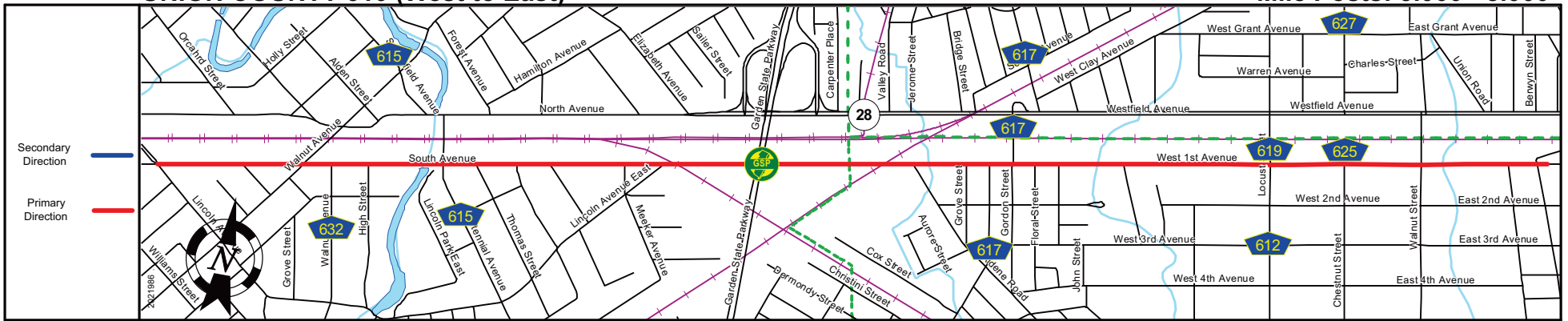
-  Existing Roadway
-  Proposed Driveway
-  AM (PM)
-  Signalized Intersection



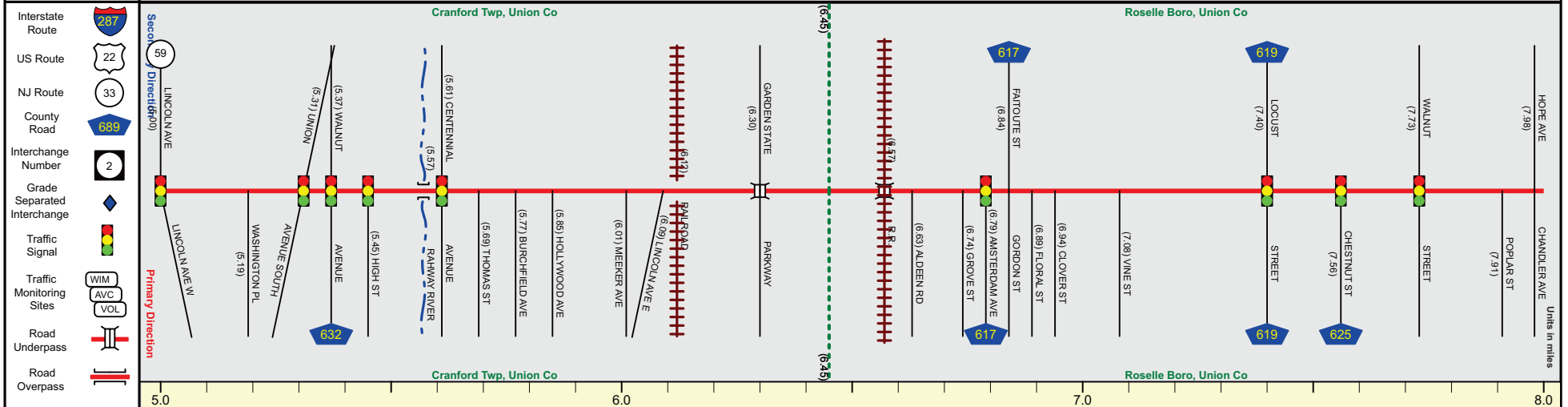
Appendix B
Project Information

UNION COUNTY 610 (West to East)

Mile Posts: 5.000 - 8.000



Secondary Direction	
Primary Direction	
Pavement	
Shoulder	
Number of Lanes	
Speed Limit	
Street Name	



Street Name	South Avenue		West 1st Avenue		East 1st Avenue
Jurisdiction	County		County		
Functional Class	Urban Minor Arterial		Urban Minor Arterial		
Federal Aid - NHS Sy	STP		STP		
Control Section					
Speed Limit	35	30	35	40	25
Number of Lanes			2		4
Med. Type			None		
Med. Width			0		
Pavement			40		28
Shoulder			0		6
Traffic Volume			13,594 (2016)		
Traffic Sta. ID			162003		
Structure No.	2003028				
Enlarged Views					

SRI = 2000610__

Date last inventoried: April 2012

INTERSECTION OF SOUTH AVENUE & HIGH STREET
TOWNSHIP OF CRANFORD
SEPTEMBER 2000 (REV. 3/07)

TIME OF OPERATION:

TIMING PLAN 1 = 12:00 AM TO 12:00 PM
TIMING PLAN 2 = 12:00 PM TO 12:00 AM

90 SECOND BACKGROUND CYCLE
90 SECOND BACKGROUND CYCLE

INTERSECTION TIMING PLAN FOR SEMI - ACTUATED SIGNAL OPERATION

PHASE	SIGNAL HEADS				TIME (SECONDS)	
	1-6	7-12	17-20	13-16	PLAN 1	PLAN 2
1. SOUTH AVENUE	G	R	DW	DW	73 - 46	73 - 66 46
CHANGE	Y	R	DW	DW	3	3
CLEARANCE	R	R	DW	DW	2	2
2. HIGH STREET	R	G	DW	DW	7 - 34	7 - 44 34
CHANGE	R	Y	DW	DW	3	3
CLEARANCE	R	R	DW	DW	2	2


















WITH PEDESTRIAN ACTUATION

1. SOUTH AVENUE	G	R	W	DW	44 - 30	44 - 30
PEDESTRIAN CLEARANCE	G	R	FDW	DW	16	16
CHANGE	Y	R	DW	DW	3	3
CLEARANCE	R	R	DW	DW	2	2
2. HIGH STREET	R	G	DW	W	7	7
PEDESTRIAN CLEARANCE	R	G	DW	FDW	13	13
VEHICLE EXTENSION	R	G	DW	DW	0 - 14	0 - 14
CHANGE	R	Y	DW	DW	3	3
CLEARANCE	R	R	DW	DW	2	2
EMERGENCY FLASH	Y	R	DARK	DARK		

NOTES :

1. CONTROLLER TO REST IN PHASE 1.
2. VEHICLE EXTENSION INTERVAL - 2 SECONDS
3. MANUAL CONTROL SHALL BE DISCONNECTED.
4. MEMORY CIRCUIT IS TO BE IN OFF POSITION (PRESENCE MODE), PHASE 2.
5. INTERSECTION TO BE OFFSET ZERO SECONDS FROM THE CHANGE OF WALNUT AVENUE INTERSECTION
6. CRANFORD PD MAINTENANCE ADJUSTED TIMING IN FIELD 3/07 TO ALLEVIATE PM BACKUP IN STATION DRIVEWAY. TIMING PLAN 2 REVISED.

Appendix C
Capacity Analysis

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	538	24	50	464	5	48	19	84	16	8	11
Future Volume (vph)	9	538	24	50	464	5	48	19	84	16	8	11
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	13	13	13	13	13	13	10	10	10	16	16	16
Grade (%)		-2%			-2%			0%			-6%	
Storage Length (ft)	0		0	0		0	0		50	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.999				0.850		0.959	
Flt Protected		0.999			0.995			0.966			0.977	
Satd. Flow (prot)	0	2057	0	0	2022	0	0	1893	1633	0	2173	0
Flt Permitted		0.993			0.910			0.765			0.815	
Satd. Flow (perm)	0	2044	0	0	1849	0	0	1499	1633	0	1812	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			1				88		11	
Link Speed (mph)		35			30			25			25	
Link Distance (ft)		243			643			150			332	
Travel Time (s)		4.7			14.6			4.1			9.1	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	11%	6%	0%	6%	8%	0%	0%	0%	2%	6%	13%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	594	0	0	540	0	0	70	88	0	36	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		
Detector Phase	2	2		6	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	46.0	46.0		46.0	46.0		7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	51.0	51.0		51.0	51.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	51.0	51.0		51.0	51.0		39.0	39.0	39.0	39.0	39.0	
Total Split (%)	56.7%	56.7%		56.7%	56.7%		43.3%	43.3%	43.3%	43.3%	43.3%	
Maximum Green (s)	46.0	46.0		46.0	46.0		34.0	34.0	34.0	34.0	34.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.0			5.0			5.0	5.0		5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None	None	None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		13.0	13.0	13.0	13.0	13.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)		74.3			74.3			9.1	9.1		9.1	
Actuated g/C Ratio		0.83			0.83			0.10	0.10		0.10	
v/c Ratio		0.35			0.35			0.46	0.36		0.19	
Control Delay		3.5			3.6			47.6	12.7		29.7	

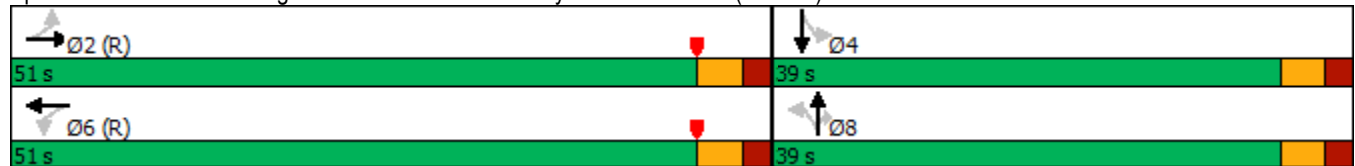


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0	0.0			0.0
Total Delay		3.5			3.6			47.6	12.7			29.7
LOS		A			A			D	B			C
Approach Delay		3.5			3.6			28.2				29.7
Approach LOS		A			A			C				C
Queue Length 50th (ft)		73			67			38	0			13
Queue Length 95th (ft)		139			131			77	41			40
Internal Link Dist (ft)		163			563			70				252
Turn Bay Length (ft)									50			
Base Capacity (vph)		1688			1527			566	671			691
Starvation Cap Reductn		0			0			0	0			0
Spillback Cap Reductn		0			0			0	0			0
Storage Cap Reductn		0			0			0	0			0
Reduced v/c Ratio		0.35			0.35			0.12	0.13			0.05

Intersection Summary

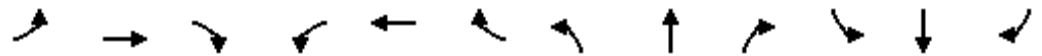
Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle:	65
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.46
Intersection Signal Delay:	7.2
Intersection LOS:	A
Intersection Capacity Utilization	65.6%
ICU Level of Service	C
Analysis Period (min)	15

Splits and Phases: 10: High Street/NJ Transit Driveway & South Avenue (CR 610)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕	↕		↕	
Traffic Volume (vph)	11	580	17	86	434	31	33	12	96	25	28	40
Future Volume (vph)	11	580	17	86	434	31	33	12	96	25	28	40
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	13	13	13	13	13	13	10	10	10	16	16	16
Grade (%)		-2%			-2%			0%				-6%
Storage Length (ft)	0		0	0		0	0		50	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.992				0.850		0.942	
Flt Protected		0.999			0.992			0.965			0.987	
Satd. Flow (prot)	0	2120	0	0	2091	0	0	1891	1666	0	2279	0
Flt Permitted		0.989			0.830			0.685			0.893	
Satd. Flow (perm)	0	2099	0	0	1750	0	0	1343	1666	0	2062	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			5				101		42	
Link Speed (mph)		35			30			25			25	
Link Distance (ft)		243			643			150			332	
Travel Time (s)		4.7			14.6			4.1			9.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	3%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	641	0	0	581	0	0	48	101	0	97	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		
Detector Phase	2	2		6	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	46.0	46.0		46.0	46.0		7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	51.0	51.0		51.0	51.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	51.0	51.0		51.0	51.0		39.0	39.0	39.0	39.0	39.0	
Total Split (%)	56.7%	56.7%		56.7%	56.7%		43.3%	43.3%	43.3%	43.3%	43.3%	
Maximum Green (s)	46.0	46.0		46.0	46.0		34.0	34.0	34.0	34.0	34.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.0			5.0			5.0	5.0		5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None	None	None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		13.0	13.0	13.0	13.0	13.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)		75.3			75.3			8.1	8.1		8.1	
Actuated g/C Ratio		0.84			0.84			0.09	0.09		0.09	
v/c Ratio		0.37			0.40			0.40	0.42		0.43	
Control Delay		3.2			3.5			48.0	13.6		29.5	

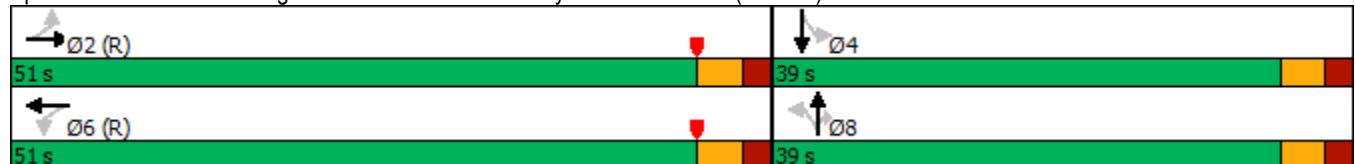


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0	0.0		0.0	
Total Delay		3.2			3.5			48.0	13.6		29.5	
LOS		A			A			D	B		C	
Approach Delay		3.2			3.5			24.7			29.5	
Approach LOS		A			A			C			C	
Queue Length 50th (ft)		73			68			27	0		30	
Queue Length 95th (ft)		135			132			60	45		75	
Internal Link Dist (ft)		163			563			70			252	
Turn Bay Length (ft)									50			
Base Capacity (vph)		1755			1464			507	692		805	
Starvation Cap Reductn		0			0			0	0		0	
Spillback Cap Reductn		0			0			0	0		0	
Storage Cap Reductn		0			0			0	0		0	
Reduced v/c Ratio		0.37			0.40			0.09	0.15		0.12	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle:	65
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.43
Intersection Signal Delay:	7.2
Intersection LOS:	A
Intersection Capacity Utilization:	87.7%
ICU Level of Service:	E
Analysis Period (min):	15

Splits and Phases: 10: High Street/NJ Transit Driveway & South Avenue (CR 610)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	549	24	52	474	5	49	19	86	16	8	11
Future Volume (vph)	9	549	24	52	474	5	49	19	86	16	8	11
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	13	13	13	13	13	13	10	10	10	16	16	16
Grade (%)		-2%			-2%			0%			-6%	
Storage Length (ft)	0		0	0		0	0		50	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.999				0.850		0.959	
Flt Protected		0.999			0.995			0.965			0.977	
Satd. Flow (prot)	0	2057	0	0	2022	0	0	1891	1633	0	2173	0
Flt Permitted		0.993			0.906			0.764			0.814	
Satd. Flow (perm)	0	2044	0	0	1841	0	0	1497	1633	0	1810	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			1				90		11	
Link Speed (mph)		35			30			25			25	
Link Distance (ft)		243			643			150			332	
Travel Time (s)		4.7			14.6			4.1			9.1	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	11%	6%	0%	6%	8%	0%	0%	0%	2%	6%	13%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	606	0	0	553	0	0	71	90	0	36	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		
Detector Phase	2	2		6	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	46.0	46.0		46.0	46.0		7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	51.0	51.0		51.0	51.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	51.0	51.0		51.0	51.0		39.0	39.0	39.0	39.0	39.0	
Total Split (%)	56.7%	56.7%		56.7%	56.7%		43.3%	43.3%	43.3%	43.3%	43.3%	
Maximum Green (s)	46.0	46.0		46.0	46.0		34.0	34.0	34.0	34.0	34.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.0			5.0			5.0	5.0		5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None	None	None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		13.0	13.0	13.0	13.0	13.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)		74.3			74.3			9.1	9.1		9.1	
Actuated g/C Ratio		0.83			0.83			0.10	0.10		0.10	
v/c Ratio		0.36			0.36			0.47	0.37		0.19	
Control Delay		3.5			3.7			47.7	12.6		29.7	




















Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0	0.0		0.0	
Total Delay		3.5			3.7			47.7	12.6		29.7	
LOS		A			A			D	B		C	
Approach Delay		3.5			3.7			28.1			29.7	
Approach LOS		A			A			C			C	
Queue Length 50th (ft)		76			70			39	0		13	
Queue Length 95th (ft)		144			136			78	42		40	
Internal Link Dist (ft)		163			563			70			252	
Turn Bay Length (ft)									50			
Base Capacity (vph)		1687			1519			565	672		690	
Starvation Cap Reductn		0			0			0	0		0	
Spillback Cap Reductn		0			0			0	0		0	
Storage Cap Reductn		0			0			0	0		0	
Reduced v/c Ratio		0.36			0.36			0.13	0.13		0.05	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle:	65
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.47
Intersection Signal Delay:	7.2
Intersection LOS:	A
Intersection Capacity Utilization:	67.3%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 10: High Street/NJ Transit Driveway & South Avenue (CR 610)



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	592	17	89	443	31	34	12	98	25	28	40
Future Volume (vph)	11	592	17	89	443	31	34	12	98	25	28	40
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	13	13	13	13	13	13	10	10	10	16	16	16
Grade (%)		-2%			-2%			0%			-6%	
Storage Length (ft)	0		0	0		0	0		50	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.992				0.850		0.942	
Flt Protected		0.999			0.992			0.965			0.987	
Satd. Flow (prot)	0	2120	0	0	2091	0	0	1891	1666	0	2279	0
Flt Permitted		0.989			0.824			0.684			0.893	
Satd. Flow (perm)	0	2099	0	0	1737	0	0	1341	1666	0	2062	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			5				103		42	
Link Speed (mph)		35			30			25			25	
Link Distance (ft)		243			643			150			332	
Travel Time (s)		4.7			14.6			4.1			9.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	3%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	653	0	0	593	0	0	49	103	0	97	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		
Detector Phase	2	2		6	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	46.0	46.0		46.0	46.0		7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	51.0	51.0		51.0	51.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	51.0	51.0		51.0	51.0		39.0	39.0	39.0	39.0	39.0	
Total Split (%)	56.7%	56.7%		56.7%	56.7%		43.3%	43.3%	43.3%	43.3%	43.3%	
Maximum Green (s)	46.0	46.0		46.0	46.0		34.0	34.0	34.0	34.0	34.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.0			5.0			5.0	5.0		5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None	None	None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		13.0	13.0	13.0	13.0	13.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)		75.2			75.2			8.2	8.2		8.2	
Actuated g/C Ratio		0.84			0.84			0.09	0.09		0.09	
v/c Ratio		0.37			0.41			0.40	0.42		0.43	
Control Delay		3.2			3.6			48.0	13.5		29.3	



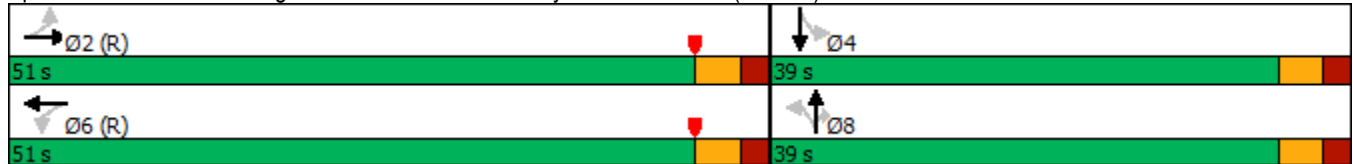
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0	0.0		0.0	
Total Delay		3.2			3.6			48.0	13.5		29.3	
LOS		A			A			D	B		C	
Approach Delay		3.2			3.6			24.6			29.3	
Approach LOS		A			A			C			C	
Queue Length 50th (ft)		76			71			27	0		30	
Queue Length 95th (ft)		140			139			61	46		75	
Internal Link Dist (ft)		163			563			70			252	
Turn Bay Length (ft)									50			
Base Capacity (vph)		1753			1451			506	693		805	
Starvation Cap Reductn		0			0			0	0		0	
Spillback Cap Reductn		0			0			0	0		0	
Storage Cap Reductn		0			0			0	0		0	
Reduced v/c Ratio		0.37			0.41			0.10	0.15		0.12	


















Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.43
 Intersection Signal Delay: 7.3
 Intersection Capacity Utilization 90.1%
 Analysis Period (min) 15

Intersection LOS: A
 ICU Level of Service E

Splits and Phases: 10: High Street/NJ Transit Driveway & South Avenue (CR 610)



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	555	24	55	478	5	49	19	90	16	8	11
Future Volume (vph)	9	555	24	55	478	5	49	19	90	16	8	11
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	13	13	13	13	13	13	10	10	10	16	16	16
Grade (%)		-2%			-2%			0%			-6%	
Storage Length (ft)	0		0	0		0	0		50	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.999				0.850		0.959	
Flt Protected		0.999			0.995			0.965			0.977	
Satd. Flow (prot)	0	2057	0	0	2022	0	0	1891	1633	0	2173	0
Flt Permitted		0.993			0.900			0.764			0.814	
Satd. Flow (perm)	0	2044	0	0	1829	0	0	1497	1633	0	1810	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			1				94		11	
Link Speed (mph)		35			30			25			25	
Link Distance (ft)		243			643			150			332	
Travel Time (s)		4.7			14.6			4.1			9.1	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	11%	6%	0%	6%	8%	0%	0%	0%	2%	6%	13%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	612	0	0	560	0	0	71	94	0	36	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		
Detector Phase	2	2		6	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	46.0	46.0		46.0	46.0		7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	51.0	51.0		51.0	51.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	51.0	51.0		51.0	51.0		39.0	39.0	39.0	39.0	39.0	
Total Split (%)	56.7%	56.7%		56.7%	56.7%		43.3%	43.3%	43.3%	43.3%	43.3%	
Maximum Green (s)	46.0	46.0		46.0	46.0		34.0	34.0	34.0	34.0	34.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.0			5.0			5.0	5.0		5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None	None	None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		13.0	13.0	13.0	13.0	13.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)		74.3			74.3			9.1	9.1		9.1	
Actuated g/C Ratio		0.83			0.83			0.10	0.10		0.10	
v/c Ratio		0.36			0.37			0.47	0.38		0.19	
Control Delay		3.6			3.7			47.7	12.6		29.7	

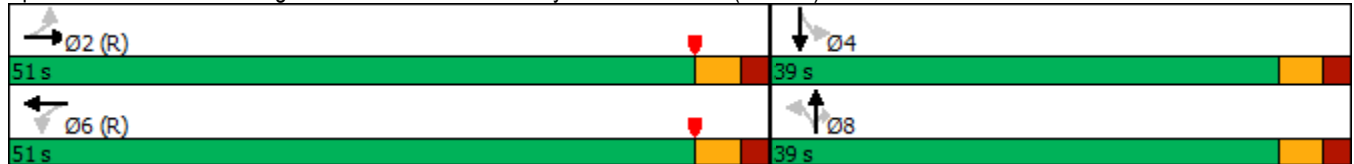



















Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0	0.0		0.0	
Total Delay		3.6			3.7			47.7	12.6		29.7	
LOS		A			A			D	B		C	
Approach Delay		3.6			3.7			27.7			29.7	
Approach LOS		A			A			C			C	
Queue Length 50th (ft)		77			71			39	0		13	
Queue Length 95th (ft)		145			139			78	43		40	
Internal Link Dist (ft)		163			563			70			252	
Turn Bay Length (ft)									50			
Base Capacity (vph)		1687			1509			565	675		690	
Starvation Cap Reductn		0			0			0	0		0	
Spillback Cap Reductn		0			0			0	0		0	
Storage Cap Reductn		0			0			0	0		0	
Reduced v/c Ratio		0.36			0.37			0.13	0.14		0.05	

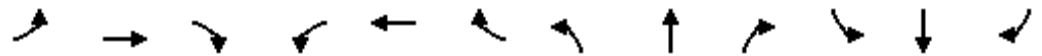
Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle:	65
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.47
Intersection Signal Delay:	7.2
Intersection LOS:	A
Intersection Capacity Utilization:	69.2%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 10: High Street/NJ Transit Driveway & South Avenue (CR 610)



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	601	17	96	454	31	34	12	104	25	28	40
Future Volume (vph)	11	601	17	96	454	31	34	12	104	25	28	40
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	13	13	13	13	13	13	10	10	10	16	16	16
Grade (%)		-2%			-2%			0%				-6%
Storage Length (ft)	0		0	0		0	0		50	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.993				0.850		0.942	
Flt Protected		0.999			0.992			0.965			0.987	
Satd. Flow (prot)	0	2120	0	0	2094	0	0	1891	1666	0	2279	0
Flt Permitted		0.989			0.813			0.684			0.893	
Satd. Flow (perm)	0	2099	0	0	1716	0	0	1341	1666	0	2062	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			5				109		42	
Link Speed (mph)		35			30			25			25	
Link Distance (ft)		243			643			150			332	
Travel Time (s)		4.7			14.6			4.1			9.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	3%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	663	0	0	612	0	0	49	109	0	97	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		
Detector Phase	2	2		6	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	46.0	46.0		46.0	46.0		7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	51.0	51.0		51.0	51.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	51.0	51.0		51.0	51.0		39.0	39.0	39.0	39.0	39.0	
Total Split (%)	56.7%	56.7%		56.7%	56.7%		43.3%	43.3%	43.3%	43.3%	43.3%	
Maximum Green (s)	46.0	46.0		46.0	46.0		34.0	34.0	34.0	34.0	34.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.0			5.0			5.0	5.0		5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None	None	None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		13.0	13.0	13.0	13.0	13.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)		75.2			75.2			8.2	8.2		8.2	
Actuated g/C Ratio		0.84			0.84			0.09	0.09		0.09	
v/c Ratio		0.38			0.43			0.40	0.43		0.43	
Control Delay		3.3			3.8			48.0	13.5		29.3	

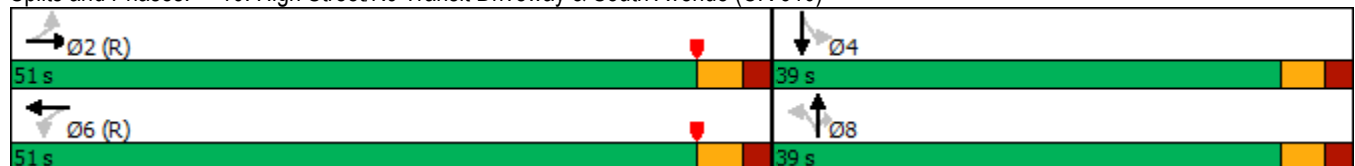


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0	0.0		0.0	
Total Delay		3.3			3.8			48.0	13.5		29.3	
LOS		A			A			D	B		C	
Approach Delay		3.3			3.8			24.2			29.3	
Approach LOS		A			A			C			C	
Queue Length 50th (ft)		77			75			27	0		30	
Queue Length 95th (ft)		143			147			61	47		75	
Internal Link Dist (ft)		163			563			70			252	
Turn Bay Length (ft)									50			
Base Capacity (vph)		1753			1434			506	697		805	
Starvation Cap Reductn		0			0			0	0		0	
Spillback Cap Reductn		0			0			0	0		0	
Storage Cap Reductn		0			0			0	0		0	
Reduced v/c Ratio		0.38			0.43			0.10	0.16		0.12	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle:	65
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.43
Intersection Signal Delay:	7.3
Intersection LOS:	A
Intersection Capacity Utilization:	94.7%
ICU Level of Service:	F
Analysis Period (min):	15

Splits and Phases: 10: High Street/NJ Transit Driveway & South Avenue (CR 610)






Intersection						
Int Delay, s/veh	0.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	582	6	4	534	8	6
Future Vol, veh/h	582	6	4	534	8	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-4	-	-	2	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	2	2	8	2	2
Mvmt Flow	606	6	4	556	8	6
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	612	0	1173	609
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	564	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	967	-	212	495
Stage 1	-	-	-	-	543	-
Stage 2	-	-	-	-	569	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	967	-	211	495
Mov Cap-2 Maneuver	-	-	-	-	211	-
Stage 1	-	-	-	-	543	-
Stage 2	-	-	-	-	566	-
Approach	EB	WB	NB			
HCM Control Delay, s	0	0.1	18.6			
HCM LOS				C		
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	280	-	-	967	-	
HCM Lane V/C Ratio	0.052	-	-	0.004	-	
HCM Control Delay (s)	18.6	-	-	8.7	0	
HCM Lane LOS	C	-	-	A	A	
HCM 95th %tile Q(veh)	0.2	-	-	0	-	

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	620	14	11	517	12	9
Future Vol, veh/h	620	14	11	517	12	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-4	-	-	2	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	3	2	2	3	2	2
Mvmt Flow	681	15	12	568	13	10

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	696	0	1281
Stage 1	-	-	-	-	689
Stage 2	-	-	-	-	592
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	900	-	183
Stage 1	-	-	-	-	498
Stage 2	-	-	-	-	553
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	900	-	180
Mov Cap-2 Maneuver	-	-	-	-	180
Stage 1	-	-	-	-	498
Stage 2	-	-	-	-	542

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	21.4
HCM LOS			C




Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	242	-	-	900	-
HCM Lane V/C Ratio	0.095	-	-	0.013	-
HCM Control Delay (s)	21.4	-	-	9.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	2	1	154	84	3
Future Vol, veh/h	4	2	1	154	84	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	1	5	2
Mvmt Flow	5	2	1	190	104	4
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	298	106	108	0	-	0
Stage 1	106	-	-	-	-	-
Stage 2	192	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	693	948	1483	-	-	-
Stage 1	918	-	-	-	-	-
Stage 2	841	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	692	948	1483	-	-	-
Mov Cap-2 Maneuver	692	-	-	-	-	-
Stage 1	917	-	-	-	-	-
Stage 2	841	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.8	0		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1483	-	760	-	-	
HCM Lane V/C Ratio	0.001	-	0.01	-	-	
HCM Control Delay (s)	7.4	0	9.8	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0	-	-	

Intersection

Int Delay, s/veh 0.4

Movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	3	4	144	134	7
Future Vol, veh/h	6	3	4	144	134	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	0	0	2
Mvmt Flow	6	3	4	153	143	7

Major/Minor

	Minor2	Major1	Major2			
Conflicting Flow All	308	147	150	0	-	0
Stage 1	147	-	-	-	-	-
Stage 2	161	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	684	900	1431	-	-	-
Stage 1	880	-	-	-	-	-
Stage 2	868	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	682	900	1431	-	-	-
Mov Cap-2 Maneuver	682	-	-	-	-	-
Stage 1	877	-	-	-	-	-
Stage 2	868	-	-	-	-	-

Approach

	EB	NB	SB
HCM Control Delay, s	9.9	0.2	0
HCM LOS	A		

Minor Lane/Major Mvmt

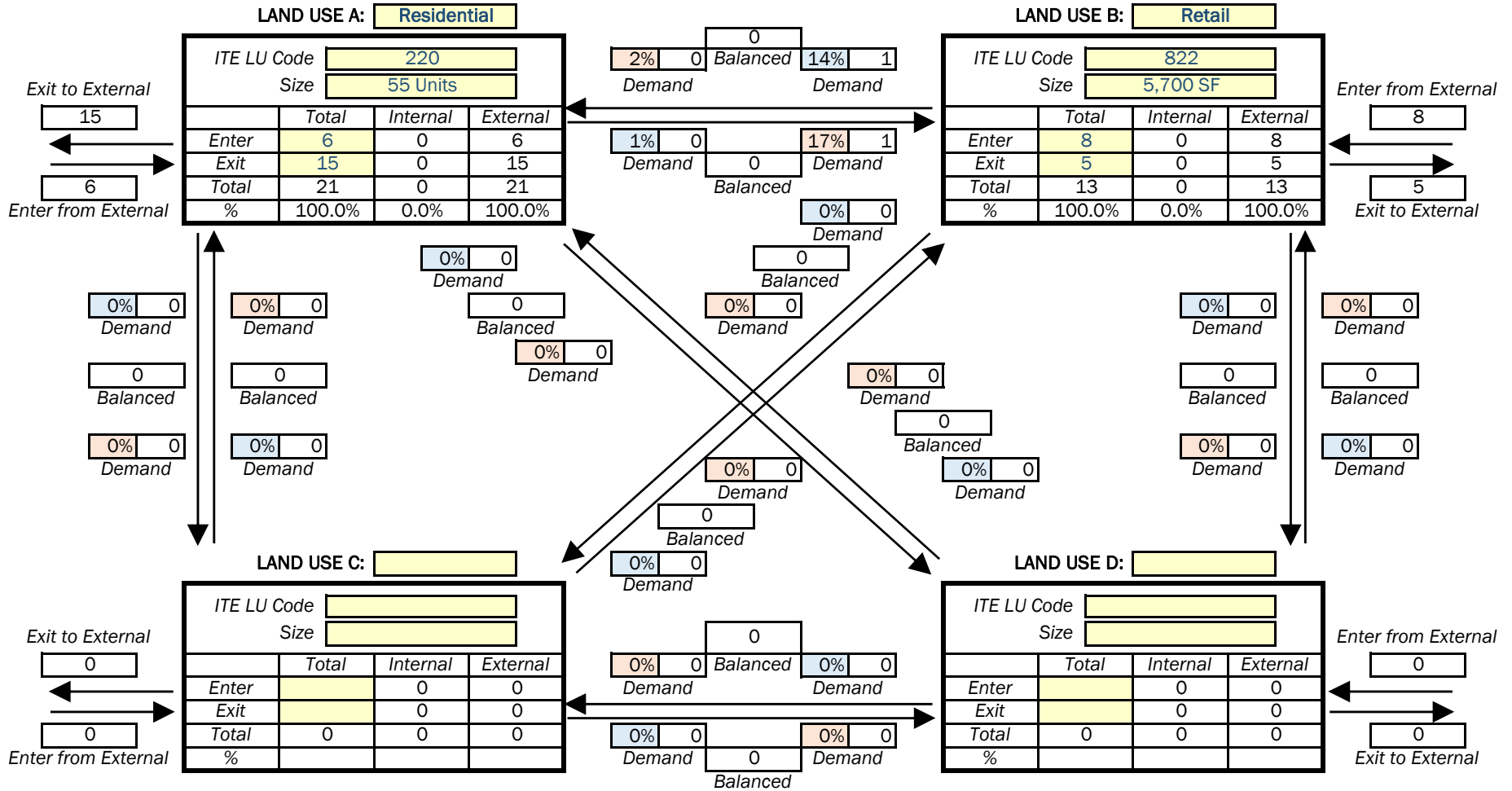
	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1431	-	742	-	-
HCM Lane V/C Ratio	0.003	-	0.013	-	-
HCM Control Delay (s)	7.5	0	9.9	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Appendix D
Internal Capture Worksheets

**MULTI-USE DEVELOPMENT TRIP
GENERATION AND INTERNAL CAPTURE
SUMMARY**

Analyst: **JDP**
Date: **11/7/2022**

Name of Development: **2956-99-004TE**
Time Period: **Weekday AM Peak Hour**



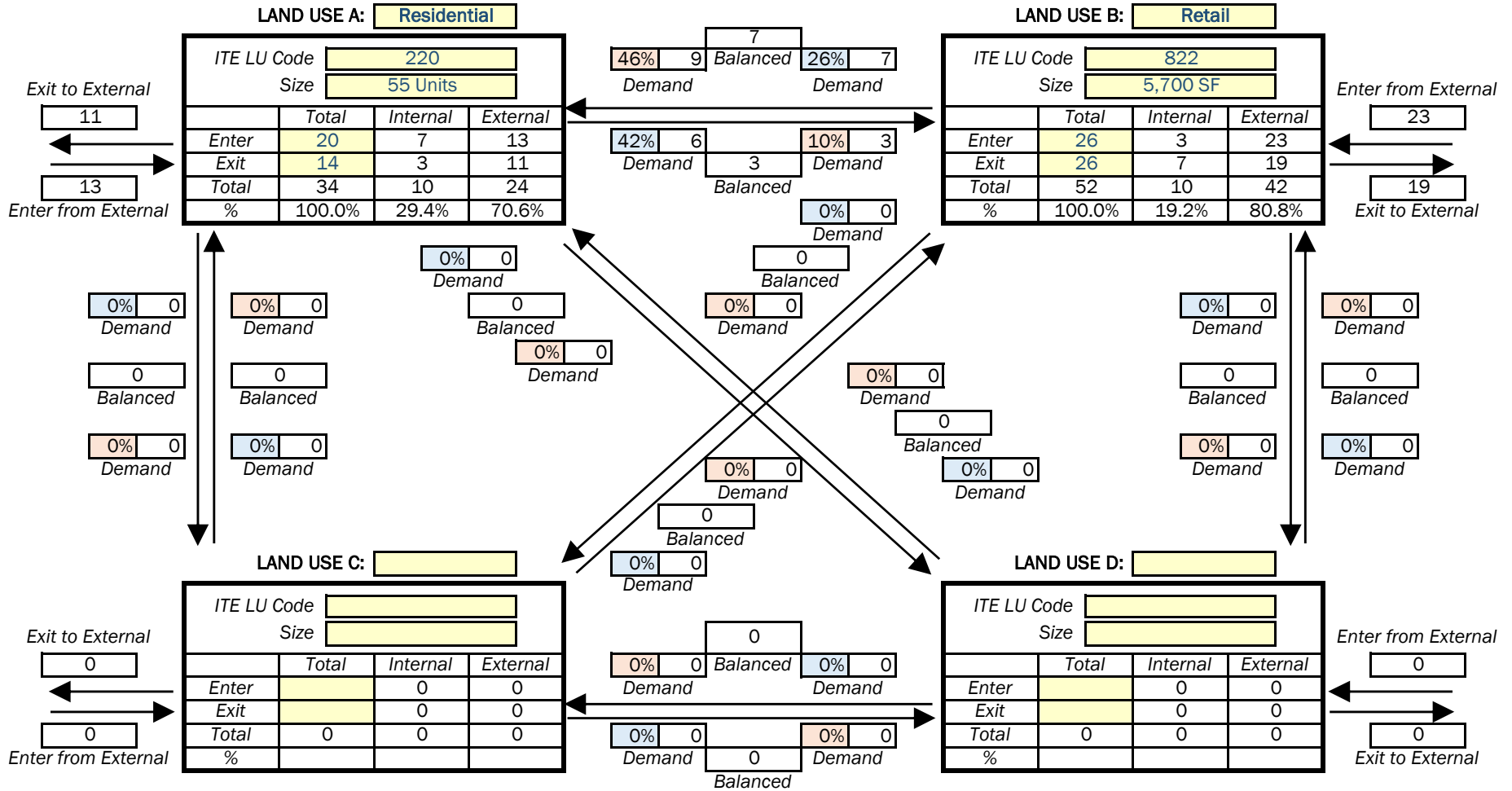
Net External Trips for Mult-Use Development					
	Land Use A	Land Use B	Land Use C	Land Use D	Total
Enter	6	8	0	0	14
Exit	15	5	0	0	20
Total	21	13	0	0	34
Single Use Trip Gen Est.	21	13	0	0	34
					Internal Capture
					0.0%

Note: Internal capture rates obtained from ITE publications *Trip Generation Handbook, 3rd Edition* and *Trip Generation Handbook, 2nd Edition*

Analyst: JDP
Date: 11/7/2022

MULTI-USE DEVELOPMENT TRIP GENERATION AND INTERNAL CAPTURE SUMMARY

Name of Development: 2956-99-004TE
Time Period: Weekday PM Peak Hour



Net External Trips for Mult-Use Development						
	Land Use A	Land Use B	Land Use C	Land Use D	Total	
Enter	13	23	0	0	36	
Exit	11	19	0	0	30	
Total	24	42	0	0	66	
Single Use Trip Gen Est.	34	52	0	0	86	
						Internal Capture 23.3%

Note: Internal capture rates obtained from ITE publications *Trip Generation Handbook, 3rd Edition* and *Trip Generation Handbook, 2nd Edition*