



181 WEST HIGH STREET  
SOMERVILLE, NJ 08876

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# TRAFFIC IMPACT ASSESSMENT FOR RIVER ROAD REDEVELOPMENT PLAN

BLOCK 135, LOTS 9, 10 11, & 12  
BOROUGH OF CHATHAM  
MORRIS COUNTY, NEW JERSEY

NOVEMBER 6, 2019

A handwritten signature in black ink, appearing to read "Elizabeth Dolan", written over a horizontal line.

ELIZABETH DOLAN, P.E.  
NJ LICENSE No. 37071

A handwritten signature in black ink, appearing to read "Gary W. Dean", written over a horizontal line.

GARY W. DEAN, P.E., P.P.  
NJ LICENSE No. 33722

## INTRODUCTION

This Traffic Impact Assessment has been prepared as part of a redevelopment plan application for an assemblage of parcels that comprise Block 135, Lots 9 - 12 for multi-family, residential apartment units. The River Road redevelopment proposal would include both “affordable” and “market” dwelling units with layouts ranging from one to three bedrooms. The community is proposed to consist of 106 one-bedroom units, 145 two-bedroom units, and 8 three-bedroom units totaling 259 units. The building will have lobby and amenity space for residents.

Primary site access is envisioned via a full-movement driveway along River Road that would be located approximately 600 feet south of its intersection with Watchung Avenue. The driveway would lead directly to a parking garage with approximately 500 spaces for tenant and guest/visitor use. Secondary vehicular access has also been considered as desirable for a pick-up/drop-off area near the main building entrance, closer to Watchung Avenue.

As shown, the subject site is presently developed with multiple industrial/light manufacturing uses occupied by National Manufacturing located in the larger building closest to Watchung Avenue, and Burling Instrument, which is located in the smaller building opposite Westy Self-Storage. At the southern end of the site, there is the existing



Crown Oil, petroleum storage facility with several large, above-ground tanks. All of these existing uses would be razed for the proposed redevelopment.



While any site redevelopment could affect traffic conditions, both the volume and characteristics of new residential traffic in lieu of existing manufacturing/industrial traffic are of important consideration in evaluating the projected traffic impacts on the surrounding area. Dolan & Dean Consulting Engineers, LLC (D&D) has been commissioned by the applicant to prepare this Traffic Impact Assessment for the proposed redevelopment for residential apartments, to evaluate the plan for conformance with the Residential Site Improvement Standards (RSIS) and to ensure safe and efficient site ingress and egress.

This traffic study follows the scope and requirements as outlined under Section 4.3.5-Access & Circulation of the May 6, 2019 River Road Redevelopment Plan prepared by Topology.

As will be detailed further in this study, the resultant impacts associated with the redevelopment plan do not require significant mitigation along the Watchung Avenue corridor due to the low projected traffic impacts (less than 1%). However, at the intersection of Watchung Avenue and River Road as will be detailed below, the redeveloper will provide specific mitigation to address the net traffic impacts associated with the proposed redevelopment.

This traffic impact study has focused on the projected vehicular traffic impacts as such will constitute the majority of activity associated with the redevelopment site. Given the site's location and recognizing that although three different train stations are located near the site, that "last mile" travel to and from the subject site will invariably consist of motor vehicle related traffic. While individual residents may not use personal automobiles for travel to and from local train stations, the use of ridesharing services and/or potential jitney bus service nevertheless constitute motor vehicle travel.

Recognizing that some residents may walk to and from the site or use bicycles for partial commuting to the train stations, given certain times of the year these options may not be practical or realistic at least within the anticipated redevelopment horizon of the property. Consequently, this traffic study has considered a "worst case" estimate of projected



automobile traffic associated with the redevelopment. To the extent that multi-modal service becomes a greater reality in suburban New Jersey (including Chatham), the projections and conclusions contained in this analysis will be reduced, thus resulting in better than projected operating conditions. While the development of walkable communities are highly desirable, given this particular site's location which is relatively removed from any central business district or urban core, it is anticipated that the site's walkability will be limited to weekend or evening recreational activity and not as a primary commuting means, which is the focus of this particular traffic study.

Appended to this report is a summary of commuting characteristics for Chatham Borough based on the most recent data from the US Census Bureau. As noted, approximately 2/3 Borough residents use a motor vehicle as a means of transportation to work. Public transportation (excluding taxi cabs) represents 25.3% of the travel means; walking and bicycling to work account for minimal travel use particularly in the context of the River Road Redevelopment. 7.3% of Borough residents work at home.

For the anticipated future public transportation use, obviously the distances to the New Jersey Transit rail and bus lines would affect the River Road redevelopment. For example, the approximate walking distance from the subject site to the Chatham Transit Station is approximately 4,900 linear feet traveling west along Watchung Avenue and north on Fairmount Avenue to reach the train station.

However, while sidewalks are intermittently provided along Watchung Avenue, there is not a single continuous walkway on either side of the road from the subject site to Fairmount Avenue. For example, in front of Bottle King there is no sidewalk nor is there any sidewalk in front of the building occupied by Pascarella Brothers. There is also no sidewalk on the south side of Watchung Avenue west of the Railroad overpass. Moreover, the walking distance of just under a mile under favorable weather conditions, would take approximately 20 minutes. By contrast, either as a shared automobile trip with another building resident or via ride-service, the travel time from the site to the train station is less than 3 minutes via motor vehicle.





Travel to the Summit train station is approximately 1.7 miles and the New Providence train station is approximately 1.5 miles away. Again, while walking to the various train stations is possible, for a conservative traffic impact analysis, it is assumed that the 25% of future site residents who may use mass transit would use a motor vehicle as part of a multi-modal trip.



## EXISTING CONDITIONS

As noted, the redevelopment site is an assemblage of four lots and is located at the southwestern corner of River Road and Watchung Avenue. The overall redevelopment site has approximately 650 feet of frontage on River Road and almost 275 feet of frontage on Watchung Avenue. The western edge of the site is bordered by the New Jersey Transit Morris & Essex commuter rail line. North of the site, River Road intersects Watchung Avenue at a three-leg, traffic signal-controlled intersection. The driveway to Dreyer's Lumber yard is offset from River Road. As noted, the subject site is developed with multiple industrial buildings that are believed to total approximately 64,710 square feet, excluding the oil storage tanks.

Watchung Avenue (Morris County Route 646) has a general northwest/southeast orientation and is under County jurisdiction. For general orientation, the road is considered to run east/west. The roadway provides one lane in each travel direction with a posted speed limit of 35 miles per hour near the site. A dedicated left turn lane to travel south on River Road is provided at the intersection.

River Road is a local roadway with a general northeast/southwest orientation that will be considered to run north/south for this report. The roadway provides one lane of travel in each direction, with posted speed limit of 30 miles per hour. A variety of land uses exist along River Road, including warehouses, a self-storage facility, restaurants, and a bus depot. To improve intersection efficiency, the Borough has re-striped River Road under an interim scheme for two northbound approach lanes at the Watchung Avenue intersection.

Morris Avenue is designated as Union County Route 651 and has a general northwest/southeast orientation. Morris Avenue has a posted speed limit of 35 miles per hour with one lane is provided per travel direction. The road's northern terminus intersects Watchung Avenue at a signalized T-Type intersection where right-hand turning movements are processed via channelized Yield-controlled lanes.



Passaic Avenue is designated as Morris County Route 649 and has a general north/south orientation. Morris County Route 649 spans an approximate total of 1.2 miles and exists between River Road to the north and Springfield Avenue to the south. The roadway provides one lane per travel direction within the general site vicinity and operates with a posted speed limit of 40 Miles Per hour. Passaic Avenue intersects River Road at a T-type intersection which has recently been outfitted with a traffic signal.

Fairmont Avenue is designated as Morris County Route 638 and has a general north/south orientation. To the north, the roadway begins at Main Street in Chatham, then continues past the Chatham Train Station and continues south for approximately 3.8 miles, where it becomes Central Avenue upon entering Union County. The roadway provides one travel lane in each direction with a posted speed limit of 30 MPH. Fairmount Avenue intersects Watchung Avenue at a signalized 4-leg intersection. Continuous sidewalks are provided on both sides of Fairmount Avenue from Watchung Avenue to Main Street.

Hillside Avenue is a local street within Chatham with a general north/south orientation. The road provides one travel lane in each direction, with a posted speed limit of 25 MPH consistent with the residential nature of the roadway. Hillside Avenue intersects Watchung Avenue at a signalized, 4-leg intersection.

Girard Avenue, Bridge Street, & Edgehill Avenue are local roadways generally serve residential land uses. Each roadway provides one lane per travel direction with a non-posted, statutory speed limit of 25 MPH. These roadways intersect Watchung Avenue at STOP-controlled, T-Type intersections.



## EXISTING TRAFFIC CONDITIONS

To establish existing traffic conditions near the site, manual traffic counts were conducted on Wednesday, March 27, 2019 from 7:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 6:30 p.m. at the following intersections, consistent with the Redevelopment Plan:

- River Road & Watchung Avenue
- Watchung Avenue & Bridge Street
- Watchung Avenue & Commerce Street
- Watchung Avenue & Girard Avenue
- Watchung Avenue & Hillside Avenue
- Watchung Avenue & Edgehill Road
- Watchung Avenue & Fairmount Avenue
- Passaic Avenue & River Road (in the City of Summit)
- Morris Avenue & River Road (in the City of Summit)

Appended Figures 2 and 3 shows the 2019 peak hour traffic volumes; the traffic count data is also appended to this report.

## ANALYSIS OF EXISTING TRAFFIC VOLUMES

A volume/capacity, Level of Service analysis was conducted for the existing traffic volumes at the subject intersections using the Highway Capacity Manual (HCM) computer software. This type of analysis is performed to assess intersection operations and to identify any areas of excessive delay. While traffic volumes provide a measure of activity on the area roadway system, it is also important to evaluate how well that system can accommodate those volumes – i.e., a comparison of peak hour traffic volumes with available roadway capacity.

By definition, capacity represents the maximum vehicular volume that can be accommodated on a given road segment or intersection lane as a function of roadway geometry, the general environs, traffic characteristics, regulations and controls. Intersections are usually the critical point in any road network since it is at such points that conflicts exist between through, crossing, and turning traffic. It is at these locations where congestion is most likely to occur.



Based on this analysis, and as shown in Figure 4, all movements at the study intersections currently operate at Levels of Service “D” or better during both peak hours. A description of intersection Levels of Service is noted below:

Levels of Service and Expected Delay for Signalized Intersections

Level of Service	Delay per Vehicle (seconds)
A	<10.0
B	>10.0 and <20.0
C	>20.0 and < 35.0
D	>35.0 and < 55.0
E	>55.0 and < 80.0
F	>80.0

Levels of Service and Expected Delay for Unsignalized Intersections

Level of Service	Delay per Vehicle (seconds)
A	<0-10
B	>10 to <15
C	>15 to <25
D	>25 to <35
E	> 35 to <50
F	>50

Observations made during the traffic counts confirm that traffic flows generally well with only average delays noted throughout the peak hours. Queuing was observed along eastbound Watchung Avenue in the morning leading up to its intersection with River Road, during both the morning and evening peak hour, however, would clear during subsequent “green” phase of the traffic signal. Local schools were in session during the time of the traffic counts and conditions are believed to representative of typical operations.

Current operations at the River Road and Watchung Avenue intersection can best be characterized as somewhat inefficient due to older traffic signal equipment that has either not been maintained or is not operating properly, which leads to unnecessarily longer delays on Watchung Avenue. For example, the vehicle detection equipment on River Road extends the signal “green” phase even though there are no vehicles present. This poor operation in turn, delays traffic on Watchung Avenue that could otherwise flow through the intersection, if not for the antiquated and malfunctioning equipment.





## TRAFFIC CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The Redevelopment Plan proposes to first raze all of the existing manufacturing/light industrial uses to allow for the construction of new building with 259 residential units and off-street parking to be provided in compliance with RSIS requirements. As the site is presently developed and generates peak hour traffic, the net traffic impacts associated with the change in use will be fairly minimal, though the patterns between ingress and egress traffic will be reversed with a residential use.

Most importantly, virtually all heavy truck use would be eliminated with a residential use on the site. From the observations made during the recent traffic counts, trucks currently back into the loading docks at the northern end of the National Manufacturing building directly at the Watchung Avenue intersection. This activity creates considerable traffic disruption (along with significant safety concerns) as large, tractor trailers must back up on River Road, in direct conflict with intersection traffic. While occurring presumably for decades, the practice is undesirable and potentially both unsafe and illegal.

### TRIP GENERATION

The potential traffic generation from any use is directly related to the type, size, and characteristic of the use itself. Lacking specific site operational data, trip generation projections are customarily made using data from studies of similar uses as compiled by the Institute of Transportation Engineers (ITE) in Trip Generation Manual, 10<sup>th</sup> Edition, 2017.

For this particular study, traffic projections for the proposed housing were prepared using the industry standard ITE trip generation rates for “Multi-Family Housing (Low Rise)”. These projections were then compared with the traffic generated by the existing light industrial/manufacturing uses to determine the net new traffic impacts. The table on the following pages summarizes the projected traffic generation for the morning and evening peak hours. The ITE trip generation worksheets are appended to this report.



As a note, the conceptual plans prepared for the redevelopment plan depict a multi-story residential building. Under both the RSIS as well as ITE definitions, the building can be considered “mid-rise” (defined as having between 3 and 10 levels (floors))for traffic generation purposes. However, to provide a conservative traffic analysis, low-rise trip generation rates were used.

As summarized on Table I if mid-rise traffic rates were used in the analysis, the overall projections would be approximately 21% lower than assumed in this study. Presumably the higher density of mid-rise apartments allows for more ridesharing, shuttles, mass transit use, as such buildings are typically located closer to town/city centers with greater transit options. Again, rather than assume certain transit credits and the appropriateness of such, this study uses the higher traffic projections for low-rise units.

TABLE I  
PROJECTED TRIP GENERATION  
RIVER ROAD REDEVELOPMENT SITE - 259 MULTI-FAMILY UNITS

Time Period	Low-Rise Total Trips	Mid-Rise Total Trips
Morning Peak Hour	119	93
Evening Peak Hour	145	114

As noted, the site is presently developed with approximately 64,710 total square-feet of light industrial/manufacturing facilities, each generating traffic onto the adjacent roadway system. Traffic from the redevelopment proposal would therefore replace traffic from the existing facility, thus would not be an entirely new traffic impact on the area roadway system. To better isolate the net additional traffic impacts associated with the development, existing trip “credits” must first be taken as such traffic will be eliminated with the redevelopment proposal.

Existing traffic was estimated by also using ITE projections, specifically for Land Use Code 110 “General Light Industrial” rates and subsequently removed from existing traffic. Table II shows the net new site trips after eliminating the existing site uses. Once this traffic was removed from the network, traffic from the redevelopment site was then added.



TABLE II  
PROJECTED NET NEW TRIPS

Land Use	Morning Peak Hour	Evening Peak Hour
Multi-Family Housing (Low-Rise)	119	145
General Light Industrial	-45	-41
Net New Trips	74	104

As noted, for a conservative traffic impact analysis, no additional traffic credits were taken for possible mass-transit usage, telecommuting options, or other non-automobile travel options (walking/bicycle) that would be available to future residents. Consequently, the actual site traffic generated by the redevelopment proposal will be less than estimated in this report.

The next step in the analysis is to determine the general directional distribution of future site-generated traffic, for example to determine the primary exiting traffic patterns in the morning and arrival patterns in the evening. Again, using the ITE data, directional distribution percentages for Multi-Family Housing (Low-Rise) were then applied to the new trips to develop projected entering and exiting volumes at the site driveway. For the morning peak hour, the overall site traffic would consist of 27 entering and 92 exiting vehicles, and during the evening peak hour, site traffic is projected to consist of 91 entering and 54 exiting vehicles.

#### DISTRIBUTION OF SITE GENERATED TRAFFIC

The directional distribution of new site-generated traffic was established based on a review of the existing traffic volumes and patterns as observed along the roadway network, which generally reflect home-to-work (and the reverse) commuting patterns. The projected site traffic is shown on appended Figure 5. Most site traffic is expected to arrive/depart via Watchung Avenue reflecting access to and the regional highway system to the east and the Chatham train station and Route 287 to the west.



## **FUTURE TRAFFIC CONDITIONS**

### FUTURE TRAFFIC VOLUMES

It is recognized that traffic routinely fluctuates along various state and county roadways, as well as local streets, and varies not only day-to-day, but also on a monthly and yearly basis. Normal "background" traffic increases regularly occur as attributed to continued regional growth and changes in driver demographics. There may also be additional traffic generated by specific projects that will lead to increased demands on the roadways in the site vicinity (at least to some degree), even if no changes were to occur on the subject property.

Regional traffic growth patterns as compiled by the New Jersey Department of Transportation (NJDOT) were examined for this analysis. Based on NJDOT Regional Planning data for Morris County, peak hour traffic volumes are conservatively projected to annually increase by 1.0%. This DOT traffic growth rate would account for any new traffic associated with on-going, area development.

Future base "no-build" volumes were developed by applying the assumed DOT background growth to the existing volumes over a two-year period. These base "no-build" volumes were then reduced to account for traffic generated by the existing "light industrial" use. This was done by utilizing ITE data and the observed traffic patterns to forecast an existing "light industrial" trip distribution. This distribution was then subtracted out of the base "no-build" volumes to develop future adjusted "no-build" volumes which are shown on Figures 6 & 7. "Build" traffic volumes were developed (shown in Figure 8 & 9) by adding site traffic to the adjusted "no-build" volumes for a total future composite.

### FUTURE "BUILD" TRAFFIC ANALYSIS

An analysis of future intersection operations was completed including the "new" traffic added by the redevelopment for residential apartments. Revised Levels of Service analyses were conducted to compare the "no build" and "build" traffic volumes at the study intersections and the results are shown in Figures 10 and 11, respectively. This type of



comparative analysis is used to determine the net traffic impacts of the proposed redevelopment.

As noted, the additional site traffic (shown under the “build” conditions) will not negatively affect the intersection operations. All movements will continue to operate at Levels of Service “D” or better during both peak hours, illustrating the minimal traffic impacts of the proposed residential development. Adequate capacity exists to accommodate the additional site-generated traffic without the need for roadway, intersection or other mitigation that arises as directly attributable to the net increase in traffic.

As requested by Topology, appended Figures A & B show the net percent traffic impact associated with the Redevelopment at each studied intersection for each peak hour. As noted, future site traffic will contribute result less than 1% of the total intersection traffic except at the River Road intersection where site traffic will be most heavily concentrated. Even at this location, the site traffic will at most represent 5.2% of the total intersection with nearly 95% of the traffic comprised of existing traffic plus future background growth.

For the traffic mitigation required in the Redevelopment Plan, overall intersection operations at Watchung Avenue and River Road could be improved through a minor re-timing of the traffic signal and improved maintenance or replacement of exiting, deficient traffic signal equipment that is designed to better accommodate actual traffic demands though improved efficiency that would optimize the traffic operations. It is further assumed that the redevelopment would permit an opportunity for a minor cartway widening of at least 3 feet on River Road along the site frontage to improve the lane widths and increasing stacking at the traffic-signal approach. This improvement would allow for better right-turn-on-red opportunities and the implementation of an overlap signal phase to continue east on Watchung Avenue.

Appended Figure 11 also shows the improved operations with the signal re-timing, which benefits all motorists traveling through the intersection.





## SITE ACCESS AND CIRCULATION

The following items address access and on-site design characteristics based on a concept plan for the redevelopment:

- Site access is envisioned via a new, full-movement roadway along River Road to be located as far south as practical, thus avoiding interference with vehicular operations closer to the signalized intersection. The driveway operational analyses indicate that the proposed access design will adequately accommodate peak hour traffic associated with traffic volume projections and confirm that any on-site queuing will be minimal. Projected delays exiting the site into River Road will be minimal with high service levels projected, providing further evidence of the minimal traffic impact associated with the proposed redevelopment.
- For residential developments, the required parking supply is predicated on ratios contained in the Residential Site Improvement Standards (RSIS, NJAC 5:21). The following table summarizes the required parking:

TABLE III  
PARKING REQUIREMENTS

Use	Unit Count	Parking Ratio	Required Parking Spaces
One-Bedroom Apartments	106	1.8 spaces/unit	191
Two-Bedroom Apartments	145	2 spaces/unit	290
Three-Bedroom Apartments	8	2.1 spaces/unit	17
Total Parking Required			498 spaces

As shown, RSIS requires a total of 498 on-site parking spaces, which includes the required 0.5 space/unit for visitor and guest use. The concept plan can comply with the required parking standard.



## CONCLUSIONS

In summary, it is evident from this analysis of projected future traffic conditions that the proposed redevelopment for new 259-unit residential apartments would generate only modest net traffic increases. This traffic study concludes that the overall traffic increases will not create a negative impact on the local roadway network and there will be no significant change in intersection operations at Watchung Avenue and River Road, with the implementation of intersection improvements that are appropriate to improve existing, deficient operating conditions.

Even with the potential traffic increases associated with the application, adequate roadway capacity will continue to exist to accommodate future site traffic. All movements to and from the site will operate safely and efficiently, assuming reasonable and prudent driver behavior.

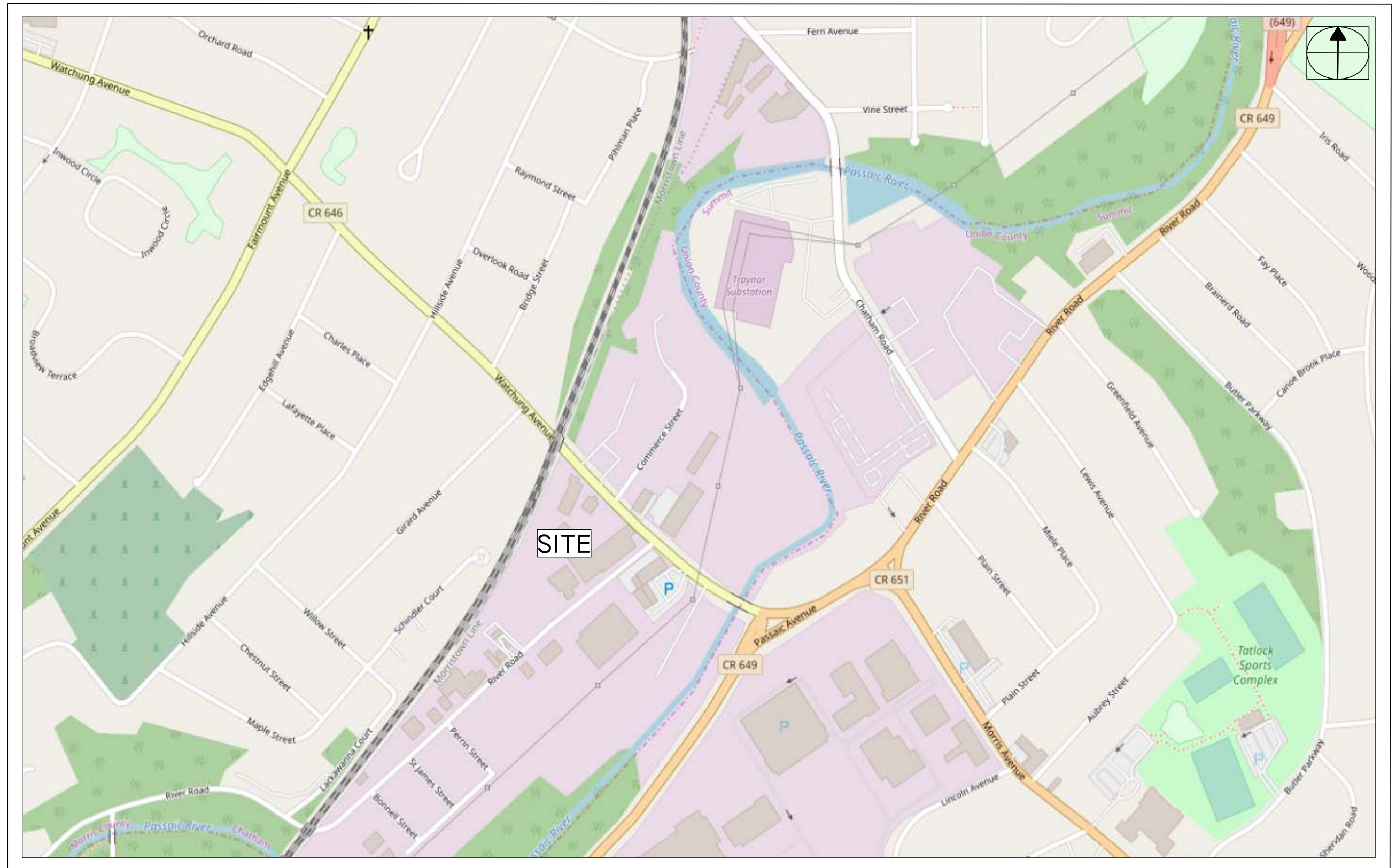
Based on these findings, it is concluded that the site is particularly well suited for the proposed redevelopment, particularly in light of the current industrial/manufacturing use and its associated traffic and safety impacts with the current truck access along River Road.

The proposed redevelopment and resultant traffic impacts will not negatively impact the traffic in the surrounding area or along the adjacent streets as adequate roadway capacity exists to accommodate the increases. The traffic characteristics of the uses will be consistently minimal and will not result in any additional off tract congestion or unfavorable conditions.

As a mitigation of these minor traffic impacts, the redevelopment proposal allows for minor intersection enhancements and frontage improvements affording an opportunity to actually make intersection operations better, even with the additional redevelopment site traffic.

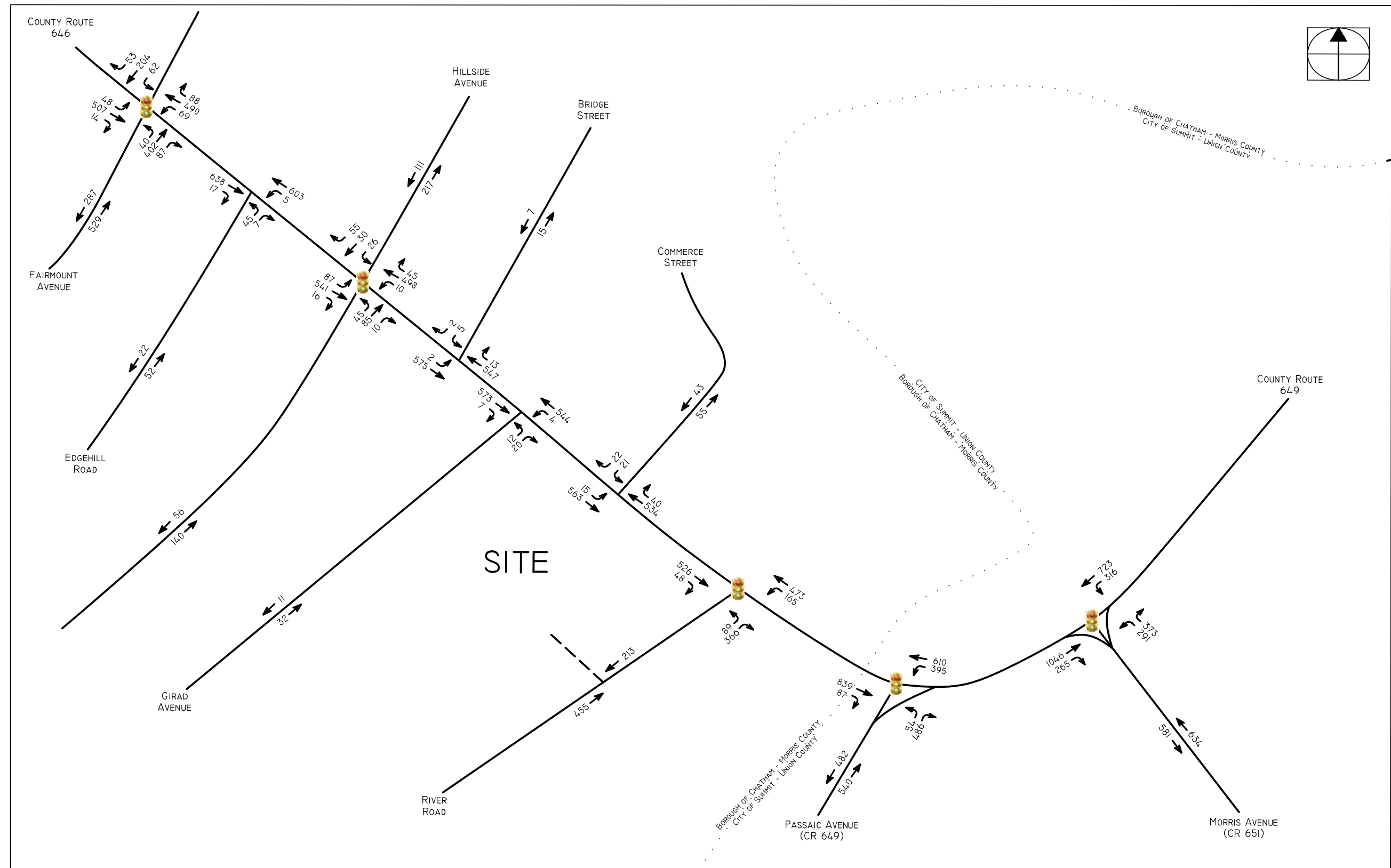


## TECHNICAL APPENDIX



RIVER ROAD REDEVELOPMENT  
BOROUGH OF CHATHAM  
MORRIS COUNTY, NEW JERSEY

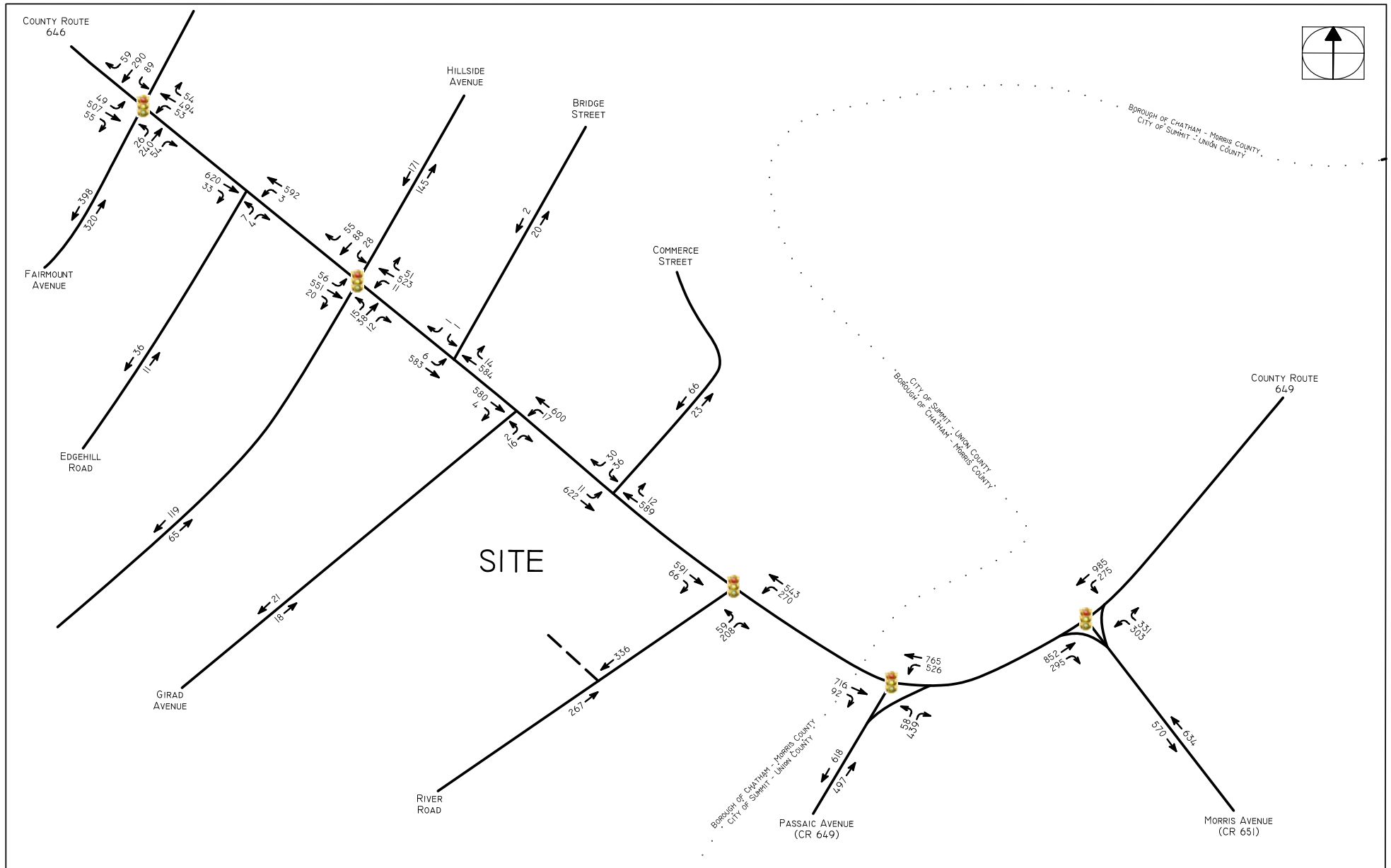
FIGURE I



RIVER ROAD REDEVELOPMENT  
BOROUGH OF CHATHAM  
MORRIS COUNTY, NEW JERSEY

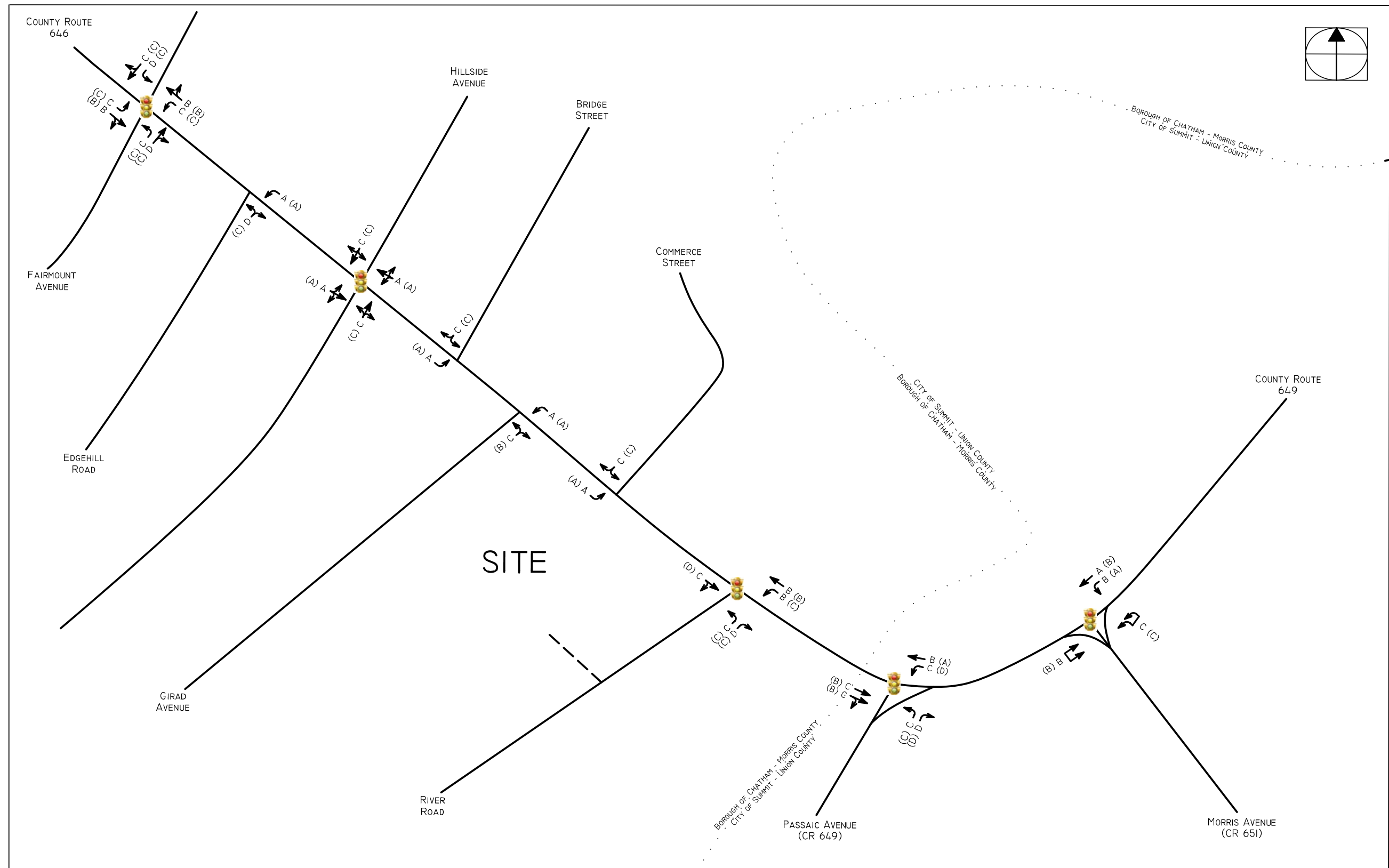
FIGURE 2





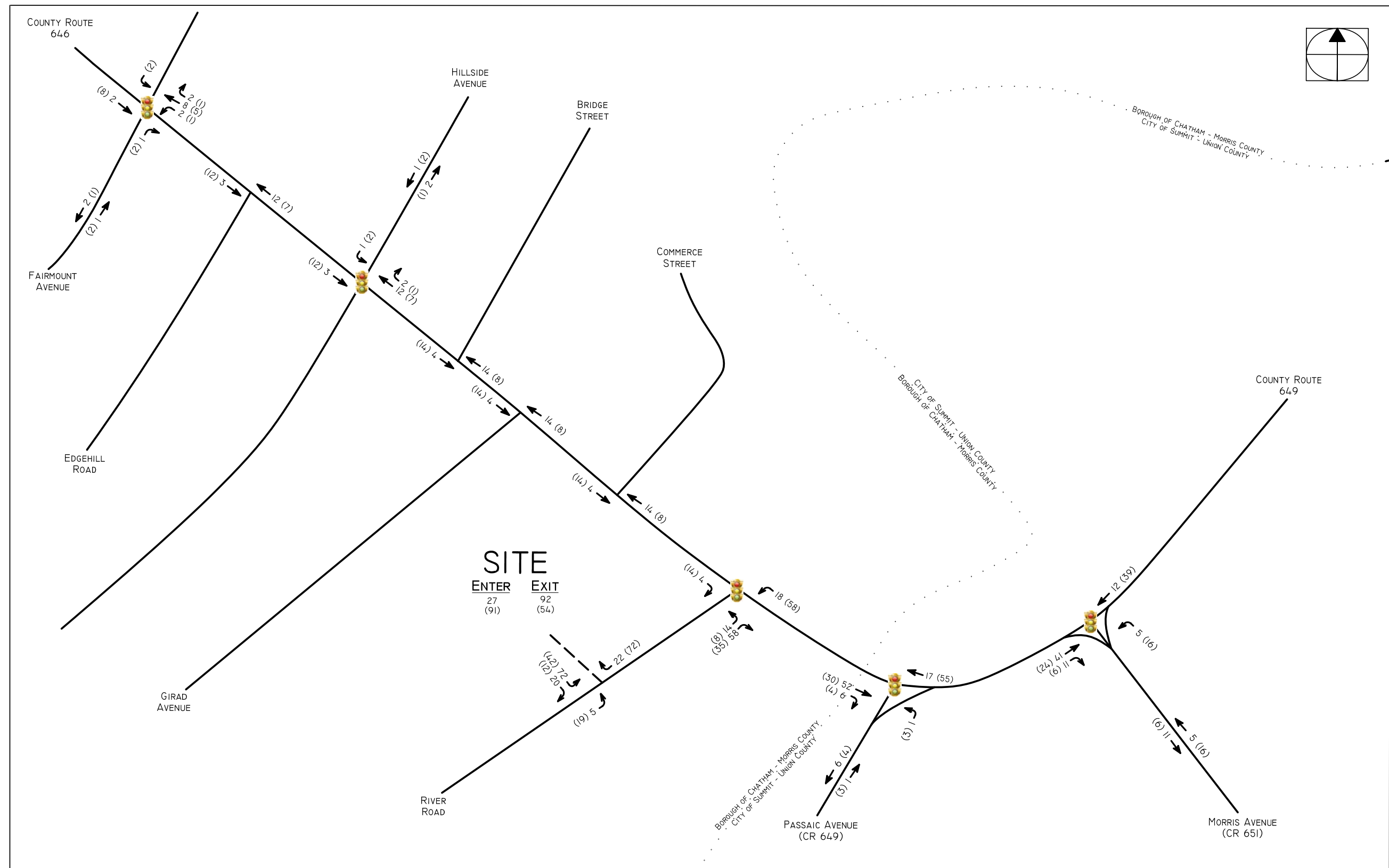
RIVER ROAD REDEVELOPMENT  
BOROUGH OF CHATHAM  
MORRIS COUNTY, NEW JERSEY

FIGURE 3



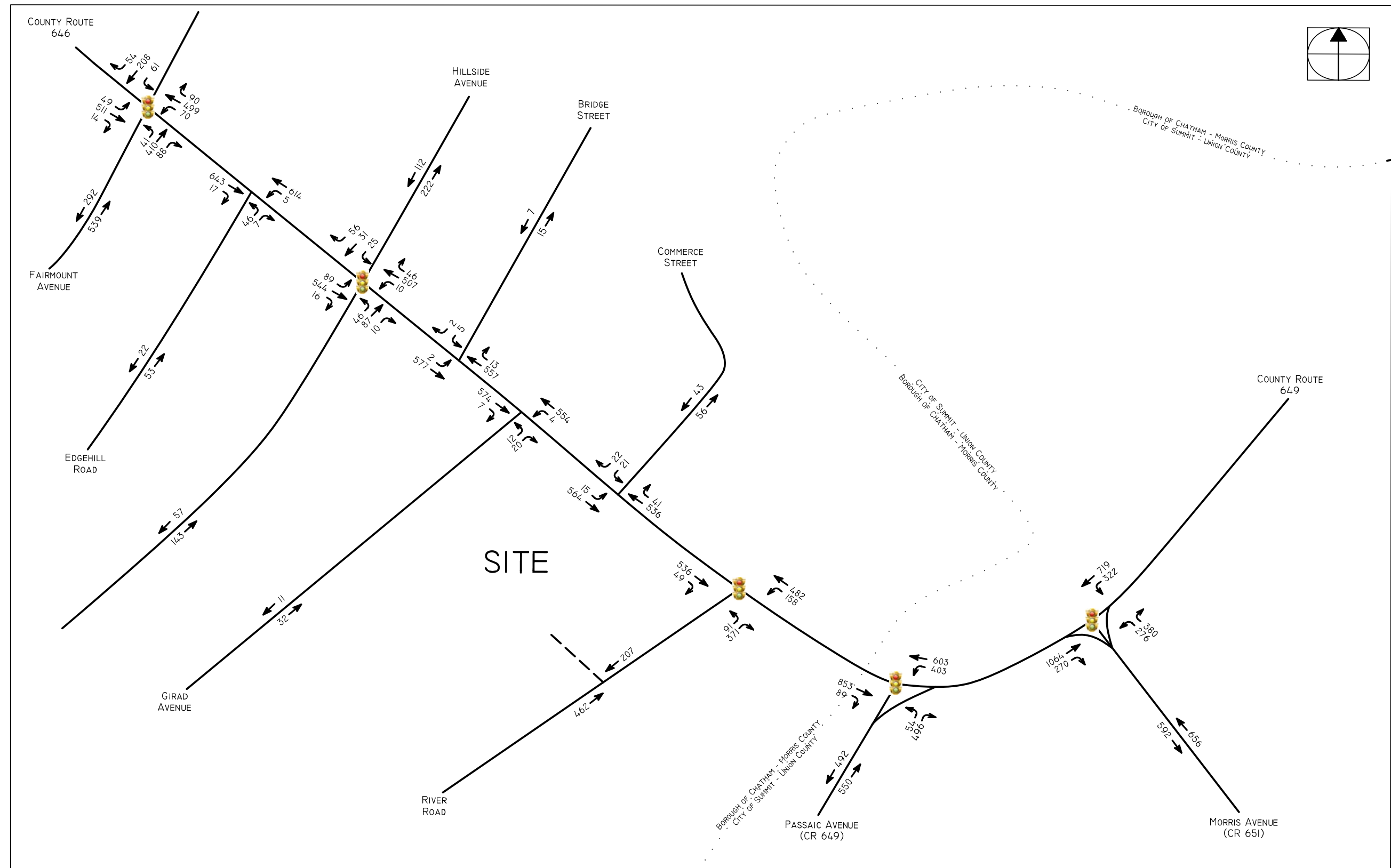
RIVER ROAD REDEVELOPMENT  
BOROUGH OF CHATHAM  
MORRIS COUNTY, NEW JERSEY

FIGURE 4



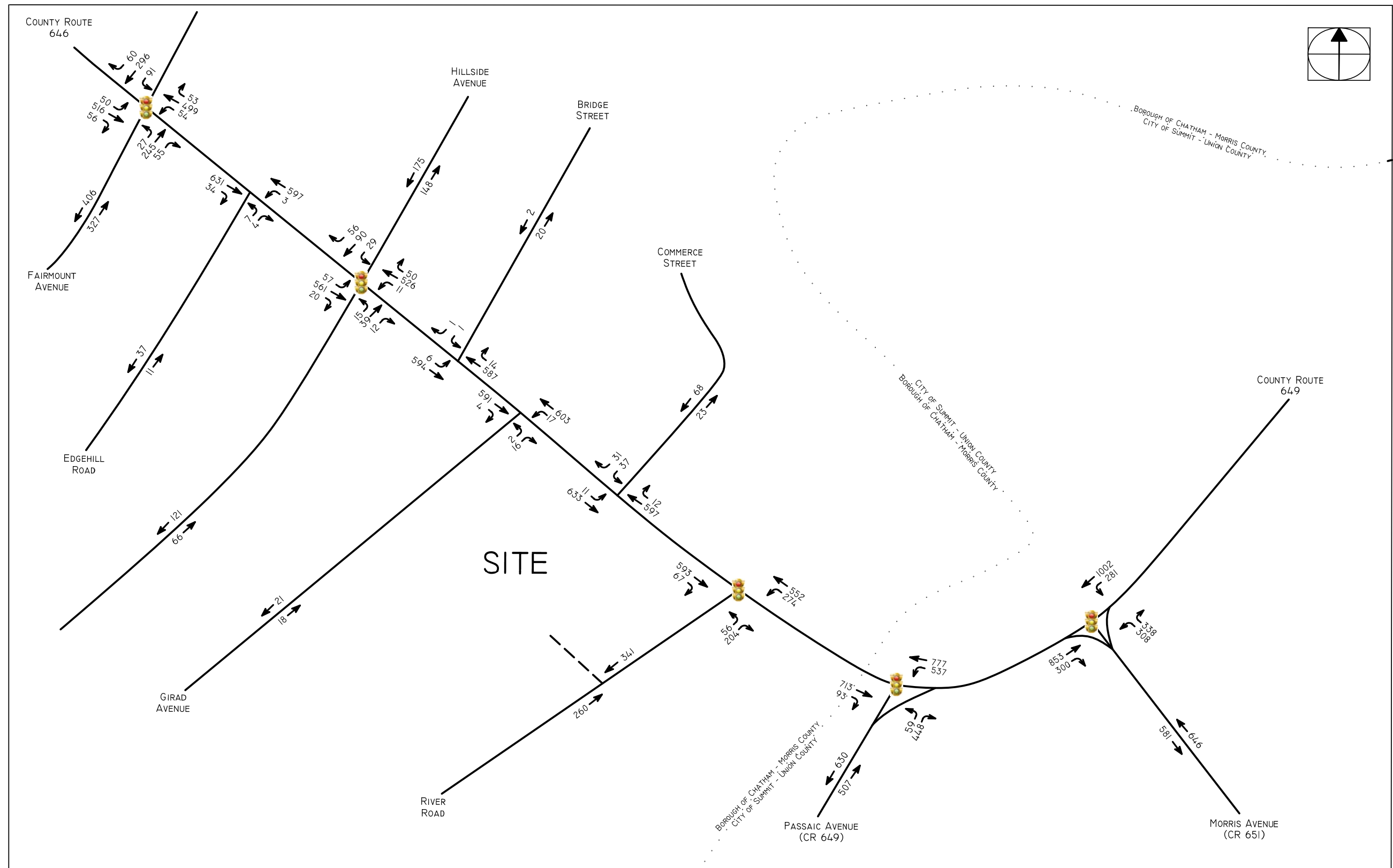
RIVER ROAD REDEVELOPMENT  
BOROUGH OF CHATHAM  
MORRIS COUNTY, NEW JERSEY

FIGURE 5



RIVER ROAD REDEVELOPMENT  
BOROUGH OF CHATHAM  
MORRIS COUNTY, NEW JERSEY

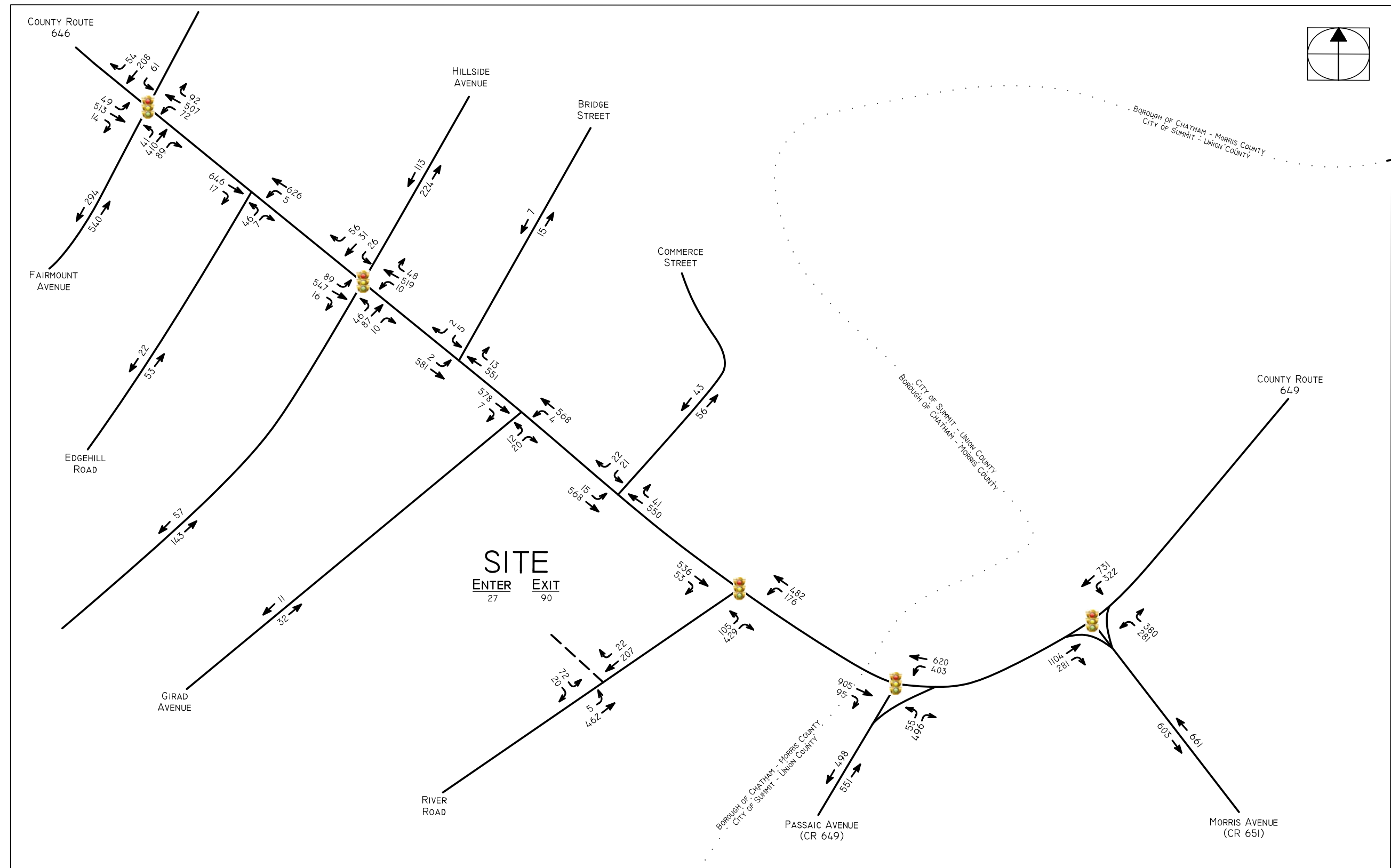
FIGURE 6



RIVER ROAD REDEVELOPMENT  
BOROUGH OF CHATHAM  
MORRIS COUNTY, NEW JERSEY

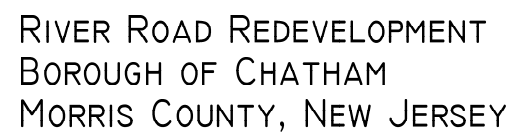
FIGURE 7



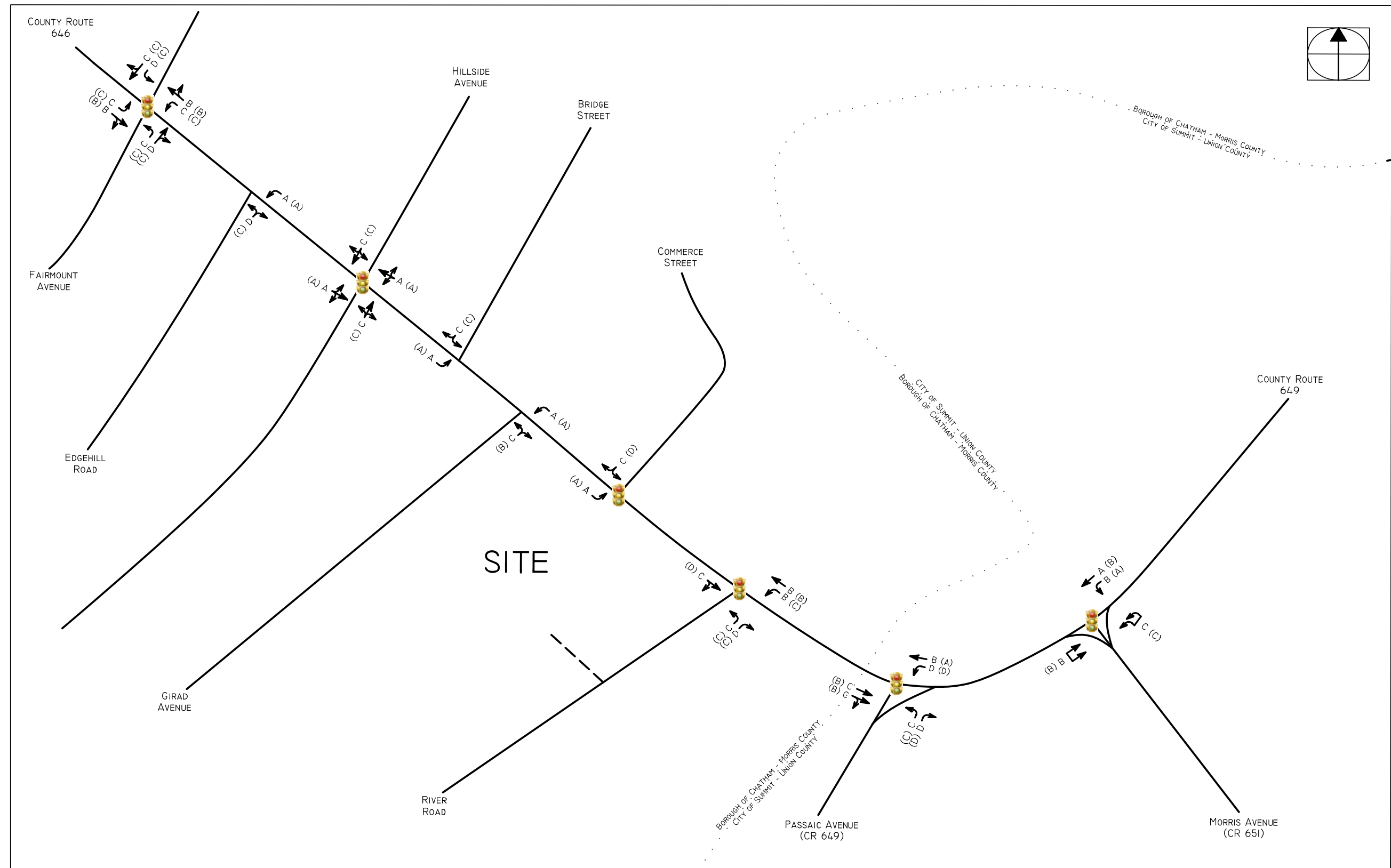


RIVER ROAD REDEVELOPMENT  
BOROUGH OF CHATHAM  
MORRIS COUNTY, NEW JERSEY

FIGURE 8

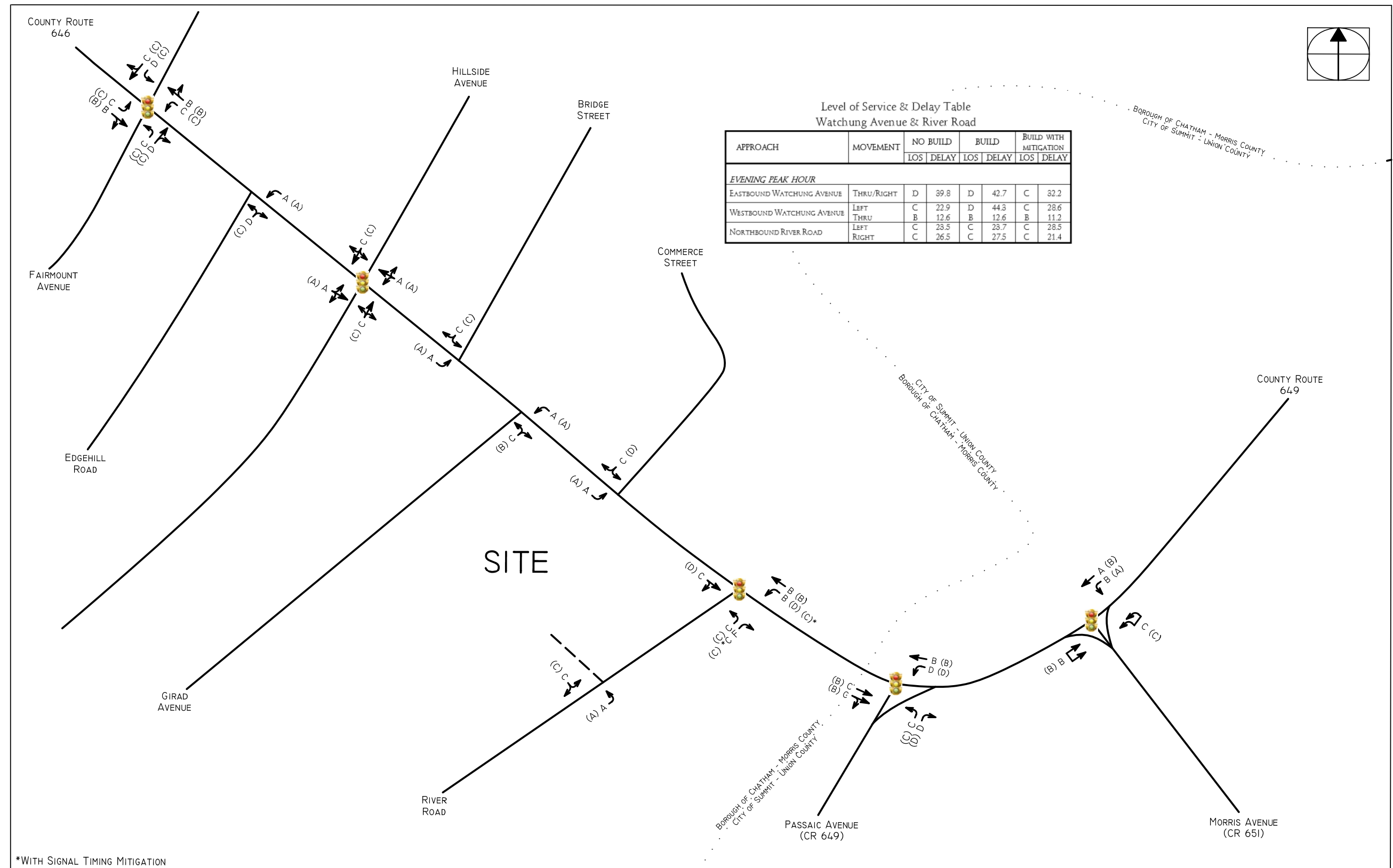


## BUILD TRAFFIC VOLUMES EVENING PEAK HOUR



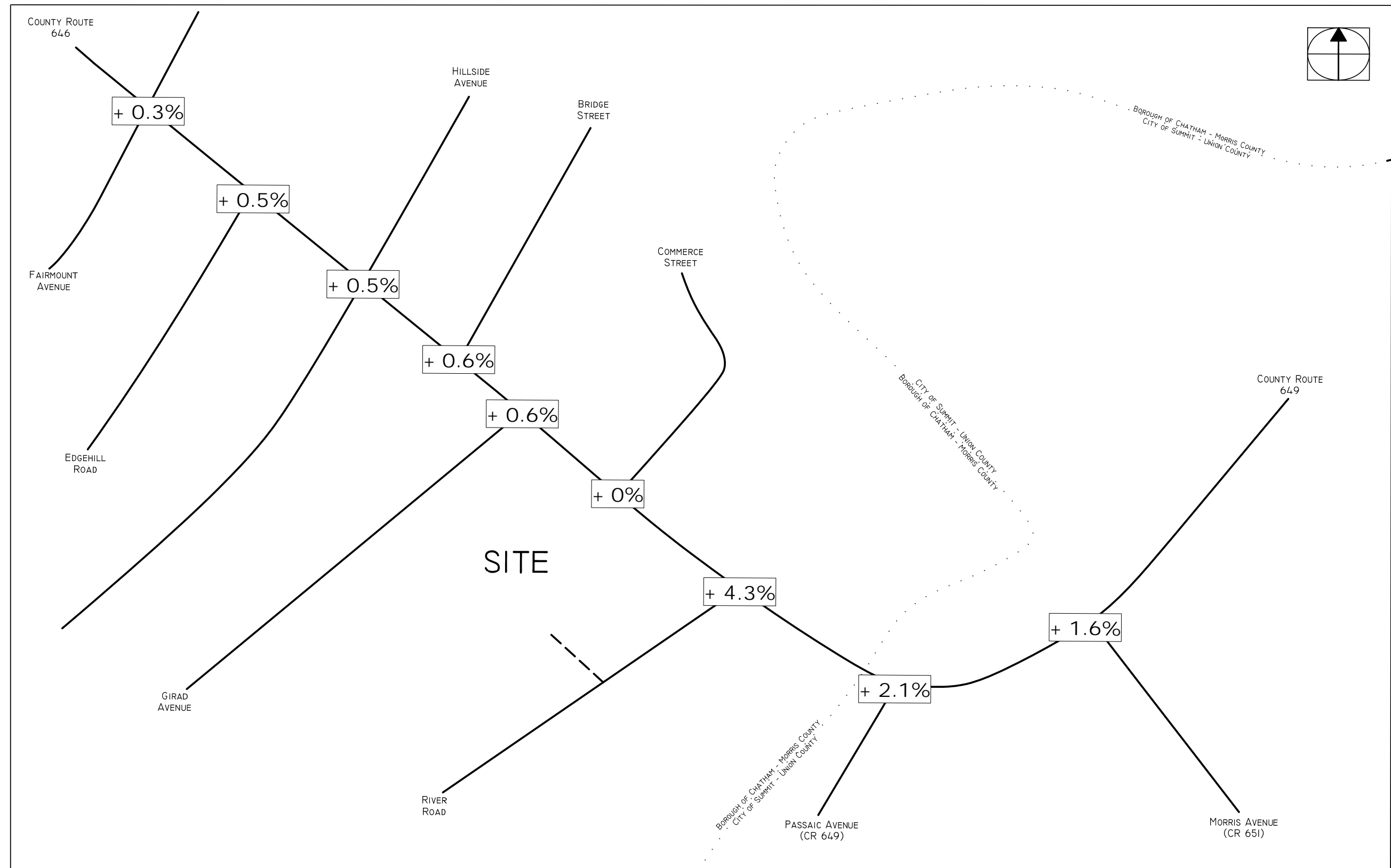
RIVER ROAD REDEVELOPMENT  
BOROUGH OF CHATHAM  
MORRIS COUNTY, NEW JERSEY

FIGURE 10



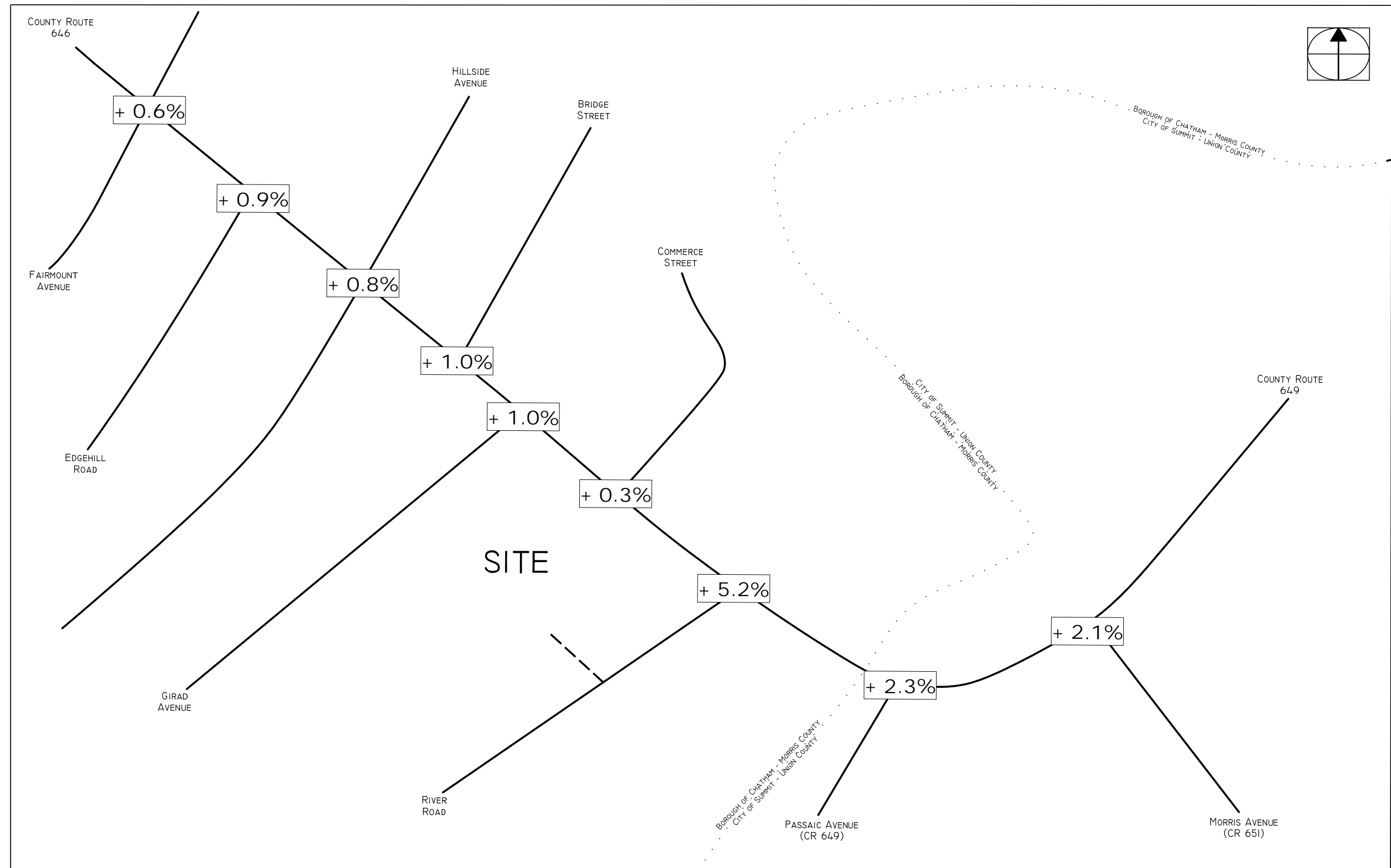
RIVER ROAD REDEVELOPMENT  
BOROUGH OF CHATHAM  
MORRIS COUNTY, NEW JERSEY

FIGURE II



RIVER ROAD REDEVELOPMENT  
BOROUGH OF CHATHAM  
MORRIS COUNTY, NEW JERSEY

FIGURE A



RIVER ROAD REDEVELOPMENT  
BOROUGH OF CHATHAM  
MORRIS COUNTY, NEW JERSEY

FIGURE B

# Multifamily Housing (Low-Rise) (220)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,  
Peak Hour of Adjacent Street Traffic,  
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 42

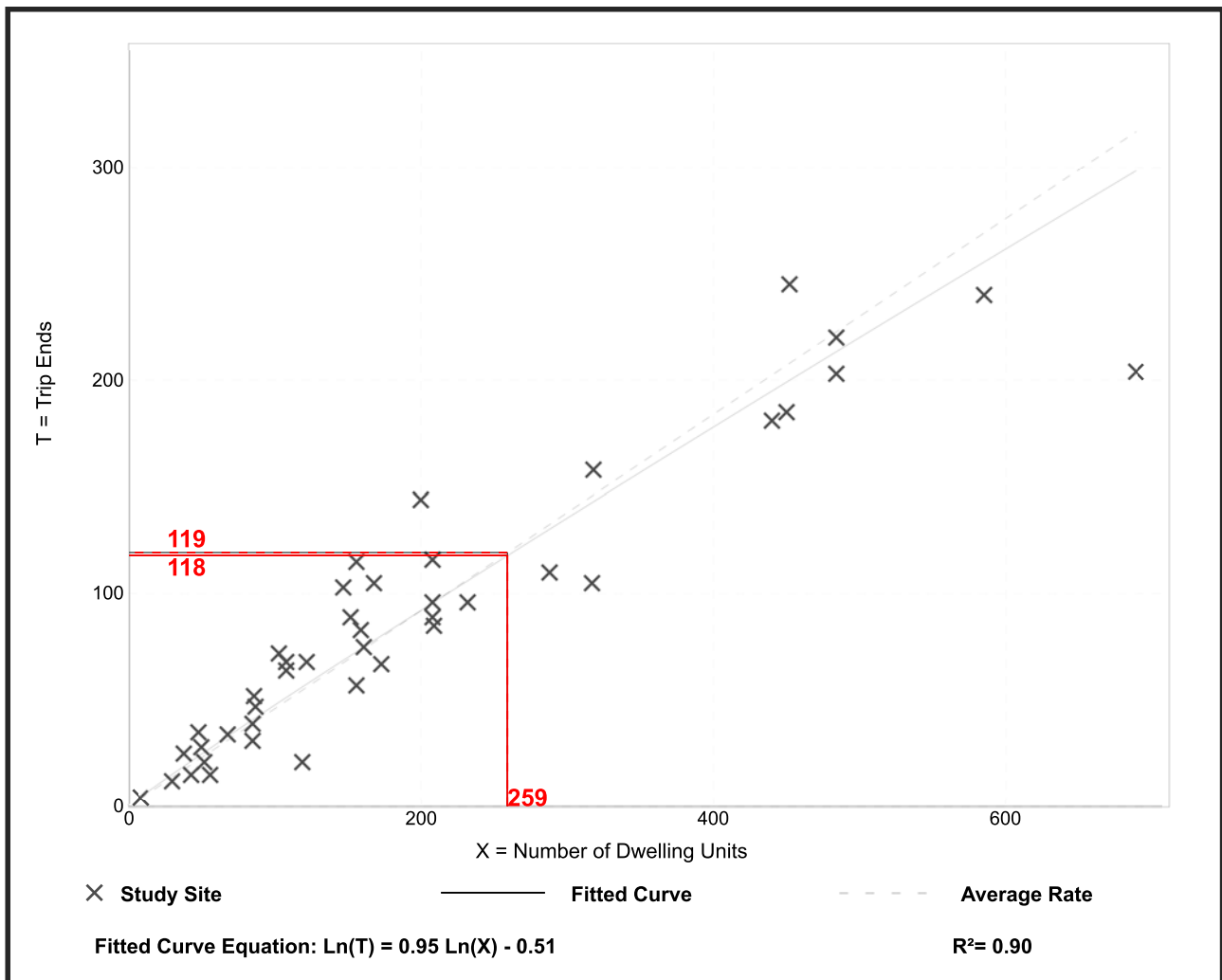
Avg. Num. of Dwelling Units: 199

Directional Distribution: 23% entering, 77% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.46	0.18 - 0.74	0.12

## Data Plot and Equation



# Multifamily Housing (Low-Rise) (220)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,  
Peak Hour of Adjacent Street Traffic,  
One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 50

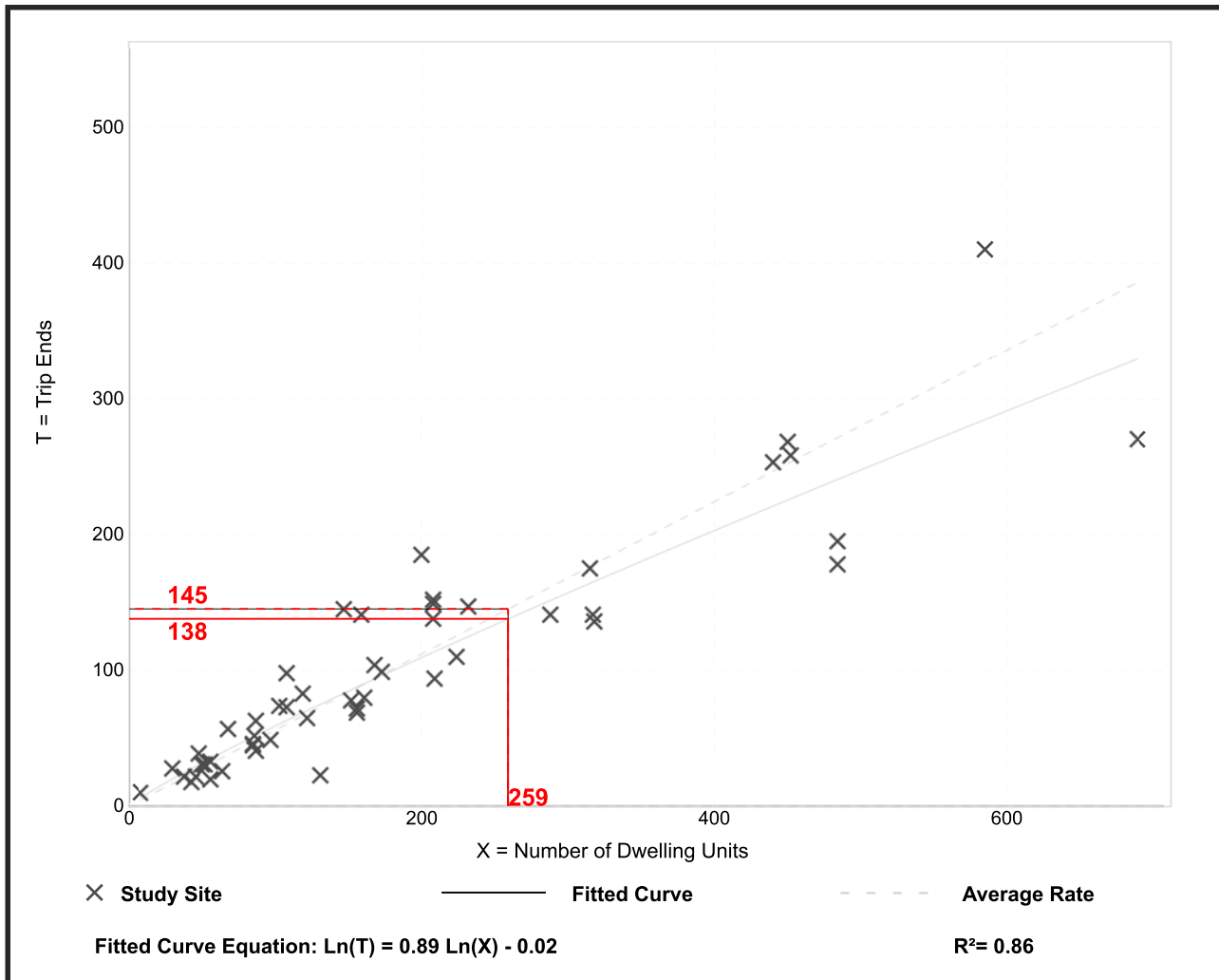
Avg. Num. of Dwelling Units: 187

Directional Distribution: 63% entering, 37% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.56	0.18 - 1.25	0.16

## Data Plot and Equation





# Multifamily Housing (Mid-Rise) (221)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 60

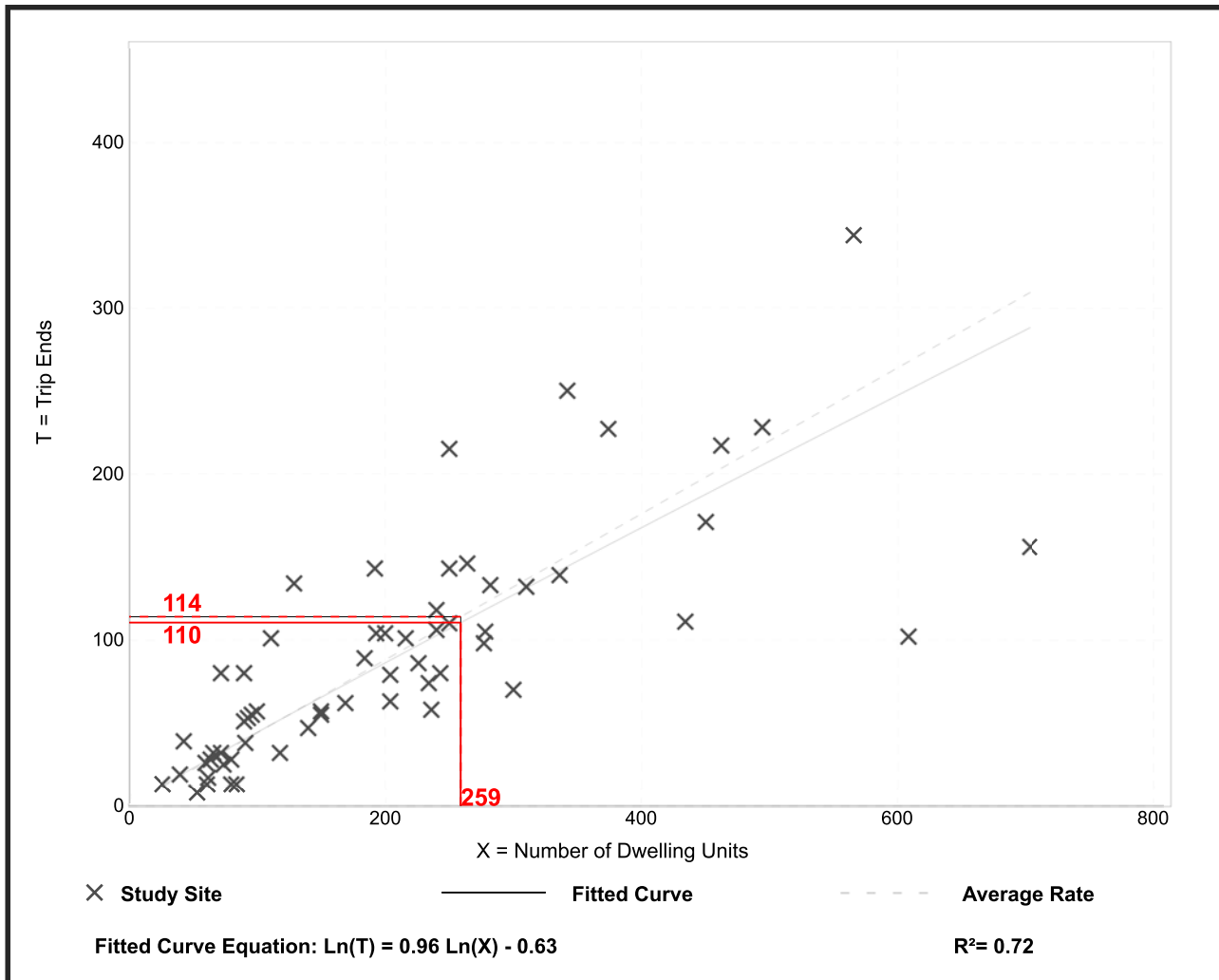
Avg. Num. of Dwelling Units: 208

Directional Distribution: 61% entering, 39% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.44	0.15 - 1.11	0.19

## Data Plot and Equation



# Multifamily Housing (Mid-Rise) (221)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,  
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 53

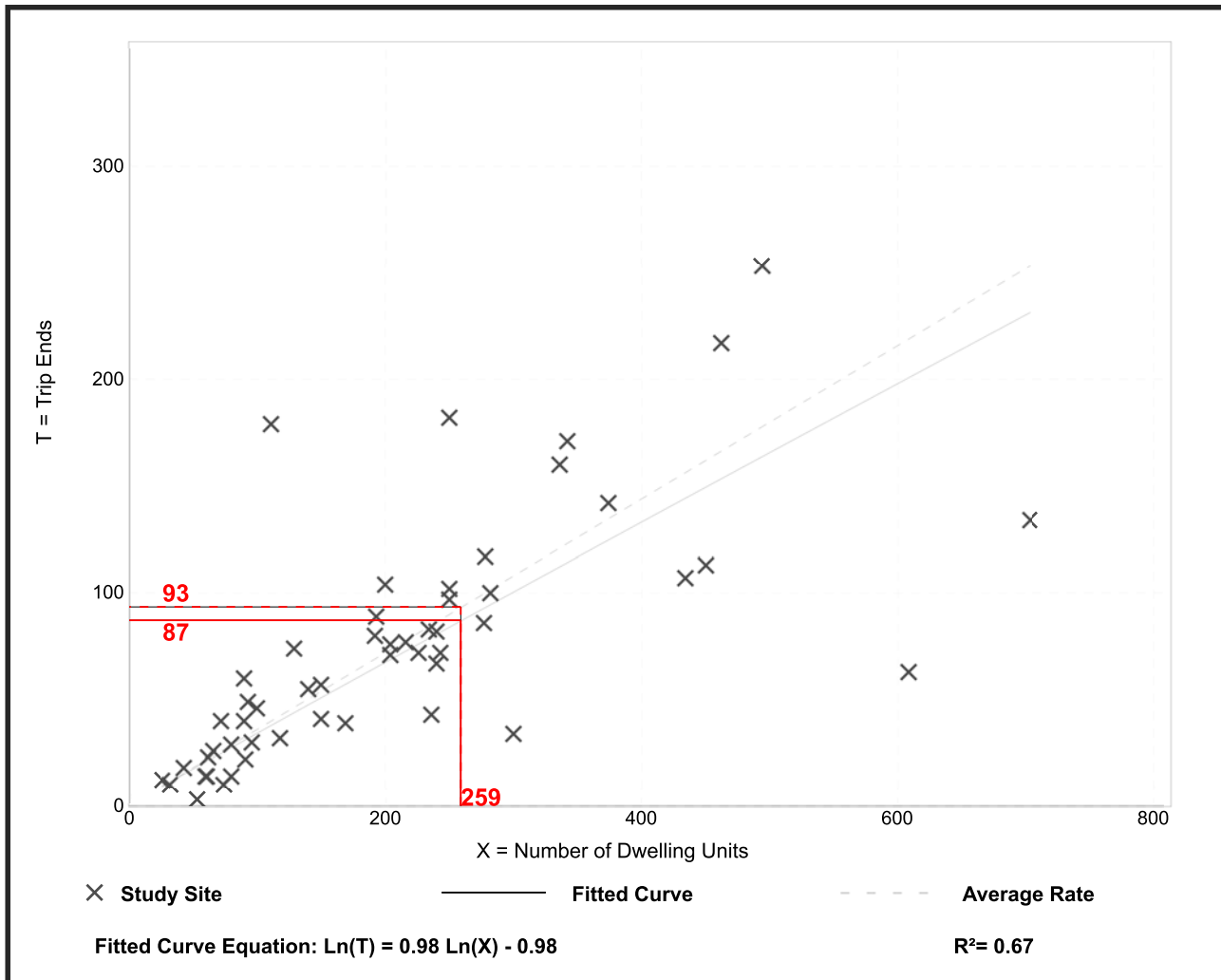
Avg. Num. of Dwelling Units: 207

Directional Distribution: 26% entering, 74% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.36	0.06 - 1.61	0.19

## Data Plot and Equation



S0801

## COMMUTING CHARACTERISTICS BY SEX

2013-2017 American Community Survey 5-Year Estimates

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the Technical Documentation section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the Methodology section.

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities, and towns and estimates of housing units for states and counties.

Subject	Chatham borough, New Jersey					
	Total		Male		Female	
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
Workers 16 years and over	4,267	+/-294	2,346	+/-208	1,921	+/-172
MEANS OF TRANSPORTATION TO WORK						
Car, truck, or van	64.7%	+/-4.4	59.3%	+/-5.5	71.2%	+/-5.9
Drove alone	59.6%	+/-4.5	55.6%	+/-5.8	64.5%	+/-7.0
Carpooled	5.1%	+/-2.1	3.7%	+/-2.6	6.7%	+/-3.9
In 2-person carpool	2.1%	+/-1.3	1.1%	+/-1.3	3.3%	+/-2.1
In 3-person carpool	2.5%	+/-1.6	2.5%	+/-1.9	2.6%	+/-2.9
In 4-or-more person carpool	0.4%	+/-0.6	0.1%	+/-0.3	0.8%	+/-1.3
Workers per car, truck, or van	1.05	+/-0.02	1.04	+/-0.03	1.06	+/-0.04
Public transportation (excluding taxicab)	25.3%	+/-3.6	30.7%	+/-4.8	18.7%	+/-4.7
Walked	2.3%	+/-1.3	2.7%	+/-1.9	1.9%	+/-2.1
Bicycle	0.2%	+/-0.2	0.3%	+/-0.4	0.0%	+/-1.7
Taxicab, motorcycle, or other means	0.3%	+/-0.4	0.5%	+/-0.7	0.0%	+/-1.7
Worked at home	7.3%	+/-2.3	6.5%	+/-3.1	8.2%	+/-3.1
PLACE OF WORK						
Worked in state of residence	70.8%	+/-5.0	64.1%	+/-6.0	79.0%	+/-5.7
Worked in county of residence	36.7%	+/-3.9	29.8%	+/-4.9	45.1%	+/-5.9
Worked outside county of residence	34.1%	+/-5.6	34.3%	+/-7.6	33.9%	+/-5.9

Subject	Chatham borough, New Jersey					
	Total		Male		Female	
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
Worked outside state of residence	29.2%	+/-5.0	35.9%	+/-6.0	21.0%	+/-5.7
Living in a place	100.0%	+/-0.8	100.0%	+/-1.4	100.0%	+/-1.7
Worked in place of residence	15.6%	+/-3.2	13.6%	+/-3.9	18.1%	+/-5.3
Worked outside place of residence	84.4%	+/-3.2	86.4%	+/-3.9	81.9%	+/-5.3
Not living in a place	0.0%	+/-0.8	0.0%	+/-1.4	0.0%	+/-1.7
Living in 12 selected states	100.0%	+/-0.8	100.0%	+/-1.4	100.0%	+/-1.7
Worked in minor civil division of residence	15.6%	+/-3.2	13.6%	+/-3.9	18.1%	+/-5.3
Worked outside minor civil division of residence	84.4%	+/-3.2	86.4%	+/-3.9	81.9%	+/-5.3
Not living in 12 selected states	0.0%	+/-0.8	0.0%	+/-1.4	0.0%	+/-1.7
Workers 16 years and over who did not work at home	3,957	+/-289	2,193	+/-215	1,764	+/-167
TIME LEAVING HOME TO GO TO WORK						
12:00 a.m. to 4:59 a.m.	2.1%	+/-1.5	3.7%	+/-2.6	0.0%	+/-1.8
5:00 a.m. to 5:29 a.m.	1.3%	+/-1.1	0.8%	+/-0.9	1.9%	+/-2.1
5:30 a.m. to 5:59 a.m.	1.0%	+/-0.8	1.1%	+/-1.1	0.9%	+/-1.3
6:00 a.m. to 6:29 a.m.	6.8%	+/-2.4	10.2%	+/-3.9	2.6%	+/-1.7
6:30 a.m. to 6:59 a.m.	8.9%	+/-2.6	11.7%	+/-3.7	5.5%	+/-2.9
7:00 a.m. to 7:29 a.m.	20.9%	+/-3.7	25.7%	+/-5.7	15.0%	+/-4.8
7:30 a.m. to 7:59 a.m.	18.7%	+/-3.5	19.8%	+/-4.4	17.3%	+/-5.2
8:00 a.m. to 8:29 a.m.	14.2%	+/-2.6	8.7%	+/-2.9	21.1%	+/-5.3
8:30 a.m. to 8:59 a.m.	6.3%	+/-2.0	3.2%	+/-1.8	10.0%	+/-3.7
9:00 a.m. to 11:59 p.m.	19.8%	+/-3.8	15.0%	+/-4.1	25.7%	+/-5.9
TRAVEL TIME TO WORK						
Less than 10 minutes	9.8%	+/-2.9	8.0%	+/-3.0	12.0%	+/-4.4
10 to 14 minutes	9.7%	+/-3.0	6.8%	+/-3.3	13.2%	+/-4.2
15 to 19 minutes	13.2%	+/-2.9	11.7%	+/-3.7	15.1%	+/-4.7
20 to 24 minutes	14.7%	+/-5.2	13.5%	+/-5.6	16.2%	+/-6.0
25 to 29 minutes	3.9%	+/-1.3	2.9%	+/-1.6	5.3%	+/-2.3
30 to 34 minutes	8.2%	+/-2.5	7.8%	+/-2.8	8.8%	+/-3.9
35 to 44 minutes	2.1%	+/-1.1	2.7%	+/-1.6	1.4%	+/-1.4
45 to 59 minutes	7.4%	+/-3.1	8.1%	+/-3.2	6.6%	+/-4.2
60 or more minutes	31.0%	+/-4.4	38.6%	+/-5.9	21.6%	+/-5.5
Mean travel time to work (minutes)	39.3	+/-3.3	45.0	+/-4.3	32.2	+/-3.8
VEHICLES AVAILABLE						
Workers 16 years and over in households	4,246	+/-293	2,329	+/-207	1,917	+/-173
No vehicle available	1.8%	+/-1.8	1.8%	+/-1.9	1.8%	+/-2.0
1 vehicle available	13.9%	+/-3.8	11.2%	+/-3.5	17.2%	+/-5.2
2 vehicles available	53.5%	+/-6.9	54.1%	+/-7.4	52.8%	+/-7.4
3 or more vehicles available	30.8%	+/-7.4	32.9%	+/-7.6	28.2%	+/-8.1

Subject	Chatham borough, New Jersey					
	Total		Male		Female	
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
PERCENT ALLOCATED						
Means of transportation to work	5.3%	(X)	(X)	(X)	(X)	(X)
Private vehicle occupancy	6.8%	(X)	(X)	(X)	(X)	(X)
Place of work	10.2%	(X)	(X)	(X)	(X)	(X)
Time leaving home to go to work	12.0%	(X)	(X)	(X)	(X)	(X)
Travel time to work	7.5%	(X)	(X)	(X)	(X)	(X)
Vehicles available	0.0%	(X)	(X)	(X)	(X)	(X)

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error can be interpreted roughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see Accuracy of the Data). The effect of nonsampling error is not represented in these tables.

The 12 selected states are Connecticut, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Wisconsin.

Workers include members of the Armed Forces and civilians who were at work last week.

When information is missing or inconsistent, the Census Bureau logically assigns an acceptable value using the response to a related question or questions. If a logical assignment is not possible, data are filled using a statistical process called allocation, which uses a similar individual or household to provide a donor value. The "Allocated" section is the number of respondents who received an allocated value for a particular subject.

While the 2013-2017 American Community Survey (ACS) data generally reflect the February 2013 Office of Management and Budget (OMB) definitions of metropolitan and micropolitan statistical areas; in certain instances the names, codes, and boundaries of the principal cities shown in ACS tables may differ from the OMB definitions due to differences in the effective dates of the geographic entities.

Estimates of urban and rural populations, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2010 data. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

#### Explanation of Symbols:

1. An '\*\*\*' entry in the margin of error column indicates that either no sample observations or too few sample observations were available to compute a standard error and thus the margin of error. A statistical test is not appropriate.
2. An '-' entry in the estimate column indicates that either no sample observations or too few sample observations were available to compute an estimate, or a ratio of medians cannot be calculated because one or both of the median estimates falls in the lowest interval or upper interval of an open-ended distribution.
3. An '-' following a median estimate means the median falls in the lowest interval of an open-ended distribution.
4. An '+' following a median estimate means the median falls in the upper interval of an open-ended distribution.
5. An '\*\*\*\*' entry in the margin of error column indicates that the median falls in the lowest interval or upper interval of an open-ended distribution. A statistical test is not appropriate.
6. An '\*\*\*\*\*' entry in the margin of error column indicates that the estimate is controlled. A statistical test for sampling variability is not appropriate.
7. An 'N' entry in the estimate and margin of error columns indicates that data for this geographic area cannot be displayed because the number of sample cases is too small.
8. An '(X)' means that the estimate is not applicable or not available.

# TRAFFIC SIGNAL TIMING

## WATCHUNG AVENUE AND FAIRMOUNT AVENUE

### CHATHAM BOROUGH

#### 90 SEC BACKGROUND CYCLE

#### VEHICLE ACTUATION

PHASE	SIGNALS				TIME
	1-4	5-8	9-12	13-16	
A – WATCHUNG	G	R	W	DW	60-37
PED CLEARANCE	G	R	FDW	DW	11
CHANGE	Y	R	DW	DW	4
CLEARANCE	R	R	DW	DW	2
B – FAIRMOUNT AVE	R	G	DW	DW	7-30
CHANGE	R	Y	DW	DW	4
CLEARANCE	R	R	DW	DW	2

FLASHING OPERATION                      Y              R    DARK    DARK

#### NOTES:

1. CONTROLLER TO REST IN PHASE A GREEN. MEMORY AND RECALL OFF FOR PHASE B.
2. VEHICLE EXTENSION - 2 SEC.
3. AN OFFSET OF 27 SECONDS TO BE MEASURED FROM THE BEGINNING OF WATCHUNG AVENUE YELLOW AT THE INTERSECTION OF WATCHUNG AVE / LAFAYETTE AVE TO THE BEGINNING OF YELLOW AT WATCHUNG AVE / FAIRMOUNT AVE.

6/27/00

Offset not  
implemented as of  
6/28/00

# TRAFFIC SIGNAL TIMING

## WATCHUNG AVENUE AND HILLSIDE AVENUE

### CHATHAM BOROUGH

#### 90 SEC BACKGROUND CYCLE

PHASE	SIGNALS		TIME
	1-4	5-8	
A – WATCHUNG	G	R	73-64
CHANGE	Y	R	4
CLEARANCE	R	R	1
B – HILLSIDE AVE	R	G	7-16
CHANGE	R	Y	4
CLEARANCE	R	R	1
FLASHING OPERATION	Y	R	

#### NOTES:

1. CONTROLLER TO REST IN PHASE A GREEN. MEMORY AND RECALL OFF FOR PHASE B.
2. VEHICLE EXTENSION - 2 SEC.
3. AN OFFSET OF 77 SECONDS TO BE MEASURED FROM THE BEGINNING OF WATCHUNG AVENUE YELLOW AT THE INTERSECTION OF WATCHUNG AVE / LAFAYETTE AVE TO THE BEGINNING OF YELLOW AT WATCHUNG AVE / HILLSIDE AVE.

6/27/00

Offset not  
implemented as of  
6/28/00

Directive # \_\_\_\_\_  
 Watchung Avenue and River Road  
 Borough of Chatham, Morris County  
 040133602  
 Dated: 5/23/97  
 Revised: September 29, 2004

# 63-90 SECOND VARIABLE CYCLE

## INDICATIONS

Phase		1	2,5	3,4	6,7,8, 9,10	TIME I (SEC)	TIME II (SEC)	TIME III (SEC)
A	Watchung Avenue WB Lead Change	G G	<G-/G <Y-/G	R R	R R	5-8 3	5-13 3	5-8 3
B.	Watchung Avenue R.O.W Change Clearance	G Y R	G Y R	G Y R	R R R	42 4 2	37 4 2	48 4 2
C.	River Road R.O.W Change Clearance	R R R	R R R	R R R	G Y R	7-26 3 2	7-26 3 2	7-20 3 2
EMERGENCY FLASH		Y	Y	Y	R			

### NOTES:

1. Phase B Recall to be on. Phase A & C Memory and Recall to be off.
2. The vehicle extension interval is to be set at 3 seconds.
3. Pedestrian Actuation must guarantee a 14 second interval to Phase C.
4. Time I operates from 6:00 am to 9:00 am and Time II operates 4:00 pm to 6:00 pm Monday through Friday. Time III operates at all other times.

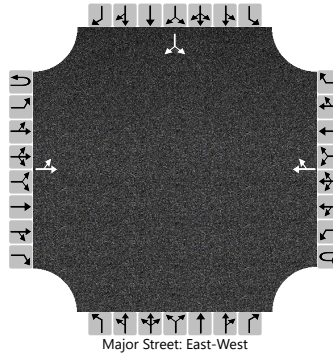


# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Bridge St & 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/15/2019	East/West Street	CR 646
Analysis Year	2019	North/South Street	Bridge Street
Time Analyzed	Am Existing	Peak Hour Factor	0.93
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		2	575				547	13						5		2
Percent Heavy Vehicles (%)		4												4		4
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.14												6.44		6.24
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.24												3.54		3.34

## Delay, Queue Length, and Level of Service

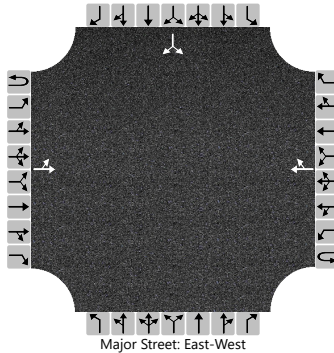
Flow Rate, v (veh/h)		2													8	
Capacity, c (veh/h)		966													238	
v/c Ratio		0.00													0.03	
95% Queue Length, Q <sub>95</sub> (veh)		0.0													0.1	
Control Delay (s/veh)		8.7													20.6	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)	0.1												20.6			
Approach LOS													C			

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Commerce St & Rt 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/16/2019	East/West Street	Route 646
Analysis Year	2019	North/South Street	Commerce Street
Time Analyzed	Am Existing	Peak Hour Factor	0.93
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		15	563				534	40						21		22
Percent Heavy Vehicles (%)		4												4		4
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.14												6.44		6.24
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.24												3.54		3.34

## Delay, Queue Length, and Level of Service

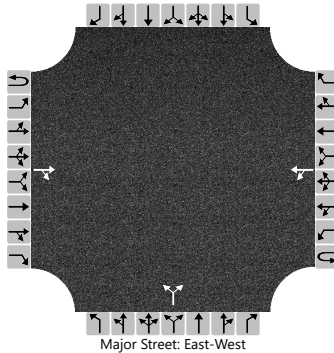
Flow Rate, v (veh/h)		16													46	
Capacity, c (veh/h)		953													277	
v/c Ratio		0.02													0.17	
95% Queue Length, Q <sub>95</sub> (veh)		0.1													0.6	
Control Delay (s/veh)		8.8													20.6	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)	0.4												20.6			
Approach LOS													C			

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Edgehill Rd & CR 646
Agency/Co.	DD	Jurisdiction	
Date Performed	4/5/2019	East/West Street	County Route 646
Analysis Year	2019	North/South Street	Edgehill Rd
Time Analyzed	Am Existing	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			638	17		5	603			45		7				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						5					54					
Capacity, c (veh/h)						906					188					
v/c Ratio						0.01					0.29					
95% Queue Length, Q <sub>95</sub> (veh)						0.0					1.1					
Control Delay (s/veh)						9.0					31.7					
Level of Service (LOS)						A					D					
Approach Delay (s/veh)					0.2				31.7							
Approach LOS									D							

# HCS7 Signalized Intersection Results Summary

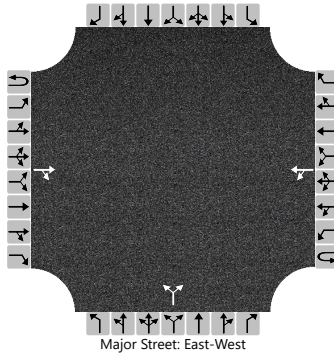
General Information						Intersection Information													
Agency						Duration, h		0.250											
Analyst				Analysis Date		5/16/2019		Area Type		Other									
Jurisdiction				Time Period				PHF		0.95									
Urban Street				Analysis Year		2019		Analysis Period		1> 7:00									
Intersection		Fairmount & Watchung		File Name		Fairmount & 646 Am Existing.xus													
Project Description		Am Existing																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h				48	507	14	69	490	88	40	402	87	62	204	53				
Signal Information																			
Cycle, s	90.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	On																
Force Mode	Fixed	Simult. Gap N/S	On																
				Green	48.0	30.0	0.0	0.0	0.0	0.0									
				Yellow	4.0	4.0	0.0	0.0	0.0	0.0									
				Red	2.0	2.0	0.0	0.0	0.0	0.0									
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase						2				6				8				4	
Case Number						6.0				6.0				6.0				6.0	
Phase Duration, s						54.0				54.0				36.0				36.0	
Change Period, ( Y+R c ), s						6.0				6.0				6.0				6.0	
Max Allow Headway ( MAH ), s						0.0				0.0				3.2				3.2	
Queue Clearance Time ( g s ), s														26.1				32.0	
Green Extension Time ( g e ), s						0.0				0.0				1.0				0.0	
Phase Call Probability														1.00				1.00	
Max Out Probability														0.78				1.00	
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h				51	548		73	608		42	515		65	271					
Adjusted Saturation Flow Rate ( s ), veh/h/ln				806	1847		852	1806		1100	1798		879	1789					
Queue Service Time ( g s ), s				4.2	17.7		5.6	21.3		2.8	24.1		5.9	10.7					
Cycle Queue Clearance Time ( g c ), s				25.6	17.7		23.3	21.3		13.5	24.1		30.0	10.7					
Green Ratio ( g/C )				0.53	0.53		0.53	0.53		0.33	0.33		0.33	0.33					
Capacity ( c ), veh/h				319	985		366	963		316	599		138	596					
Volume-to-Capacity Ratio ( X )				0.159	0.557		0.198	0.632		0.133	0.859		0.473	0.454					
Back of Queue ( Q ), ft/ln ( 50 th percentile)				22.4	186.7		30.6	222.3		18.7	298.8		37.4	111.3					
Back of Queue ( Q ), veh/ln ( 50 th percentile)				0.9	7.3		1.2	8.7		0.7	11.7		1.5	4.3					
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 1 ), s/veh				23.8	13.9		21.7	14.8		28.9	28.0		42.4	23.6					
Incremental Delay ( d 2 ), s/veh				1.1	2.3		1.2	3.1		0.1	11.5		0.9	0.2					
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				24.8	16.2		22.9	17.9		28.9	39.5		43.3	23.8					
Level of Service (LOS)				C	B		C	B		C	D		D	C					
Approach Delay, s/veh / LOS				16.9	B		18.5	B		38.7	D		27.6	C					
Intersection Delay, s/veh / LOS				24.6						C									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.89	B		1.89	B		1.92	B		1.92	B					
Bicycle LOS Score / LOS				1.48	A		1.61	B		1.41	A		1.04	A					

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Girad Ave & CR 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/15/2019	East/West Street	County Route 646
Analysis Year	2019	North/South Street	Girad Avenue
Time Analyzed	Am Existing	Peak Hour Factor	0.91
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			573	7		4	544			12		20				
Percent Heavy Vehicles (%)						4				4		4				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.14				6.44		6.24				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.24				3.54		3.34				

## Delay, Queue Length, and Level of Service

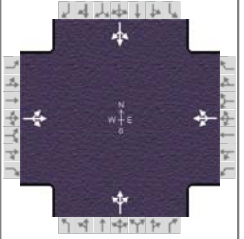
Flow Rate, v (veh/h)						4					35					
Capacity, c (veh/h)						937					304					
v/c Ratio						0.00					0.12					
95% Queue Length, Q <sub>95</sub> (veh)						0.0					0.4					
Control Delay (s/veh)						8.9					18.4					
Level of Service (LOS)						A					C					
Approach Delay (s/veh)					0.1				18.4							
Approach LOS									C							

# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019	Duration, h	0.250
Analyst		Area Type	Other	PHF	0.91
Jurisdiction		Analysis Year	2019	Analysis Period	1 > 7:00
Urban Street		File Name	Hillside & 646 Am Existing.xus		
Intersection	Hillside & 646				
Project Description	Am Existing				

## 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	87	541	16	10	498	45	45	85	10	26	30	55

## Signal Information

Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	64.0	16.0	0.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0		
				Red	1.0	1.0	0.0	0.0	0.0	0.0		

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		8.0		8.0		8.0
Phase Duration, s		69.0		69.0		21.0		21.0
Change Period, ( $Y+R_c$ ), s		5.0		5.0		5.0		5.0
Max Allow Headway ( $MAH$ ), s		0.0		0.0		3.2		3.2
Queue Clearance Time ( $g_s$ ), s						9.3		7.8
Green Extension Time ( $g_e$ ), s		0.0		0.0		0.3		0.3
Phase Call Probability						1.00		1.00
Max Out Probability						0.05		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	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h		708			608			154			122	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln		1616			1800			1654			1606	
Queue Service Time ( $g_s$ ), s		4.5			0.0			1.5			0.0	
Cycle Queue Clearance Time ( $g_c$ ), s		17.6			13.1			7.3			5.8	
Green Ratio ( $g/C$ )		0.71			0.71			0.18			0.18	
Capacity ( $c$ ), veh/h		1195			1321			347			335	
Volume-to-Capacity Ratio ( $X$ )		0.592			0.460			0.444			0.364	
Back of Queue ( $Q$ ), ft/ln ( 50 th percentile)		140.8			107.6			76.7			59.7	
Back of Queue ( $Q$ ), veh/ln ( 50 th percentile)		5.5			4.2			3.0			2.3	
Queue Storage Ratio ( $RQ$ ) ( 50 th percentile)		0.00			0.00			0.00			0.00	
Uniform Delay ( $d_1$ ), s/veh		6.2			5.6			33.3			32.8	
Incremental Delay ( $d_2$ ), s/veh		2.2			1.2			0.3			0.2	
Initial Queue Delay ( $d_3$ ), s/veh		0.0			0.0			0.0			0.0	
Control Delay ( $d$ ), s/veh		8.3			6.8			33.6			33.0	
Level of Service (LOS)		A			A			C			C	
Approach Delay, s/veh / LOS	8.3	A		6.8	A		33.6	C		33.0	C	
Intersection Delay, s/veh / LOS	12.1						B					

## Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	1.63	B		1.63	B		1.71	B		1.71	B	
Bicycle LOS Score / LOS	1.66	B		1.49	A		0.74	A		0.69	A	

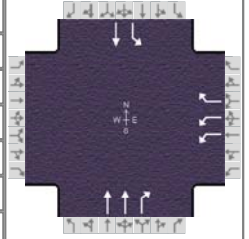
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019
Analyst		Time Period	
Jurisdiction		Analysis Year	2019
Urban Street		File Name	Morris & 649 Am Existing.xus
Intersection	Morris Ave & 649		
Project Description	Am Existing		

## Intersection Information







Duration, h	0.250
Area Type	Other
PHF	0.98
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				291		373		1046	265	316	723	

## Signal Information

Cycle, s	90.0	Reference Phase	2											
Offset, s	0	Reference Point	End	Green	12.0	45.0	18.0	0.0	0.0	0.0	1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.0	3.0	3.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0	0.0	0.0	5	6	7	8

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2	1	6
Case Number				9.0		7.3	1.0	4.0
Phase Duration, s				23.0		50.0	17.0	67.0
Change Period, ( $Y+R_c$ ), s				5.0		5.0	5.0	5.0
Max Allow Headway ( $MAH$ ), s				3.3		0.0	3.1	0.0
Queue Clearance Time ( $g_s$ ), s				20.0			9.0	
Green Extension Time ( $g_e$ ), s				0.0		0.0	0.2	0.0
Phase Call Probability				1.00			1.00	
Max Out Probability				1.00			1.00	

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	2	12		1	6	
Adjusted Flow Rate ( $v$ ), veh/h				297		381	1067	270		322	738	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln				1702			1752			1753	1841	
Queue Service Time ( $g_s$ ), s				6.9			19.7			7.0	18.7	
Cycle Queue Clearance Time ( $g_c$ ), s				6.9			19.7			7.0	18.7	
Green Ratio ( $g/C$ )				0.20			0.50			0.66	0.69	
Capacity ( $c$ ), veh/h				681			1752			460	1268	
Volume-to-Capacity Ratio ( $X$ )				0.436			0.609			0.701	0.582	
Back of Queue ( $Q$ ), ft/ln ( 50 th percentile)				71.3			195.8			77.5	165.8	
Back of Queue ( $Q$ ), veh/ln ( 50 th percentile)				2.8			7.6			3.0	6.4	
Queue Storage Ratio ( $RQ$ ) ( 50 th percentile)				0.00			0.00			0.00	0.00	
Uniform Delay ( $d_1$ ), s/veh				31.6			16.2			13.1	7.3	
Incremental Delay ( $d_2$ ), s/veh				0.2			1.6			4.0	2.0	
Initial Queue Delay ( $d_3$ ), s/veh				0.0			0.0			0.0	0.0	
Control Delay ( $d$ ), s/veh				31.7		0.0	17.8	0.0		17.1	9.2	
Level of Service (LOS)				C		A	B	A		B	A	
Approach Delay, s/veh / LOS	0.0			13.9		B	14.2		B	11.6		B
Intersection Delay, s/veh / LOS				13.2					B			

## Multimodal Results

	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

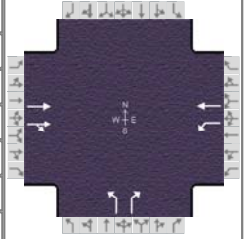


# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019	Duration, h	0.250
Analyst		Area Type	Other	PHF	0.94
Jurisdiction		Analysis Year	2019	Analysis Period	1 > 7:00
Urban Street		File Name	Passaic & 649 Am Existing.xus		
Intersection	Passaic Ave & 649				
Project Description	Am Existing				

## 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		839	87	395	610		54		486			

## Signal Information

Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	15.0	37.0	20.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	4.0	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		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		43.0	21.0	64.0		26.0		
Change Period, ( Y+R <sub>c</sub> ), s		6.0	6.0	6.0		6.0		
Max Allow Headway ( MAH ), s		0.0	3.1	0.0		3.3		
Queue Clearance Time ( g <sub>s</sub> ), s			13.3			22.0		
Green Extension Time ( g <sub>e</sub> ), s		0.0	0.2	0.0		0.0		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			1.00		

## Movement Group Results

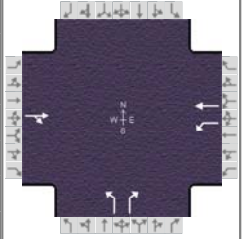
	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate ( v ), veh/h		501	484	420	649		57		517			
Adjusted Saturation Flow Rate ( s ), veh/h/ln		1841	1779	1753	1841		1753		1560			
Queue Service Time ( g <sub>s</sub> ), s		19.8	19.8	11.3	17.4		2.4		20.0			
Cycle Queue Clearance Time ( g <sub>c</sub> ), s		19.8	19.8	11.3	17.4		2.4		20.0			
Green Ratio ( g/C )		0.41	0.41	0.60	0.64		0.22		0.39			
Capacity ( c ), veh/h		757	732	480	1186		390		607			
Volume-to-Capacity Ratio ( X )		0.662	0.662	0.876	0.547		0.147		0.852			
Back of Queue ( Q ), ft/ln ( 50 th percentile)		230.6	216.8	152.1	164.7		25.2		289.4			
Back of Queue ( Q ), veh/ln ( 50 th percentile)		8.9	8.7	5.9	6.4		1.0		11.2			
Queue Storage Ratio ( RQ ) ( 50 th percentile)		0.00	0.00	0.00	0.00		0.00		0.00			
Uniform Delay ( d <sub>1</sub> ), s/veh		21.4	21.4	15.7	8.8		28.1		25.1			
Incremental Delay ( d <sub>2</sub> ), s/veh		4.5	4.7	16.0	1.8		0.1		10.7			
Initial Queue Delay ( d <sub>3</sub> ), s/veh		0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay ( d ), s/veh		26.0	26.1	31.7	10.6		28.2		35.9			
Level of Service ( LOS )		C	C	C	B		C		D			
Approach Delay, s/veh / LOS	26.0	C		18.9	B		35.1	D		0.0		
Intersection Delay, s/veh / LOS	25.1						C					

## Multimodal Results

	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	4/9/2019	Area Type	Other
Jurisdiction		Time Period		PHF	0.93
Urban Street		Analysis Year	2019	Analysis Period	1> 7:00
Intersection	Watchung Ave & River...	File Name	Watchung & River Am Ex.xus		
Project Description	Am Exisitng				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( $v$ ), veh/h		526	48	165	473		89		366			

Signal Information											
Cycle, s	90.0	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	No	Simult. Gap E/W	On	Green	8.0	42.0	26.0	0.0	0.0	0.0	
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	4.0	3.0	0.0	0.0	0.0	
				Red	0.0	2.0	2.0	0.0	0.0	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		48.0	11.0	59.0		31.0		
Change Period, ( $Y+R_c$ ), s		6.0	3.0	6.0		5.0		
Max Allow Headway ( $MAH$ ), s		0.0	3.1	0.0		3.3		
Queue Clearance Time ( $g_s$ ), s			6.3			23.6		
Green Extension Time ( $g_e$ ), s		0.0	0.1	0.0		0.3		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			1.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate ( $v$ ), veh/h		617		177	509		96		394			
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln		1813		1753	1841		1753		1560			
Queue Service Time ( $g_s$ ), s		24.8		4.3	14.1		3.7		21.6			
Cycle Queue Clearance Time ( $g_c$ ), s		24.8		4.3	14.1		3.7		21.6			
Green Ratio ( $g/C$ )		0.47		0.58	0.59		0.29		0.29			
Capacity ( $c$ ), veh/h		846		388	1084		506		451			
Volume-to-Capacity Ratio ( $X$ )		0.729		0.458	0.469		0.189		0.873			
Back of Queue ( $Q$ ), ft/ln ( 95 th percentile)		418.9		69.1	240		69.3		384.3			
Back of Queue ( $Q$ ), veh/ln ( 95 th percentile)		16.2		2.7	9.3		2.7		14.9			
Queue Storage Ratio ( $RQ$ ) ( 95 th percentile)		0.00		0.00	0.00		0.00		0.00			
Uniform Delay ( $d_1$ ), s/veh		19.4		14.1	10.5		24.1		30.4			
Incremental Delay ( $d_2$ ), s/veh		5.5		0.3	1.5		0.1		16.4			
Initial Queue Delay ( $d_3$ ), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay ( $d$ ), s/veh		24.9		14.4	12.0		24.1		46.8			
Level of Service (LOS)		C		B	B		C		D			
Approach Delay, s/veh / LOS	24.9	C		12.6	B		42.4	D		0.0		
Intersection Delay, s/veh / LOS	25.0						C					

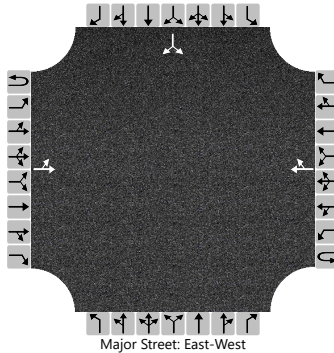
Multimodal Results	EB			WB			NB			SB		
Pedestrian LOS Score / LOS												
Bicycle LOS Score / LOS												

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Bridge St & 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/15/2019	East/West Street	CR 646
Analysis Year	2019	North/South Street	Bridge Street
Time Analyzed	Pm Existing	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		6	583				584	14						1		1
Percent Heavy Vehicles (%)		1												1		1
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.11												6.41		6.21
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.21												3.51		3.31

## Delay, Queue Length, and Level of Service

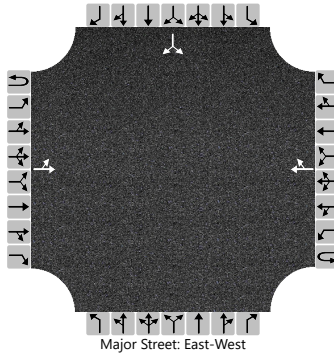
Flow Rate, v (veh/h)		6													2	
Capacity, c (veh/h)		973													287	
v/c Ratio		0.01													0.01	
95% Queue Length, Q <sub>95</sub> (veh)		0.0													0.0	
Control Delay (s/veh)		8.7													17.7	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)	0.2												17.7			
Approach LOS													C			

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Commerce St & Rt 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/16/2019	East/West Street	Route 646
Analysis Year	2019	North/South Street	Commerce Street
Time Analyzed	Pm Existing	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		11	622				589	12						36		30
Percent Heavy Vehicles (%)		1												1		1
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.11												6.41		6.21
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.21												3.51		3.31

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		11													69	
Capacity, c (veh/h)		960													250	
v/c Ratio		0.01													0.27	
95% Queue Length, Q <sub>95</sub> (veh)		0.0													1.1	
Control Delay (s/veh)		8.8													24.7	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)	0.3												24.7			
Approach LOS													C			

# HCS7 Two-Way Stop-Control Report

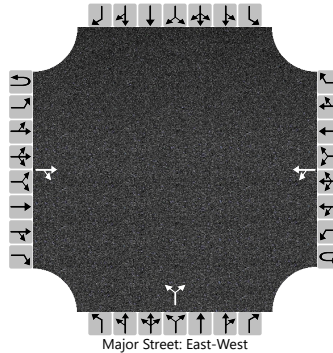
## General Information

Analyst	EIC
Agency/Co.	DD
Date Performed	4/5/2019
Analysis Year	2019
Time Analyzed	Pm Existing
Intersection Orientation	East-West
Project Description	

## Site Information

Intersection	Edgehill Rd & CR 646
Jurisdiction	
East/West Street	County Route 646
North/South Street	Edgehill Rd
Peak Hour Factor	0.96
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			620	33		3	592			7		4				
Percent Heavy Vehicles (%)						1				1		1				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type   Storage	Undivided															

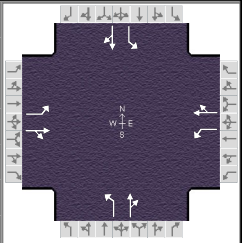
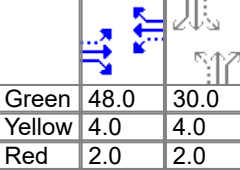
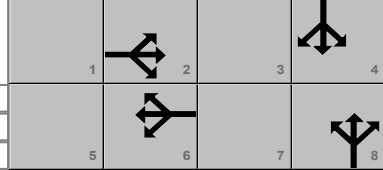
## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.11				6.41		6.21				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.21				3.51		3.31				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						3					11					
Capacity, c (veh/h)						917					233					
v/c Ratio						0.00					0.05					
95% Queue Length, Q <sub>95</sub> (veh)						0.0					0.2					
Control Delay (s/veh)						8.9					21.3					
Level of Service (LOS)						A					C					
Approach Delay (s/veh)					0.1				21.3							
Approach LOS									C							

# HCS7 Signalized Intersection Results Summary

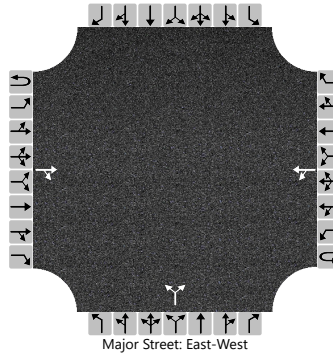
General Information						Intersection Information											
Agency						Duration, h		0.250									
Analyst				Analysis Date		5/16/2019		Area Type		Other							
Jurisdiction				Time Period				PHF		0.97							
Urban Street				Analysis Year		2019		Analysis Period		1> 7:00							
Intersection		Fairmount & Watchung		File Name		Fairmount & 646 Pm Existing.xus											
Project Description		Pm Existing															
Demand Information						EB			WB			NB			SB		
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h						49	507	55	53	494	54	26	240	54	89	290	59
Signal Information																	
Cycle, s	90.0	Reference Phase	2														
Offset, s	0	Reference Point	End														
Uncoordinated	No	Simult. Gap E/W	On														
Force Mode	Fixed	Simult. Gap N/S	On														
Green	48.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
Timer Results						EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase							2		6		8		4				
Case Number							6.0		6.0		6.0		6.0				
Phase Duration, s							54.0		54.0		36.0		36.0				
Change Period, ( Y+R c ), s							6.0		6.0		6.0		6.0				
Max Allow Headway ( MAH ), s							0.0		0.0		3.2		3.2				
Queue Clearance Time ( g s ), s											18.7		20.6				
Green Extension Time ( g e ), s							0.0		0.0		1.4		1.3				
Phase Call Probability											1.00		1.00				
Max Out Probability											0.04		0.08				
Movement Group Results						EB			WB			NB			SB		
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement						5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h						51	579		55	565		27	303		92	360	
Adjusted Saturation Flow Rate ( s ), veh/h/ln						852	1853		841	1852		1030	1825		1085	1830	
Queue Service Time ( g s ), s						3.8	19.1		4.2	18.4		2.0	12.0		6.6	14.7	
Cycle Queue Clearance Time ( g c ), s						22.2	19.1		23.4	18.4		16.7	12.0		18.6	14.7	
Green Ratio ( g/C )						0.53	0.53		0.53	0.53		0.33	0.33		0.33	0.33	
Capacity ( c ), veh/h						360	988		350	988		255	608		298	610	
Volume-to-Capacity Ratio ( X )						0.140	0.586		0.156	0.572		0.105	0.498		0.308	0.590	
Back of Queue ( Q ), ft/ln ( 50 th percentile)						20.6	199.3		22.7	191.8		12.3	125.1		43.1	157.3	
Back of Queue ( Q ), veh/ln ( 50 th percentile)						0.8	7.9		0.9	7.6		0.5	5.0		1.7	6.2	
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 1 ), s/veh						21.6	14.3		22.2	14.1		31.8	24.0		31.4	24.9	
Incremental Delay ( d 2 ), s/veh						0.8	2.5		0.9	2.4		0.1	0.2		0.2	1.0	
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						22.4	16.8		23.1	16.5		31.9	24.2		31.6	25.9	
Level of Service (LOS)						C	B		C	B		C	C		C	C	
Approach Delay, s/veh / LOS						17.3	B		17.1	B		24.8	C		27.1	C	
Intersection Delay, s/veh / LOS						20.6						C					
Multimodal Results						EB			WB			NB			SB		
Pedestrian LOS Score / LOS						1.89	B		1.89	B		1.92	B		1.92	B	
Bicycle LOS Score / LOS						1.53	B		1.51	B		1.03	A		1.23	A	

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Girad Ave & CR 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/15/2019	East/West Street	County Route 646
Analysis Year	2019	North/South Street	Girad Avenue
Time Analyzed	Pm Existing	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			580	4		17	600			2		16				
Percent Heavy Vehicles (%)						1				1		1				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.11				6.41		6.21				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.21				3.51		3.31				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						18					19					
Capacity, c (veh/h)						975					418					
v/c Ratio						0.02					0.04					
95% Queue Length, Q <sub>95</sub> (veh)						0.1					0.1					
Control Delay (s/veh)						8.8					14.0					
Level of Service (LOS)						A					B					
Approach Delay (s/veh)					0.5				14.0							
Approach LOS									B							



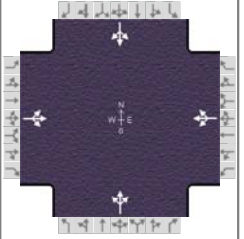
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019
Analyst		Time Period	
Jurisdiction		Analysis Year	2019
Urban Street		File Name	Hillside & 646 Pm Existing.xus
Intersection	Hillside & 646		
Project Description	Pm Existing		

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.95
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	56	551	20	11	523	51	15	38	12	28	88	55

## Signal Information

Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	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		2		6		8		4
Case Number		8.0		8.0		8.0		8.0
Phase Duration, s		69.0		69.0		21.0		21.0
Change Period, ( $Y+R_c$ ), s		5.0		5.0		5.0		5.0
Max Allow Headway ( $MAH$ ), s		0.0		0.0		3.2		3.2
Queue Clearance Time ( $g_s$ ), s						4.9		10.5
Green Extension Time ( $g_e$ ), s		0.0		0.0		0.4		0.2
Phase Call Probability						1.00		1.00
Max Out Probability						0.00		0.12

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h		660			616			68			180	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln		1740			1841			1714			1719	
Queue Service Time ( $g_s$ ), s		0.0			0.0			0.0			2.6	
Cycle Queue Clearance Time ( $g_c$ ), s		14.1			12.9			2.9			8.5	
Green Ratio ( $g/C$ )		0.71			0.71			0.18			0.18	
Capacity ( $c$ ), veh/h		1281			1350			354			352	
Volume-to-Capacity Ratio ( $X$ )		0.515			0.456			0.193			0.511	
Back of Queue ( $Q$ ), ft/ln ( 50 th percentile)		118.6			105.8			31.5			89.4	
Back of Queue ( $Q$ ), veh/ln ( 50 th percentile)		4.7			4.2			1.2			3.5	
Queue Storage Ratio ( $RQ$ ) ( 50 th percentile)		0.00			0.00			0.00			0.00	
Uniform Delay ( $d_1$ ), s/veh		5.8			5.6			31.6			33.9	
Incremental Delay ( $d_2$ ), s/veh		1.5			1.1			0.1			0.5	
Initial Queue Delay ( $d_3$ ), s/veh		0.0			0.0			0.0			0.0	
Control Delay ( $d$ ), s/veh		7.3			6.7			31.7			34.4	
Level of Service (LOS)		A			A			C			C	
Approach Delay, s/veh / LOS	7.3	A		6.7	A		31.7	C		34.4	C	
Intersection Delay, s/veh / LOS	11.4						B					

## Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	1.63	B		1.63	B		1.71	B		1.71	B	
Bicycle LOS Score / LOS	1.58	B		1.50	B		0.60	A		0.78	A	



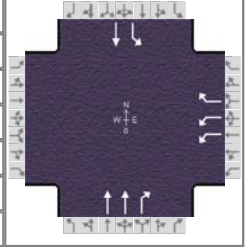
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019	Duration, h	0.250
Analyst		Time Period		Area Type	Other
Jurisdiction		Analysis Year	2019	PHF	0.98
Urban Street		File Name	Morris & 649 Pm Existing.xus	Analysis Period	1> 7:00
Intersection	Morris Ave & 649				
Project Description	Pm Existing				

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.98
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				303		331		852	295	275	985	

## Signal Information

Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	12.0	45.0	18.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	3.0	3.0	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		2	1	6
Case Number				9.0		7.3	1.0	4.0
Phase Duration, s				23.0		50.0	17.0	67.0
Change Period, ( Y+R <sub>c</sub> ), s				5.0		5.0	5.0	5.0
Max Allow Headway ( MAH ), s				3.3		0.0	3.1	0.0
Queue Clearance Time ( g <sub>s</sub> ), s				20.0			7.7	
Green Extension Time ( g <sub>e</sub> ), s				0.0		0.0	0.2	0.0
Phase Call Probability				1.00			1.00	
Max Out Probability				1.00			0.38	

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	2	12		1	6	
Adjusted Flow Rate ( v ), veh/h				309		338	869	301		281	1005	
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1743			1795			1795	1885	
Queue Service Time ( g <sub>s</sub> ), s				7.0			14.4			5.7	32.0	
Cycle Queue Clearance Time ( g <sub>c</sub> ), s				7.0			14.4			5.7	32.0	
Green Ratio ( g/C )				0.20			0.50			0.66	0.69	
Capacity ( c ), veh/h				697			1795			538	1299	
Volume-to-Capacity Ratio ( X )				0.443			0.484			0.522	0.774	
Back of Queue ( Q ), ft/ln ( 50 th percentile)				72.6			141.6			47.2	293.9	
Back of Queue ( Q ), veh/ln ( 50 th percentile)				2.9			5.6			1.9	11.7	
Queue Storage Ratio ( RQ ) ( 50 th percentile)				0.00			0.00			0.00	0.00	
Uniform Delay ( d <sub>1</sub> ), s/veh				31.6			14.8			9.0	9.3	
Incremental Delay ( d <sub>2</sub> ), s/veh				0.2			0.9			0.4	4.5	
Initial Queue Delay ( d <sub>3</sub> ), s/veh				0.0			0.0			0.0	0.0	
Control Delay ( d ), s/veh				31.8		0.0	15.8	0.0		9.4	13.9	
Level of Service ( LOS )				C		A	B	A		A	B	
Approach Delay, s/veh / LOS	0.0			15.2		B	11.7		B	12.9		B
Intersection Delay, s/veh / LOS				12.9						B		

## Multimodal Results

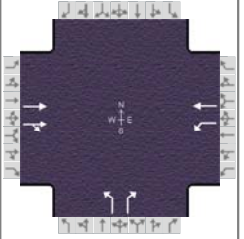
	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.31		B	2.15		B	2.09		B	0.66		A
Bicycle LOS Score / LOS						F	1.45		A	2.61		C

# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019	Duration, h	0.250
Analyst		Area Type	Other	PHF	0.95
Jurisdiction		Analysis Year	2019	Analysis Period	1 > 7:00
Urban Street		File Name	Passaic & 649 Pm Existing.xus		
Intersection	Passaic Ave & 649				
Project Description	Pm Existing				

## 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		716	92	526	765		58		439			

## Signal Information

Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	15.0	42.0	15.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	4.0	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		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		48.0	21.0	69.0		21.0		
Change Period, ( $Y+R_c$ ), s		6.0	6.0	6.0		6.0		
Max Allow Headway ( $MAH$ ), s		0.0	3.1	0.0		3.3		
Queue Clearance Time ( $g_s$ ), s			15.8			17.0		
Green Extension Time ( $g_e$ ), s		0.0	0.0	0.0		0.0		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			1.00		

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate ( $v$ ), veh/h		434	417	554	805		61		462			
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln		1885	1809	1795	1885		1795		1598			
Queue Service Time ( $g_s$ ), s		14.3	14.4	13.8	20.1		2.6		15.0			
Cycle Queue Clearance Time ( $g_c$ ), s		14.3	14.4	13.8	20.1		2.6		15.0			
Green Ratio ( $g/C$ )		0.47	0.47	0.66	0.70		0.17		0.33			
Capacity ( $c$ ), veh/h		880	844	580	1320		299		533			
Volume-to-Capacity Ratio ( $X$ )		0.493	0.493	0.955	0.610		0.204		0.868			
Back of Queue ( $Q$ ), ft/ln ( 50 th percentile)		157.3	150.4	233.6	174.5		28.5		272.8			
Back of Queue ( $Q$ ), veh/ln ( 50 th percentile)		6.2	6.0	9.3	6.9		1.1		10.8			
Queue Storage Ratio ( $RQ$ ) ( 50 th percentile)		0.00	0.00	0.00	0.00		0.00		0.00			
Uniform Delay ( $d_1$ ), s/veh		16.6	16.6	13.5	7.1		32.4		28.1			
Incremental Delay ( $d_2$ ), s/veh		2.0	2.1	26.2	2.1		0.1		13.7			
Initial Queue Delay ( $d_3$ ), s/veh		0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay ( $d$ ), s/veh		18.6	18.7	39.7	9.2		32.5		41.8			
Level of Service (LOS)		B	B	D	A		C		D			
Approach Delay, s/veh / LOS	18.6		B	21.6		C	40.7		D	0.0		
Intersection Delay, s/veh / LOS	24.3						C					

## Multimodal Results

	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

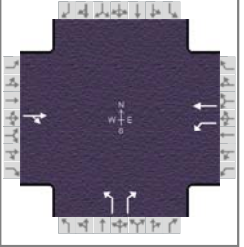
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	4/9/2019	Duration, h	0.250
Analyst		Time Period		Area Type	Other
Jurisdiction		Analysis Year	2019	PHF	0.97
Urban Street		File Name	Watchung & River Pm Ex.xus	Analysis Period	1> 7:00
Intersection	Watchung Ave & River...				
Project Description	Pm Exisitng				

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.97
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		591	66	270	543		59		208			

## Signal Information

Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	13.0	37.0	26.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	4.0	3.0	0.0	0.0	0.0		
				Red	0.0	2.0	2.0	0.0	0.0	0.0		

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		43.0	16.0	59.0		31.0		
Change Period, ( $Y+R_c$ ), s		6.0	3.0	6.0		5.0		
Max Allow Headway ( $MAH$ ), s		0.0	3.1	0.0		3.3		
Queue Clearance Time ( $g_s$ ), s			9.0			11.9		
Green Extension Time ( $g_e$ ), s		0.0	0.2	0.0		0.5		
Phase Call Probability			1.00			1.00		
Max Out Probability			0.46			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		2	12	1	6		3		18			
Adjusted Flow Rate ( $v$ ), veh/h		677		278	560		61		214			
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln		1852		1795	1885		1795		1598			
Queue Service Time ( $g_s$ ), s		30.6		7.0	15.6		2.2		9.9			
Cycle Queue Clearance Time ( $g_c$ ), s		30.6		7.0	15.6		2.2		9.9			
Green Ratio ( $g/C$ )		0.41		0.58	0.59		0.29		0.29			
Capacity ( $c$ ), veh/h		761		394	1110		519		462			
Volume-to-Capacity Ratio ( $X$ )		0.890		0.706	0.504		0.117		0.465			
Back of Queue ( $Q$ ), ft/ln ( 95 th percentile)		553.6		134.3	259		42.1		166.1			
Back of Queue ( $Q$ ), veh/ln ( 95 th percentile)		22.0		5.3	10.3		1.7		6.6			
Queue Storage Ratio ( $RQ$ ) ( 95 th percentile)		0.00		0.00	0.00		0.00		0.00			
Uniform Delay ( $d_1$ ), s/veh		24.6		17.3	10.8		23.6		26.3			
Incremental Delay ( $d_2$ ), s/veh		14.7		4.9	1.6		0.0		0.3			
Initial Queue Delay ( $d_3$ ), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay ( $d$ ), s/veh		39.3		22.2	12.5		23.6		26.6			
Level of Service (LOS)		D		C	B		C		C			
Approach Delay, s/veh / LOS	39.3	D		15.7	B		25.9	C		0.0		
Intersection Delay, s/veh / LOS	26.2						C					

## Multimodal Results

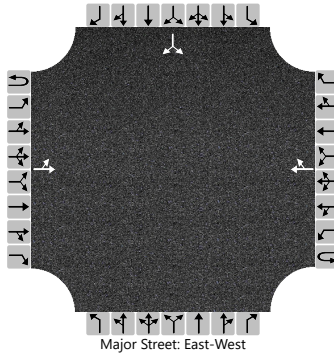
	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Bridge St & 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/15/2019	East/West Street	CR 646
Analysis Year	2019	North/South Street	Bridge Street
Time Analyzed	Am NoBuild	Peak Hour Factor	0.93
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		2	577				557	13						5		2
Percent Heavy Vehicles (%)		4												4		4
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.14												6.44		6.24
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.24												3.54		3.34

## Delay, Queue Length, and Level of Service

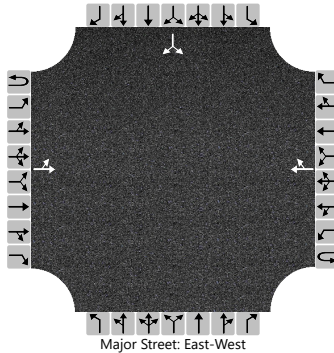
Flow Rate, v (veh/h)		2													8	
Capacity, c (veh/h)		957													234	
v/c Ratio		0.00													0.03	
95% Queue Length, Q <sub>95</sub> (veh)		0.0													0.1	
Control Delay (s/veh)		8.8													20.9	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)	0.1												20.9			
Approach LOS													C			

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Commerce St & Rt 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/16/2019	East/West Street	Route 646
Analysis Year	2019	North/South Street	Commerce Street
Time Analyzed	Am NoBuild	Peak Hour Factor	0.93
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		15	564				536	41						21		22
Percent Heavy Vehicles (%)		4												4		4
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.14												6.44		6.24
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.24												3.54		3.34

## Delay, Queue Length, and Level of Service

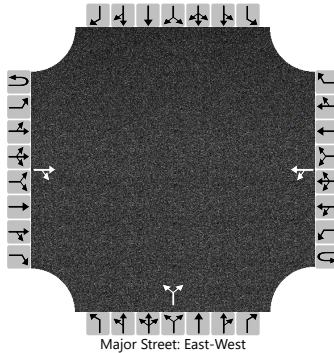
Flow Rate, v (veh/h)		16													46	
Capacity, c (veh/h)		951													275	
v/c Ratio		0.02													0.17	
95% Queue Length, Q <sub>95</sub> (veh)		0.1													0.6	
Control Delay (s/veh)		8.9													20.7	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)	0.5												20.7			
Approach LOS													C			

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Edgehill Rd & CR 646
Agency/Co.	DD	Jurisdiction	
Date Performed	4/5/2019	East/West Street	County Route 646
Analysis Year	2019	North/South Street	Edgehill Rd
Time Analyzed	Am NoBuild	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			643	17		5	614			46		7				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type   Storage	Undivided															

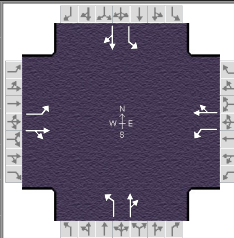
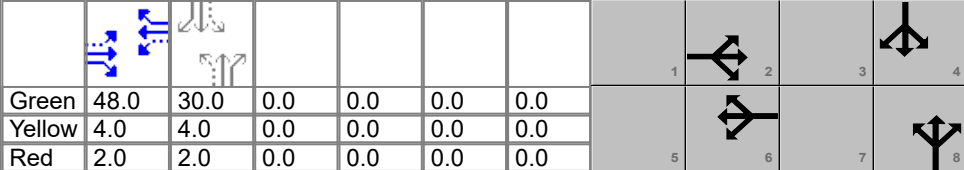
## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						5					55					
Capacity, c (veh/h)						902					184					
v/c Ratio						0.01					0.30					
95% Queue Length, Q <sub>95</sub> (veh)						0.0					1.2					
Control Delay (s/veh)						9.0					32.8					
Level of Service (LOS)						A					D					
Approach Delay (s/veh)					0.2				32.8							
Approach LOS									D							

# HCS7 Signalized Intersection Results Summary

General Information						Intersection Information															
Agency						Duration, h		0.250													
Analyst				Analysis Date		5/16/2019		Area Type		Other											
Jurisdiction				Time Period				PHF		0.95											
Urban Street				Analysis Year		2019		Analysis Period		1> 7:00											
Intersection		Fairmount & Watchung		File Name		Fairmount & 646 Am NoBuild.xus															
Project Description		Am NoBuild																			
Demand Information						EB			WB			NB			SB						
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h						49	511	14	70	499	90	41	410	88	61	208	54				
Signal Information																					
Cycle, s	90.0	Reference Phase	2																		
Offset, s	0	Reference Point	End																		
Uncoordinated	No	Simult. Gap E/W	On	Green	48.0					30.0	0.0	0.0	0.0	0.0							
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0					4.0	0.0	0.0	0.0	0.0							
						Red	2.0	2.0	0.0	0.0	0.0	0.0									
Timer Results						EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase								2				6				8				4	
Case Number								6.0				6.0				6.0				6.0	
Phase Duration, s								54.0				54.0				36.0				36.0	
Change Period, ( Y+R c ), s								6.0				6.0				6.0				6.0	
Max Allow Headway ( MAH ), s								0.0				0.0				3.2				3.2	
Queue Clearance Time ( g s ), s																26.7				32.0	
Green Extension Time ( g e ), s								0.0				0.0				0.9				0.0	
Phase Call Probability																1.00				1.00	
Max Out Probability																0.97				1.00	
Movement Group Results						EB			WB			NB			SB						
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement						5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h						52	553		74	620		43	524		64	276					
Adjusted Saturation Flow Rate ( s ), veh/h/ln						797	1847		849	1806		1095	1798		871	1789					
Queue Service Time ( g s ), s						4.4	17.9		5.7	22.0		2.9	24.7		5.3	10.9					
Cycle Queue Clearance Time ( g c ), s						26.4	17.9		23.6	22.0		13.8	24.7		30.0	10.9					
Green Ratio ( g/C )						0.53	0.53		0.53	0.53		0.33	0.33		0.33	0.33					
Capacity ( c ), veh/h						311	985		363	963		312	599		131	596					
Volume-to-Capacity Ratio ( X )						0.166	0.561		0.203	0.644		0.138	0.874		0.488	0.462					
Back of Queue ( Q ), ft/ln ( 50 th percentile)						23.2	188.7		31.2	229.4		19.3	312.2		36.9	113.8					
Back of Queue ( Q ), veh/ln ( 50 th percentile)						0.9	7.4		1.2	9.0		0.8	12.2		1.4	4.4					
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 1 ), s/veh						24.3	14.0		21.9	14.9		29.1	28.2		42.9	23.6					
Incremental Delay ( d 2 ), s/veh						1.1	2.3		1.3	3.3		0.1	13.1		1.0	0.2					
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						25.4	16.3		23.1	18.2		29.2	41.3		43.9	23.9					
Level of Service (LOS)						C	B		C	B		C	D		D	C					
Approach Delay, s/veh / LOS						17.1		B	18.8		B	40.4		D	27.6		C				
Intersection Delay, s/veh / LOS						25.2						C									
Multimodal Results						EB			WB			NB			SB						
Pedestrian LOS Score / LOS						1.89		B	1.89		B	1.92		B	1.92		B				
Bicycle LOS Score / LOS						1.48		A	1.63		B	1.42		A	1.05		A				

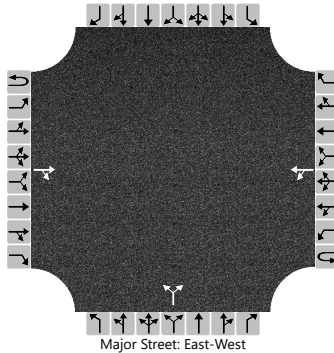


# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Girad Ave & CR 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/15/2019	East/West Street	County Route 646
Analysis Year	2019	North/South Street	Girad Avenue
Time Analyzed	Am NoBuild	Peak Hour Factor	0.91
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			574	7		4	554			12		20				
Percent Heavy Vehicles (%)						4				4		4				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.14				6.44		6.24				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.24				3.54		3.34				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						4					35					
Capacity, c (veh/h)						936					301					
v/c Ratio						0.00					0.12					
95% Queue Length, Q <sub>95</sub> (veh)						0.0					0.4					
Control Delay (s/veh)						8.9					18.5					
Level of Service (LOS)						A					C					
Approach Delay (s/veh)					0.1				18.5							
Approach LOS									C							



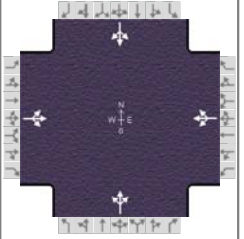
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019
Analyst		Time Period	
Jurisdiction		Analysis Year	2019
Urban Street		File Name	Hillside & 646 Am NoBuild.xus
Intersection	Hillside & 646		
Project Description	Am NoBuild		

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.91
Analysis Period	1> 7:00

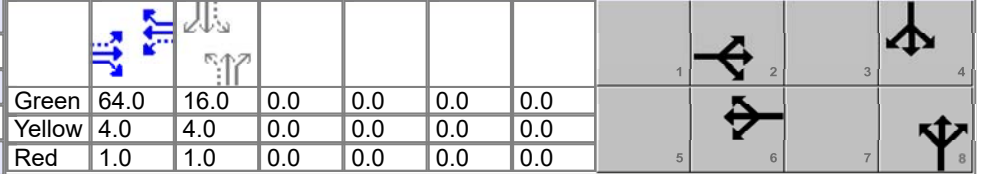


## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( $v$ ), veh/h	89	544	16	10	507	46	46	87	10	25	31	56

## Signal Information

Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	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		2		6		8		4
Case Number		8.0		8.0		8.0		8.0
Phase Duration, s		69.0		69.0		21.0		21.0
Change Period, ( $Y+R_c$ ), s		5.0		5.0		5.0		5.0
Max Allow Headway ( $MAH$ ), s		0.0		0.0		3.2		3.2
Queue Clearance Time ( $g_s$ ), s						9.5		7.8
Green Extension Time ( $g_e$ ), s		0.0		0.0		0.3		0.4
Phase Call Probability						1.00		1.00
Max Out Probability						0.06		0.02

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h		713			619			157			123	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln		1609			1800			1652			1611	
Queue Service Time ( $g_s$ ), s		4.5			0.0			1.6			0.0	
Cycle Queue Clearance Time ( $g_c$ ), s		18.0			13.5			7.5			5.8	
Green Ratio ( $g/C$ )		0.71			0.71			0.18			0.18	
Capacity ( $c$ ), veh/h		1190			1321			347			335	
Volume-to-Capacity Ratio ( $X$ )		0.600			0.468			0.453			0.367	
Back of Queue ( $Q$ ), ft/ln ( 50 th percentile)		142.8			110.6			78.6			60.3	
Back of Queue ( $Q$ ), veh/ln ( 50 th percentile)		5.5			4.3			3.0			2.3	
Queue Storage Ratio ( $RQ$ ) ( 50 th percentile)		0.00			0.00			0.00			0.00	
Uniform Delay ( $d_1$ ), s/veh		6.2			5.7			33.4			32.8	
Incremental Delay ( $d_2$ ), s/veh		2.2			1.2			0.3			0.2	
Initial Queue Delay ( $d_3$ ), s/veh		0.0			0.0			0.0			0.0	
Control Delay ( $d$ ), s/veh		8.4			6.9			33.7			33.1	
Level of Service (LOS)		A			A			C			C	
Approach Delay, s/veh / LOS	8.4	A		6.9	A		33.7	C		33.1	C	
Intersection Delay, s/veh / LOS	12.2						B					

## Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	1.63	B		1.63	B		1.71	B		1.71	B	
Bicycle LOS Score / LOS	1.66	B		1.51	B		0.75	A		0.69	A	

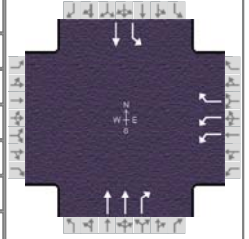
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019
Analyst		Time Period	
Jurisdiction		Analysis Year	2019
Urban Street		File Name	Morris & 649 Am NoBuild.xus
Intersection	Morris Ave & 649		
Project Description	Am NoBuild		

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.98
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				276		380		1064	270	322	719	

## Signal Information

Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	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		2	1	6
Case Number				9.0		7.3	1.0	4.0
Phase Duration, s				23.0		50.0	17.0	67.0
Change Period, ( Y+R <sub>c</sub> ), s				5.0		5.0	5.0	5.0
Max Allow Headway ( MAH ), s				3.3		0.0	3.1	0.0
Queue Clearance Time ( g <sub>s</sub> ), s				20.0			9.2	
Green Extension Time ( g <sub>e</sub> ), s				0.0		0.0	0.2	0.0
Phase Call Probability				1.00			1.00	
Max Out Probability				1.00			1.00	

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	2	12		1	6	
Adjusted Flow Rate ( v ), veh/h				282		388	1086	276		329	734	
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1702			1752			1753	1841	
Queue Service Time ( g <sub>s</sub> ), s				6.5			20.2			7.2	18.6	
Cycle Queue Clearance Time ( g <sub>c</sub> ), s				6.5			20.2			7.2	18.6	
Green Ratio ( g/C )				0.20			0.50			0.66	0.69	
Capacity ( c ), veh/h				681			1752			455	1268	
Volume-to-Capacity Ratio ( X )				0.414			0.620			0.723	0.579	
Back of Queue ( Q ), ft/ln ( 50 th percentile)				67.2			200.6			88.1	164.2	
Back of Queue ( Q ), veh/ln ( 50 th percentile)				2.6			7.8			3.4	6.4	
Queue Storage Ratio ( RQ ) ( 50 th percentile)				0.00			0.00			0.00	0.00	
Uniform Delay ( d <sub>1</sub> ), s/veh				31.4			16.3			13.5	7.2	
Incremental Delay ( d <sub>2</sub> ), s/veh				0.1			1.7			4.9	1.9	
Initial Queue Delay ( d <sub>3</sub> ), s/veh				0.0			0.0			0.0	0.0	
Control Delay ( d ), s/veh				31.5		0.0	18.0	0.0		18.4	9.2	
Level of Service ( LOS )				C		A	B	A		B	A	
Approach Delay, s/veh / LOS	0.0			13.3		B	14.3		B	12.0		B
Intersection Delay, s/veh / LOS				13.3					B			

## Multimodal Results

	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

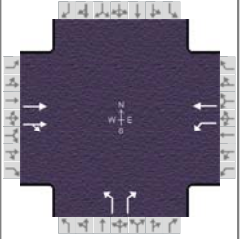
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019
Analyst		Time Period	
Jurisdiction		Analysis Year	2019
Urban Street		File Name	Passaic & 649 Am NoBuild.xus
Intersection	Passaic Ave & 649		
Project Description	Am NoBuild		

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.94
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		853	89	403	603		54		496			

## Signal Information

Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	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		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		43.0	21.0	64.0		26.0		
Change Period, ( $Y+R_c$ ), s		6.0	6.0	6.0		6.0		
Max Allow Headway ( $MAH$ ), s		0.0	3.1	0.0		3.3		
Queue Clearance Time ( $g_s$ ), s			13.9			22.0		
Green Extension Time ( $g_e$ ), s		0.0	0.1	0.0		0.0		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			1.00		

## Movement Group Results

Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate ( $\nu$ ), veh/h		510	493	429	641		57		528			
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln		1841	1779	1753	1841		1753		1560			
Queue Service Time ( $g_s$ ), s		20.2	20.3	11.9	17.1		2.4		20.0			
Cycle Queue Clearance Time ( $g_c$ ), s		20.2	20.3	11.9	17.1		2.4		20.0			
Green Ratio ( $g/C$ )		0.41	0.41	0.60	0.64		0.22		0.39			
Capacity ( $c$ ), veh/h		757	731	475	1186		390		607			
Volume-to-Capacity Ratio ( $X$ )		0.673	0.673	0.903	0.541		0.147		0.870			
Back of Queue ( $Q$ ), ft/ln ( 50 th percentile)		236.8	222.6	167.5	161.7		25.2		304			
Back of Queue ( $Q$ ), veh/ln ( 50 th percentile)		9.2	8.9	6.5	6.3		1.0		11.8			
Queue Storage Ratio ( $RQ$ ) ( 50 th percentile)		0.00	0.00	0.00	0.00		0.00		0.00			
Uniform Delay ( $d_1$ ), s/veh		21.6	21.6	16.3	8.7		28.1		25.4			
Incremental Delay ( $d_2$ ), s/veh		4.8	4.9	19.9	1.8		0.1		12.4			
Initial Queue Delay ( $d_3$ ), s/veh		0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay ( $d$ ), s/veh		26.3	26.5	36.2	10.5		28.2		37.8			
Level of Service (LOS)		C	C	D	B		C		D			
Approach Delay, s/veh / LOS	26.4	C		20.8	C		36.9	D		0.0		
Intersection Delay, s/veh / LOS	26.5						C					

## Multimodal Results

	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

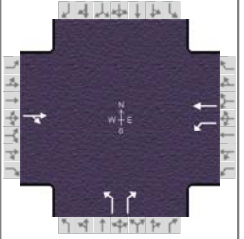
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	4/9/2019
Analyst		Time Period	
Jurisdiction		Analysis Year	2019
Urban Street		File Name	Watchung & River Am Nb.xus
Intersection	Watchung Ave & River...		
Project Description	Am NoBuild		

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.93
Analysis Period	1> 7:00



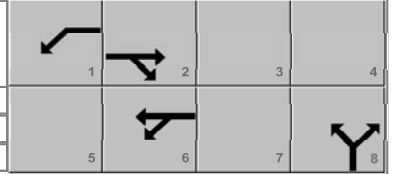
## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h		536	49	168	482		91		373			

## Signal Information

Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.0	42.0	26.0	0.0	0.0	0.0
Yellow	3.0	4.0	3.0	0.0	0.0	0.0
Red	0.0	2.0	2.0	0.0	0.0	0.0



## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		48.0	11.0	59.0		31.0		
Change Period, ( Y+R <sub>c</sub> ), s		6.0	3.0	6.0		5.0		
Max Allow Headway ( MAH ), s		0.0	3.1	0.0		3.3		
Queue Clearance Time ( g <sub>s</sub> ), s			6.4			24.2		
Green Extension Time ( g <sub>e</sub> ), s		0.0	0.1	0.0		0.3		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			1.00		

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate ( v ), veh/h		629		181	518		98		401			
Adjusted Saturation Flow Rate ( s ), veh/h/ln		1813		1753	1841		1753		1560			
Queue Service Time ( g <sub>s</sub> ), s		25.5		4.4	14.5		3.8		22.2			
Cycle Queue Clearance Time ( g <sub>c</sub> ), s		25.5		4.4	14.5		3.8		22.2			
Green Ratio ( g/C )		0.47		0.58	0.59		0.29		0.29			
Capacity ( c ), veh/h		846		380	1084		506		451			
Volume-to-Capacity Ratio ( X )		0.743		0.476	0.478		0.193		0.890			
Back of Queue ( Q ), ft/ln ( 95 th percentile)		431.1		70.7	245.4		71		400			
Back of Queue ( Q ), veh/ln ( 95 th percentile)		16.7		2.7	9.5		2.8		15.5			
Queue Storage Ratio ( RQ ) ( 95 th percentile)		0.00		0.00	0.00		0.00		0.00			
Uniform Delay ( d <sub>1</sub> ), s/veh		19.6		14.4	10.6		24.1		30.6			
Incremental Delay ( d <sub>2</sub> ), s/veh		5.9		0.3	1.5		0.1		18.7			
Initial Queue Delay ( d <sub>3</sub> ), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay ( d ), s/veh		25.5		14.7	12.1		24.2		49.3			
Level of Service ( LOS )		C		B	B		C		D			
Approach Delay, s/veh / LOS	25.5	C		12.8	B		44.4	D		0.0		
Intersection Delay, s/veh / LOS	25.8						C					

## Multimodal Results

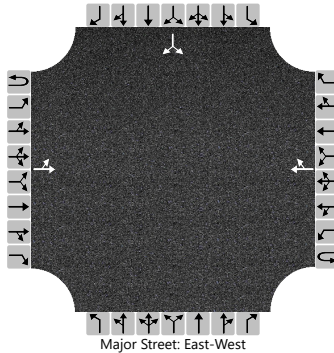
	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Bridge St & 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/15/2019	East/West Street	CR 646
Analysis Year	2019	North/South Street	Bridge Street
Time Analyzed	Pm NoBuild	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		6	594				587	14						1		1
Percent Heavy Vehicles (%)		1												1		1
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.11												6.41		6.21
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.21												3.51		3.31

## Delay, Queue Length, and Level of Service

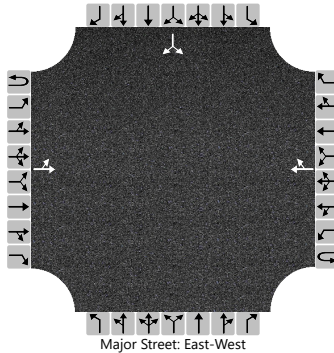
Flow Rate, v (veh/h)		6													2	
Capacity, c (veh/h)		971													282	
v/c Ratio		0.01													0.01	
95% Queue Length, Q <sub>95</sub> (veh)		0.0													0.0	
Control Delay (s/veh)		8.7													17.9	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)	0.2												17.9			
Approach LOS													C			

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Commerce St & Rt 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/16/2019	East/West Street	Route 646
Analysis Year	2019	North/South Street	Commerce Street
Time Analyzed	Pm NoBuild	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		11	633				597	12						37		31
Percent Heavy Vehicles (%)		1												1		1
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.11												6.41		6.21
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.21												3.51		3.31

## Delay, Queue Length, and Level of Service

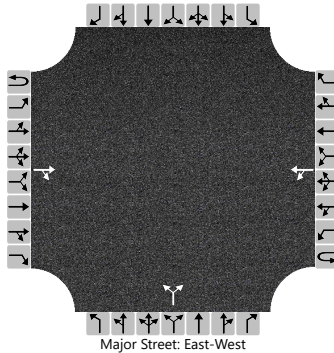
Flow Rate, v (veh/h)		11													71	
Capacity, c (veh/h)		954													245	
v/c Ratio		0.01													0.29	
95% Queue Length, Q <sub>95</sub> (veh)		0.0													1.2	
Control Delay (s/veh)		8.8													25.6	
Level of Service (LOS)		A													D	
Approach Delay (s/veh)	0.3												25.6			
Approach LOS													D			

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Edgehill Rd & CR 646
Agency/Co.	DD	Jurisdiction	
Date Performed	4/5/2019	East/West Street	County Route 646
Analysis Year	2019	North/South Street	Edgehill Rd
Time Analyzed	Pm NoBuild	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			631	34		3	597			7		4				
Percent Heavy Vehicles (%)						1				1		1				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.11				6.41		6.21				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.21				3.51		3.31				

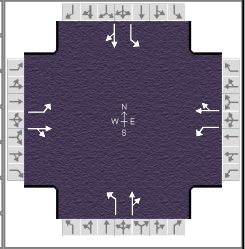
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						3					11					
Capacity, c (veh/h)						907					228					
v/c Ratio						0.00					0.05					
95% Queue Length, Q <sub>95</sub> (veh)						0.0					0.2					
Control Delay (s/veh)						9.0					21.6					
Level of Service (LOS)						A					C					
Approach Delay (s/veh)					0.1				21.6							
Approach LOS									C							



# HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	5/16/2019	Area Type	Other
Jurisdiction		Time Period		PHF	0.97
Urban Street		Analysis Year	2019	Analysis Period	1 > 7:00
Intersection	Fairmount & Watchung	File Name	Fairmount & 646 Pm NoBuild.xus		
Project Description	Pm NoBuild				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( $v$ ), veh/h	50	516	56	54	499	53	27	245	55	91	296	60

Signal Information											
Cycle, s	90.0	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	No	Simult. Gap E/W	On	Green	48.0	30.0	0.0	0.0	0.0	0.0	
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
				Red	2.0	2.0	0.0	0.0	0.0	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		54.0		54.0		36.0		36.0
Change Period, ( $Y+R_c$ ), s		6.0		6.0		6.0		6.0
Max Allow Headway ( $MAH$ ), s		0.0		0.0		3.2		3.2
Queue Clearance Time ( $g_s$ ), s						19.2		21.1
Green Extension Time ( $g_e$ ), s		0.0		0.0		1.4		1.3
Phase Call Probability						1.00		1.00
Max Out Probability						0.05		0.10

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h	52	590		56	569		28	309		94	367	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	849	1853		833	1853		1023	1825		1079	1830	
Queue Service Time ( $g_s$ ), s	3.9	19.6		4.4	18.6		2.1	12.2		6.9	15.1	
Cycle Queue Clearance Time ( $g_c$ ), s	22.5	19.6		24.0	18.6		17.2	12.2		19.1	15.1	
Green Ratio ( $g/C$ )	0.53	0.53		0.53	0.53		0.33	0.33		0.33	0.33	
Capacity ( $c$ ), veh/h	357	988		343	988		250	608		293	610	
Volume-to-Capacity Ratio ( $X$ )	0.144	0.597		0.162	0.576		0.111	0.508		0.320	0.602	
Back of Queue ( $Q$ ), ft/ln ( 50 th percentile)	21.1	204.5		23.5	193.8		12.9	128.3		44.4	161.8	
Back of Queue ( $Q$ ), veh/ln ( 50 th percentile)	0.8	8.1		0.9	7.7		0.5	5.1		1.8	6.4	
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 ( $d_1$ ), s/veh	21.7	14.4		22.6	14.1		32.2	24.1		31.8	25.0	
Incremental Delay ( $d_2$ ), s/veh	0.8	2.7		1.0	2.4		0.1	0.3		0.2	1.2	
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	22.6	17.0		23.6	16.6		32.2	24.4		32.0	26.2	
Level of Service (LOS)	C	B		C	B		C	C		C	C	
Approach Delay, s/veh / LOS	17.5	B		17.2	B		25.0	C		27.4	C	
Intersection Delay, s/veh / LOS	20.8						C					

Multimodal Results	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	1.89	B		1.89	B		1.92	B		1.92	B	
Bicycle LOS Score / LOS	1.55	B		1.52	B		1.04	A		1.25	A	

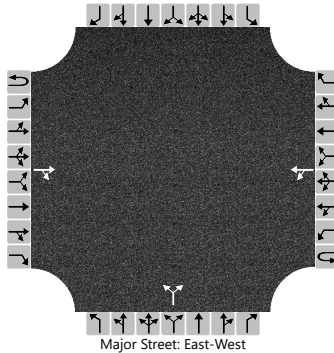


# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Girad Ave & CR 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/15/2019	East/West Street	County Route 646
Analysis Year	2019	North/South Street	Girad Avenue
Time Analyzed	Pm NoBuild	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			591	4		17	603			2		16				
Percent Heavy Vehicles (%)						1				1		1				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways


Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.11				6.41		6.21				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.21				3.51		3.31				

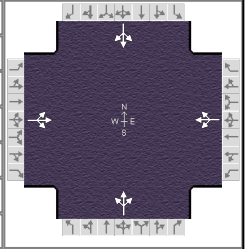
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						18					19					
Capacity, c (veh/h)						966					411					
v/c Ratio						0.02					0.05					
95% Queue Length, Q <sub>95</sub> (veh)						0.1					0.1					
Control Delay (s/veh)						8.8					14.2					
Level of Service (LOS)						A					B					
Approach Delay (s/veh)					0.5				14.2							
Approach LOS									B							

# HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	5/16/2019	Area Type	Other
Jurisdiction		Time Period		PHF	0.95
Urban Street		Analysis Year	2019	Analysis Period	1 > 7:00
Intersection	Hillside & 646	File Name	Hillside & 646 Pm NoBuild.xus		
Project Description	Pm NoBuild				





Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( $v$ ), veh/h	57	591	20	11	526	50	15	39	12	29	90	56

Signal Information											
Cycle, s	90.0	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	No	Simult. Gap E/W	On	Green	64.0	16.0	0.0	0.0	0.0	0.0	
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
				Red	1.0	1.0	0.0	0.0	0.0	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		8.0		8.0		8.0
Phase Duration, s		69.0		69.0		21.0		21.0
Change Period, ( $Y+R_c$ ), s		5.0		5.0		5.0		5.0
Max Allow Headway ( $MAH$ ), s		0.0		0.0		3.2		3.2
Queue Clearance Time ( $g_s$ ), s						4.9		10.7
Green Extension Time ( $g_e$ ), s		0.0		0.0		0.4		0.2
Phase Call Probability						1.00		1.00
Max Out Probability						0.00		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	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h		703			618			69			184	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln		1745			1840			1717			1718	
Queue Service Time ( $g_s$ ), s		0.0			0.0			0.0			3.0	
Cycle Queue Clearance Time ( $g_c$ ), s		15.6			13.0			2.9			8.7	
Green Ratio ( $g/C$ )		0.71			0.71			0.18			0.18	
Capacity ( $c$ ), veh/h		1284			1349			354			352	
Volume-to-Capacity Ratio ( $X$ )		0.548			0.458			0.196			0.523	
Back of Queue ( $Q$ ), ft/ln ( 50 th percentile)		131.3			106.2			32			92.1	
Back of Queue ( $Q$ ), veh/ln ( 50 th percentile)		5.2			4.2			1.3			3.7	
Queue Storage Ratio ( $RQ$ ) ( 50 th percentile)		0.00			0.00			0.00			0.00	
Uniform Delay ( $d_1$ ), s/veh		6.0			5.6			31.6			34.0	
Incremental Delay ( $d_2$ ), s/veh		1.7			1.1			0.1			0.7	
Initial Queue Delay ( $d_3$ ), s/veh		0.0			0.0			0.0			0.0	
Control Delay ( $d$ ), s/veh		7.7			6.8			31.7			34.6	
Level of Service (LOS)		A			A			C			C	
Approach Delay, s/veh / LOS	7.7	A		6.8	A		31.7	C		34.6	C	
Intersection Delay, s/veh / LOS	11.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.63	B	1.63	B	1.71	B	1.71	B
Bicycle LOS Score / LOS	1.65	B	1.51	B	0.60	A	0.79	A

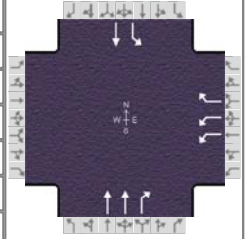
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019
Analyst		Time Period	
Jurisdiction		Analysis Year	2019
Urban Street		File Name	Morris & 649 Pm NoBuild.xus
Intersection	Morris Ave & 649		
Project Description	Pm NoBuild		

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.98
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				308		338		853	300	281	1002	

## Signal Information

Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	12.0	45.0	18.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	3.0	3.0	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		2	1	6
Case Number				9.0		7.3	1.0	4.0
Phase Duration, s				23.0		50.0	17.0	67.0
Change Period, ( Y+R <sub>c</sub> ), s				5.0		5.0	5.0	5.0
Max Allow Headway ( MAH ), s				3.3		0.0	3.1	0.0
Queue Clearance Time ( g <sub>s</sub> ), s				20.0			7.9	
Green Extension Time ( g <sub>e</sub> ), s				0.0		0.0	0.2	0.0
Phase Call Probability				1.00			1.00	
Max Out Probability				1.00			0.44	

## Movement Group Results

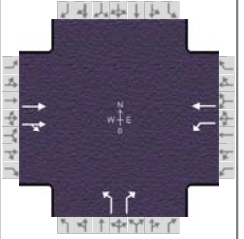
	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	2	12		1	6	
Adjusted Flow Rate ( v ), veh/h				314		345	870	306		287	1022	
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1743			1795			1795	1885	
Queue Service Time ( g <sub>s</sub> ), s				7.1			14.4			5.9	33.2	
Cycle Queue Clearance Time ( g <sub>c</sub> ), s				7.1			14.4			5.9	33.2	
Green Ratio ( g/C )				0.20			0.50			0.66	0.69	
Capacity ( c ), veh/h				697			1795			537	1299	
Volume-to-Capacity Ratio ( X )				0.451			0.485			0.534	0.787	
Back of Queue ( Q ), ft/ln ( 50 th percentile)				73.9			141.8			48.8	307	
Back of Queue ( Q ), veh/ln ( 50 th percentile)				2.9			5.6			1.9	12.2	
Queue Storage Ratio ( RQ ) ( 50 th percentile)				0.00			0.00			0.00	0.00	
Uniform Delay ( d <sub>1</sub> ), s/veh				31.7			14.9			9.1	9.5	
Incremental Delay ( d <sub>2</sub> ), s/veh				0.2			0.9			0.5	4.9	
Initial Queue Delay ( d <sub>3</sub> ), s/veh				0.0			0.0			0.0	0.0	
Control Delay ( d ), s/veh				31.8		0.0	15.8	0.0		9.6	14.4	
Level of Service ( LOS )				C		A	B	A		A	B	
Approach Delay, s/veh / LOS	0.0			15.2		B	11.7		B	13.3		B
Intersection Delay, s/veh / LOS				13.1						B		

## Multimodal Results

	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	5/16/2019	Area Type	Other
Jurisdiction		Time Period		PHF	0.95
Urban Street		Analysis Year	2019	Analysis Period	1> 7:00
Intersection	Passaic Ave & 649	File Name	Passaic & 649 Pm NoBuild.xus		
Project Description	Pm NoBuild				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( $v$ ), veh/h		713	93	537	777		59		448			

Signal Information											
Cycle, s	90.0	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	No	Simult. Gap E/W	On	Green	15.0	42.0	15.0	0.0	0.0	0.0	
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	4.0	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		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		48.0	21.0	69.0		21.0		
Change Period, ( $Y+R_c$ ), s		6.0	6.0	6.0		6.0		
Max Allow Headway ( $MAH$ ), s		0.0	3.1	0.0		3.3		
Queue Clearance Time ( $g_s$ ), s			16.2			17.0		
Green Extension Time ( $g_e$ ), s		0.0	0.0	0.0		0.0		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			1.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate ( $v$ ), veh/h		433	416	565	818		62		472			
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln		1885	1808	1795	1885		1795		1598			
Queue Service Time ( $g_s$ ), s		14.3	14.3	14.2	20.7		2.7		15.0			
Cycle Queue Clearance Time ( $g_c$ ), s		14.3	14.3	14.2	20.7		2.7		15.0			
Green Ratio ( $g/C$ )		0.47	0.47	0.66	0.70		0.17		0.33			
Capacity ( $c$ ), veh/h		880	844	581	1320		299		533			
Volume-to-Capacity Ratio ( $X$ )		0.492	0.492	0.974	0.620		0.208		0.886			
Back of Queue ( $Q$ ), ft/ln ( 50 th percentile)		156.6	149.7	253.7	180		29		287.3			
Back of Queue ( $Q$ ), veh/ln ( 50 th percentile)		6.2	6.0	10.1	7.1		1.1		11.4			
Queue Storage Ratio ( $RQ$ ) ( 50 th percentile)		0.00	0.00	0.00	0.00		0.00		0.00			
Uniform Delay ( $d_1$ ), s/veh		16.6	16.6	13.6	7.2		32.4		28.4			
Incremental Delay ( $d_2$ ), s/veh		2.0	2.1	30.5	2.2		0.1		15.8			
Initial Queue Delay ( $d_3$ ), s/veh		0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay ( $d$ ), s/veh		18.6	18.7	44.1	9.3		32.5		44.2			
Level of Service (LOS)		B	B	D	A		C		D			
Approach Delay, s/veh / LOS	18.6	B		23.6	C		42.8	D		0.0		
Intersection Delay, s/veh / LOS	25.8						C					

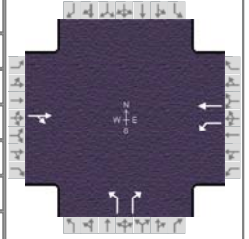
Multimodal Results	EB			WB			NB			SB		
Pedestrian LOS Score / LOS												
Bicycle LOS Score / LOS												

# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	4/9/2019	Duration, h	0.250
Analyst		Time Period		Area Type	Other
Jurisdiction		Analysis Year	2019	PHF	0.97
Urban Street		File Name	Watchung & River Pm Nb.xus	Analysis Period	1 > 7:00
Intersection	Watchung Ave & River...				
Project Description	Pm NoBuild				

## 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		593	67	274	552		56		204			

## Signal Information

Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	13.0	37.0	26.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	4.0	3.0	0.0	0.0	0.0		
				Red	0.0	2.0	2.0	0.0	0.0	0.0		

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		43.0	16.0	59.0		31.0		
Change Period, ( Y+R <sub>c</sub> ), s		6.0	3.0	6.0		5.0		
Max Allow Headway ( MAH ), s		0.0	3.1	0.0		3.3		
Queue Clearance Time ( g <sub>s</sub> ), s			9.1			11.7		
Green Extension Time ( g <sub>e</sub> ), s		0.0	0.2	0.0		0.5		
Phase Call Probability			1.00			1.00		
Max Out Probability			0.52			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		2	12	1	6		3		18			
Adjusted Flow Rate ( v ), veh/h		680		282	569		58		210			
Adjusted Saturation Flow Rate ( s ), veh/h/ln		1851		1795	1885		1795		1598			
Queue Service Time ( g <sub>s</sub> ), s		30.8		7.1	16.0		2.1		9.7			
Cycle Queue Clearance Time ( g <sub>c</sub> ), s		30.8		7.1	16.0		2.1		9.7			
Green Ratio ( g/C )		0.41		0.58	0.59		0.29		0.29			
Capacity ( c ), veh/h		761		392	1110		519		462			
Volume-to-Capacity Ratio ( X )		0.894		0.720	0.513		0.111		0.456			
Back of Queue ( Q ), ft/ln ( 95 th percentile)		558.6		139.3	264.3		39.9		162.6			
Back of Queue ( Q ), veh/ln ( 95 th percentile)		22.2		5.5	10.5		1.6		6.5			
Queue Storage Ratio ( RQ ) ( 95 th percentile)		0.00		0.00	0.00		0.00		0.00			
Uniform Delay ( d <sub>1</sub> ), s/veh		24.7		17.4	10.9		23.5		26.2			
Incremental Delay ( d <sub>2</sub> ), s/veh		15.1		5.5	1.7		0.0		0.3			
Initial Queue Delay ( d <sub>3</sub> ), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay ( d ), s/veh		39.8		22.9	12.6		23.5		26.5			
Level of Service ( LOS )		D		C	B		C		C			
Approach Delay, s/veh / LOS	39.8	D		16.0	B		25.8	C		0.0		
Intersection Delay, s/veh / LOS	26.5						C					

## Multimodal Results

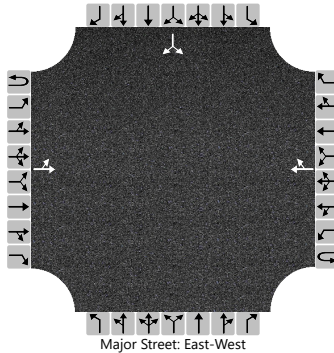
	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Bridge St & 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/15/2019	East/West Street	CR 646
Analysis Year	2019	North/South Street	Bridge Street
Time Analyzed	Am Build	Peak Hour Factor	0.93
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		2	581				551	13						5		2
Percent Heavy Vehicles (%)		4												4		4
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.14												6.44		6.24
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.24												3.54		3.34

## Delay, Queue Length, and Level of Service

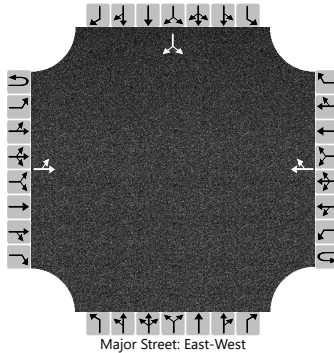
Flow Rate, v (veh/h)		2													8	
Capacity, c (veh/h)		962													235	
v/c Ratio		0.00													0.03	
95% Queue Length, Q <sub>95</sub> (veh)		0.0													0.1	
Control Delay (s/veh)		8.8													20.8	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)	0.1												20.8			
Approach LOS													C			

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Commerce St & Rt 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/16/2019	East/West Street	Route 646
Analysis Year	2019	North/South Street	Commerce Street
Time Analyzed	Am Build	Peak Hour Factor	0.93
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		15	568				550	41						21		22
Percent Heavy Vehicles (%)		4												4		4
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.14												6.44		6.24
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.24												3.54		3.34

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		16													46	
Capacity, c (veh/h)		938													268	
v/c Ratio		0.02													0.17	
95% Queue Length, Q <sub>95</sub> (veh)		0.1													0.6	
Control Delay (s/veh)		8.9													21.2	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)	0.5												21.2			
Approach LOS													C			

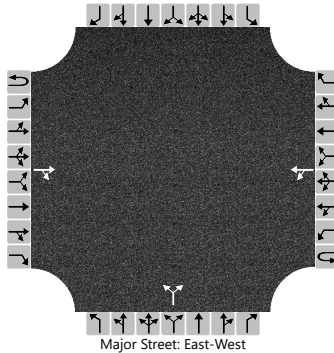


# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Edgehill Rd & CR 646
Agency/Co.	DD	Jurisdiction	
Date Performed	4/5/2019	East/West Street	County Route 646
Analysis Year	2019	North/South Street	Edgehill Rd
Time Analyzed	Am Build	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			646	17		5	626			46		7				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

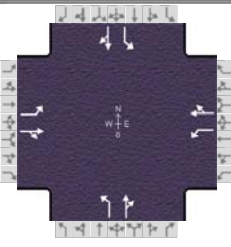
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

## Delay, Queue Length, and Level of Service

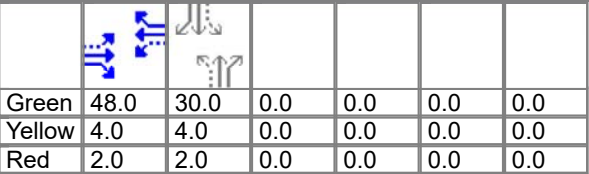
Flow Rate, v (veh/h)						5					55					
Capacity, c (veh/h)						899					180					
v/c Ratio						0.01					0.31					
95% Queue Length, Q <sub>95</sub> (veh)						0.0					1.2					
Control Delay (s/veh)						9.0					33.6					
Level of Service (LOS)						A					D					
Approach Delay (s/veh)					0.2				33.6							
Approach LOS									D							



# HCS7 Signalized Intersection Results Summary

General Information					Intersection Information		
Agency					Duration, h	0.250	
Analyst		Analysis Date	5/16/2019	Area Type	Other		
Jurisdiction		Time Period		PHF	0.95		
Urban Street		Analysis Year	2019	Analysis Period	1> 7:00		
Intersection	Fairmount & Watchung	File Name	Fairmount & 646 Am Build.xus				
Project Description	Am Build						

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	49	513	14	72	507	92	41	410	89	61	208	54

Signal Information											
Cycle, s	90.0	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	No	Simult. Gap E/W	On								
Force Mode	Fixed	Simult. Gap N/S	On	Green	48.0	30.0	0.0	0.0	0.0	0.0	
				Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
				Red	2.0	2.0	0.0	0.0	0.0	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		54.0		54.0		36.0		36.0
Change Period, ( Y+R <sub>c</sub> ), s		6.0		6.0		6.0		6.0
Max Allow Headway ( MAH ), s		0.0		0.0		3.2		3.2
Queue Clearance Time ( g <sub>s</sub> ), s						26.8		32.0
Green Extension Time ( g <sub>e</sub> ), s		0.0		0.0		0.9		0.0
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h	52	555		76	631		43	525		64	276	
Adjusted Saturation Flow Rate ( s ), veh/h/ln	790	1847		847	1806		1095	1798		870	1789	
Queue Service Time ( g <sub>s</sub> ), s	4.5	18.0		5.9	22.5		2.9	24.8		5.2	10.9	
Cycle Queue Clearance Time ( g <sub>c</sub> ), s	27.0	18.0		23.9	22.5		13.8	24.8		30.0	10.9	
Green Ratio ( g/C )	0.53	0.53		0.53	0.53		0.33	0.33		0.33	0.33	
Capacity ( c ), veh/h	303	985		362	963		312	599		131	596	
Volume-to-Capacity Ratio ( X )	0.170	0.563		0.209	0.655		0.138	0.876		0.492	0.462	
Back of Queue ( Q ), ft/ln ( 50 th percentile)	23.6	189.9		32.3	235.8		19.3	314		36.9	113.8	
Back of Queue ( Q ), veh/ln ( 50 th percentile)	0.9	7.4		1.3	9.2		0.8	12.3		1.4	4.4	
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	24.8	14.0		22.0	15.1		29.1	28.3		42.9	23.6	
Incremental Delay ( d <sub>2</sub> ), s/veh	1.2	2.3		1.3	3.5		0.1	13.3		1.1	0.2	
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	26.0	16.3		23.3	18.5		29.2	41.5		44.0	23.9	
Level of Service ( LOS )	C	B		C	B		C	D		D	C	
Approach Delay, s/veh / LOS	17.2	B		19.0	B		40.6	D		27.7	C	
Intersection Delay, s/veh / LOS	25.4						C					

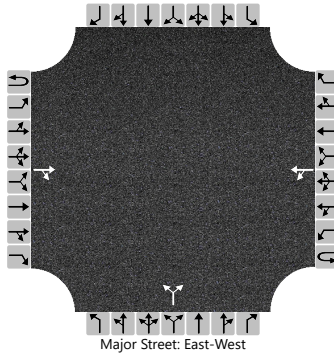
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.89	B	1.89	B	1.92	B	1.92	B
Bicycle LOS Score / LOS	1.49	A	1.65	B	1.43	A	1.05	A

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Girad Ave & CR 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/15/2019	East/West Street	County Route 646
Analysis Year	2019	North/South Street	Girad Avenue
Time Analyzed	Am Build	Peak Hour Factor	0.91
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			578	7		4	568			12		20				
Percent Heavy Vehicles (%)						4				4		4				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.14				6.44		6.24				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.24				3.54		3.34				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						4					35					
Capacity, c (veh/h)						932					295					
v/c Ratio						0.00					0.12					
95% Queue Length, Q <sub>95</sub> (veh)						0.0					0.4					
Control Delay (s/veh)						8.9					18.8					
Level of Service (LOS)						A					C					
Approach Delay (s/veh)					0.1				18.8							
Approach LOS									C							

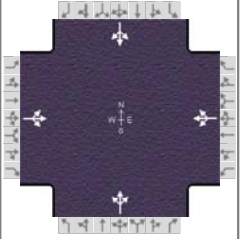
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019
Analyst		Time Period	
Jurisdiction		Analysis Year	2019
Urban Street		File Name	Hillside & 646 Am Build.xus
Intersection	Hillside & 646		
Project Description	Am Build		

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.91
Analysis Period	1> 7:00

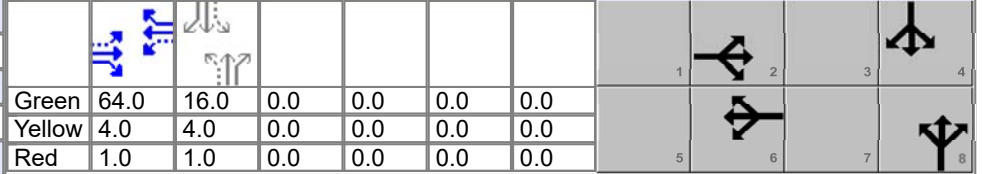


## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	89	547	16	10	519	48	46	87	10	26	51	56

## Signal Information

Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	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		2		6		8		4
Case Number		8.0		8.0		8.0		8.0
Phase Duration, s		69.0		69.0		21.0		21.0
Change Period, ( Y+R <sub>c</sub> ), s		5.0		5.0		5.0		5.0
Max Allow Headway ( MAH ), s		0.0		0.0		3.2		3.2
Queue Clearance Time ( g <sub>s</sub> ), s						9.5		8.9
Green Extension Time ( g <sub>e</sub> ), s		0.0		0.0		0.3		0.4
Phase Call Probability						1.00		1.00
Max Out Probability						0.07		0.04

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h		716			634			157			146	
Adjusted Saturation Flow Rate ( s ), veh/h/ln		1605			1800			1643			1640	
Queue Service Time ( g <sub>s</sub> ), s		4.2			0.0			0.6			0.0	
Cycle Queue Clearance Time ( g <sub>c</sub> ), s		18.2			14.0			7.5			6.9	
Green Ratio ( g/C )		0.71			0.71			0.18			0.18	
Capacity ( c ), veh/h		1187			1320			345			339	
Volume-to-Capacity Ratio ( X )		0.604			0.480			0.455			0.431	
Back of Queue ( Q ), ft/ln ( 50 th percentile)		144.2			115			78.6			72.6	
Back of Queue ( Q ), veh/ln ( 50 th percentile)		5.6			4.5			3.0			2.8	
Queue Storage Ratio ( RQ ) ( 50 th percentile)		0.00			0.00			0.00			0.00	
Uniform Delay ( d <sub>1</sub> ), s/veh		6.2			5.8			33.4			33.3	
Incremental Delay ( d <sub>2</sub> ), s/veh		2.3			1.3			0.3			0.3	
Initial Queue Delay ( d <sub>3</sub> ), s/veh		0.0			0.0			0.0			0.0	
Control Delay ( d ), s/veh		8.5			7.0			33.7			33.6	
Level of Service ( LOS )		A			A			C			C	
Approach Delay, s/veh / LOS	8.5	A		7.0	A		33.7	C		33.6	C	
Intersection Delay, s/veh / LOS	12.6						B					

## Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	1.63	B		1.63	B		1.71	B		1.71	B	
Bicycle LOS Score / LOS	1.67	B		1.53	B		0.75	A		0.73	A	

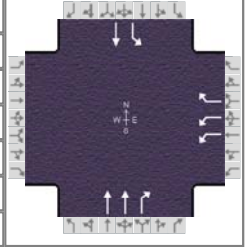
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019	Duration, h	0.250
Analyst		Area Type	Other	PHF	0.98
Jurisdiction		Time Period		Analysis Period	1 > 7:00
Urban Street		Analysis Year	2019	File Name	Morris & 649 Am Build.xus
Intersection	Morris Ave & 649				
Project Description	Am Build				

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.98
Analysis Period	1 > 7:00
File Name	Morris & 649 Am Build.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				281		380		1104	281	322	731	

## Signal Information

Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	12.0	45.0	18.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	3.0	3.0	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		2	1	6
Case Number				9.0		7.3	1.0	4.0
Phase Duration, s				23.0		50.0	17.0	67.0
Change Period, ( Y+R <sub>c</sub> ), s				5.0		5.0	5.0	5.0
Max Allow Headway ( MAH ), s				3.3		0.0	3.1	0.0
Queue Clearance Time ( g <sub>s</sub> ), s				20.0			9.2	
Green Extension Time ( g <sub>e</sub> ), s				0.0		0.0	0.2	0.0
Phase Call Probability				1.00			1.00	
Max Out Probability				1.00			1.00	

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	2	12		1	6	
Adjusted Flow Rate ( v ), veh/h				287		388	1127	287		329	746	
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1702			1752			1753	1841	
Queue Service Time ( g <sub>s</sub> ), s				6.6			21.3			7.2	19.1	
Cycle Queue Clearance Time ( g <sub>c</sub> ), s				6.6			21.3			7.2	19.1	
Green Ratio ( g/C )				0.20			0.50			0.66	0.69	
Capacity ( c ), veh/h				681			1752			443	1268	
Volume-to-Capacity Ratio ( X )				0.421			0.643			0.741	0.588	
Back of Queue ( Q ), ft/ln ( 50 th percentile)				68.5			212.5			102.8	169	
Back of Queue ( Q ), veh/ln ( 50 th percentile)				2.7			8.2			4.0	6.5	
Queue Storage Ratio ( RQ ) ( 50 th percentile)				0.00			0.00			0.00	0.00	
Uniform Delay ( d <sub>1</sub> ), s/veh				31.4			16.6			14.2	7.3	
Incremental Delay ( d <sub>2</sub> ), s/veh				0.2			1.8			5.8	2.0	
Initial Queue Delay ( d <sub>3</sub> ), s/veh				0.0			0.0			0.0	0.0	
Control Delay ( d ), s/veh				31.6		0.0	18.4	0.0		20.0	9.3	
Level of Service ( LOS )				C		A	B	A		B	A	
Approach Delay, s/veh / LOS	0.0			13.4		B	14.7		B	12.6		B
Intersection Delay, s/veh / LOS				13.7					B			

## Multimodal Results

	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

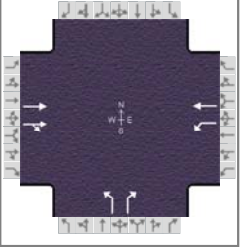
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019	Duration, h	0.250
Analyst		Area Type	Other	PHF	0.94
Jurisdiction		Analysis Year	2019	Analysis Period	1> 7:00
Urban Street		File Name	Passaic & 649 Am Build.xus		
Intersection	Passaic Ave & 649				
Project Description	Am Build				

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.94
Analysis Period	1> 7:00
File Name	Passaic & 649 Am Build.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		905	95	403	620		55		496			

## Signal Information

Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	15.0	37.0	20.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	4.0	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		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		43.0	21.0	64.0		26.0		
Change Period, ( Y+R <sub>c</sub> ), s		6.0	6.0	6.0		6.0		
Max Allow Headway ( MAH ), s		0.0	3.1	0.0		3.3		
Queue Clearance Time ( g <sub>s</sub> ), s			15.0			22.0		
Green Extension Time ( g <sub>e</sub> ), s		0.0	0.0	0.0		0.0		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			1.00		

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate ( v ), veh/h		541	523	429	660		59		528			
Adjusted Saturation Flow Rate ( s ), veh/h/ln		1841	1779	1753	1841		1753		1560			
Queue Service Time ( g <sub>s</sub> ), s		22.0	22.1	13.0	17.9		2.4		20.0			
Cycle Queue Clearance Time ( g <sub>c</sub> ), s		22.0	22.1	13.0	17.9		2.4		20.0			
Green Ratio ( g/C )		0.41	0.41	0.60	0.64		0.22		0.39			
Capacity ( c ), veh/h		757	731	459	1186		390		607			
Volume-to-Capacity Ratio ( X )		0.715	0.715	0.934	0.556		0.150		0.870			
Back of Queue ( Q ), ft/ln ( 50 th percentile)		260.1	245	185.7	169.2		25.7		304			
Back of Queue ( Q ), veh/ln ( 50 th percentile)		10.1	9.8	7.2	6.6		1.0		11.8			
Queue Storage Ratio ( RQ ) ( 50 th percentile)		0.00	0.00	0.00	0.00		0.00		0.00			
Uniform Delay ( d <sub>1</sub> ), s/veh		22.1	22.1	18.6	8.9		28.2		25.4			
Incremental Delay ( d <sub>2</sub> ), s/veh		5.7	5.9	26.1	1.9		0.1		12.4			
Initial Queue Delay ( d <sub>3</sub> ), s/veh		0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay ( d ), s/veh		27.8	28.0	44.7	10.7		28.2		37.8			
Level of Service ( LOS )		C	C	D	B		C		D			
Approach Delay, s/veh / LOS	27.9	C		24.1	C		36.9	D		0.0		
Intersection Delay, s/veh / LOS	28.3						C					

## Multimodal Results

	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

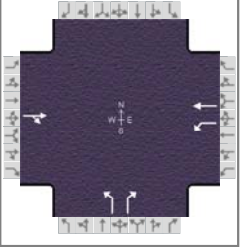
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	4/9/2019	Duration, h	0.250
Analyst		Area Type	Other	PHF	0.93
Jurisdiction		Analysis Year	2019	Analysis Period	1 > 7:00
Urban Street		File Name	Watchung & River Am B.xus		
Intersection	Watchung Ave & River...				
Project Description	Am Build				

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.93
Analysis Period	1 > 7:00
File Name	Watchung & River Am B.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		536	53	176	482		105		429			

## Signal Information

Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	8.0	42.0	26.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	4.0	3.0	0.0	0.0	0.0		
				Red	0.0	2.0	2.0	0.0	0.0	0.0		

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		48.0	11.0	59.0		31.0		
Change Period, ( Y+R <sub>c</sub> ), s		6.0	3.0	6.0		5.0		
Max Allow Headway ( MAH ), s		0.0	3.1	0.0		3.3		
Queue Clearance Time ( g <sub>s</sub> ), s			6.6			28.0		
Green Extension Time ( g <sub>e</sub> ), s		0.0	0.0	0.0		0.0		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			1.00		

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate ( v ), veh/h		633		189	518		113		461			
Adjusted Saturation Flow Rate ( s ), veh/h/ln		1811		1753	1841		1753		1560			
Queue Service Time ( g <sub>s</sub> ), s		25.8		4.6	14.5		4.4		26.0			
Cycle Queue Clearance Time ( g <sub>c</sub> ), s		25.8		4.6	14.5		4.4		26.0			
Green Ratio ( g/C )		0.47		0.58	0.59		0.29		0.29			
Capacity ( c ), veh/h		845		376	1084		506		451			
Volume-to-Capacity Ratio ( X )		0.749		0.503	0.478		0.223		1.024			
Back of Queue ( Q ), ft/ln ( 95 th percentile)		435.6		74.8	245.4		82.7		570.4			
Back of Queue ( Q ), veh/ln ( 95 th percentile)		16.9		2.9	9.5		3.2		22.1			
Queue Storage Ratio ( RQ ) ( 95 th percentile)		0.00		0.00	0.00		0.00		0.00			
Uniform Delay ( d <sub>1</sub> ), s/veh		19.7		14.7	10.6		24.3		32.0			
Incremental Delay ( d <sub>2</sub> ), s/veh		6.0		0.4	1.5		0.1		48.5			
Initial Queue Delay ( d <sub>3</sub> ), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay ( d ), s/veh		25.7		15.1	12.1		24.4		80.5			
Level of Service ( LOS )		C		B	B		C		F			
Approach Delay, s/veh / LOS	25.7	C		12.9	B		69.5	E		0.0		
Intersection Delay, s/veh / LOS	34.1						C					

## Multimodal Results

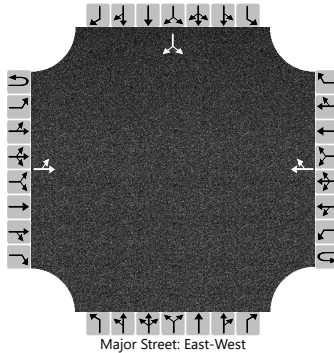
	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Bridge St & 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/15/2019	East/West Street	CR 646
Analysis Year	2019	North/South Street	Bridge Street
Time Analyzed	Pm Build	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		6	608				595	14						1		1
Percent Heavy Vehicles (%)		1												1		1
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.11												6.41		6.21
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.21												3.51		3.31

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		6													2	
Capacity, c (veh/h)		964													275	
v/c Ratio		0.01													0.01	
95% Queue Length, Q <sub>95</sub> (veh)		0.0													0.0	
Control Delay (s/veh)		8.8													18.2	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)	0.2												18.2			
Approach LOS													C			

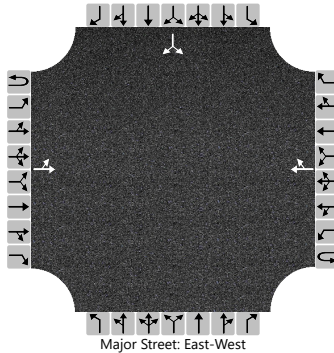


# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Commerce St & Rt 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/16/2019	East/West Street	Route 646
Analysis Year	2019	North/South Street	Commerce Street
Time Analyzed	Pm Build	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		11	647				605	12						37		31
Percent Heavy Vehicles (%)		1												1		1
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.11												6.41		6.21
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.21												3.51		3.31

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		11													71	
Capacity, c (veh/h)		947													238	
v/c Ratio		0.01													0.30	
95% Queue Length, Q <sub>95</sub> (veh)		0.0													1.2	
Control Delay (s/veh)		8.8													26.4	
Level of Service (LOS)		A													D	
Approach Delay (s/veh)	0.3												26.4			
Approach LOS													D			



# HCS7 Two-Way Stop-Control Report

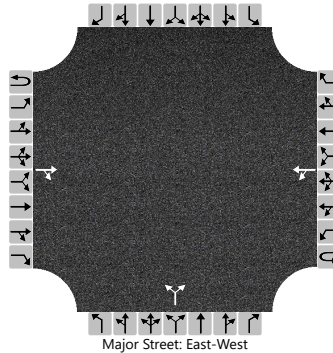
## General Information

Analyst	EIC
Agency/Co.	DD
Date Performed	4/5/2019
Analysis Year	2019
Time Analyzed	Pm Build
Intersection Orientation	East-West
Project Description	

## Site Information

Intersection	Edgehill Rd & CR 646
Jurisdiction	
East/West Street	County Route 646
North/South Street	Edgehill Rd
Peak Hour Factor	0.96
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			643	34		3	604			7		4				
Percent Heavy Vehicles (%)						1				1		1				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type   Storage	Undivided															

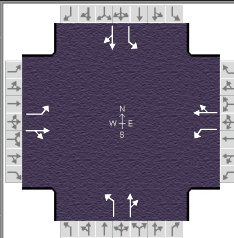
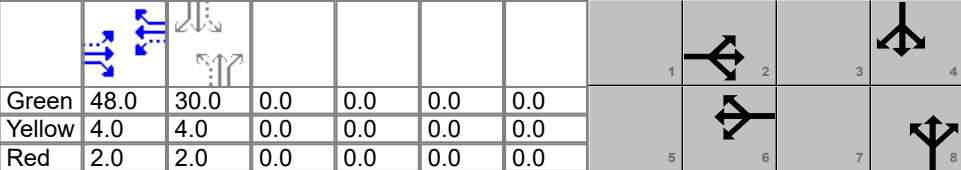
## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.11				6.41		6.21				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.21				3.51		3.31				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						3					11					
Capacity, c (veh/h)						897					222					
v/c Ratio						0.00					0.05					
95% Queue Length, Q <sub>95</sub> (veh)						0.0					0.2					
Control Delay (s/veh)						9.0					22.1					
Level of Service (LOS)						A					C					
Approach Delay (s/veh)					0.1				22.1							
Approach LOS									C							

# HCS7 Signalized Intersection Results Summary

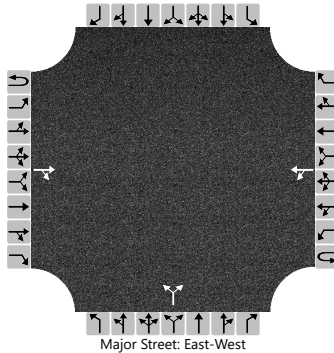
General Information						Intersection Information													
Agency						Duration, h		0.250											
Analyst				Analysis Date		5/16/2019		Area Type		Other									
Jurisdiction				Time Period				PHF		0.97									
Urban Street				Analysis Year		2019		Analysis Period		1> 7:00									
Intersection		Fairmount & Watchung		File Name		Fairmount & 646 Pm Build.xus													
Project Description		Pm Build																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h				50	524	56	55	504	54	27	245	57	93	296	60				
Signal Information																			
Cycle, s	90.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	On		Green	48.0	30.0	0.0	0.0	0.0	0.0								
Force Mode	Fixed	Simult. Gap N/S	On		Yellow	4.0	4.0	0.0	0.0	0.0	0.0								
				Red	2.0	2.0	0.0	0.0	0.0	0.0									
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase						2				6				8				4	
Case Number						6.0				6.0				6.0				6.0	
Phase Duration, s						54.0				54.0				36.0				36.0	
Change Period, ( Y+R c ), s						6.0				6.0				6.0				6.0	
Max Allow Headway ( MAH ), s						0.0				0.0				3.2				3.2	
Queue Clearance Time ( g s ), s														19.2				21.4	
Green Extension Time ( g e ), s						0.0				0.0				1.4				1.3	
Phase Call Probability														1.00				1.00	
Max Out Probability														0.05				0.12	
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h				52	598		57	575		28	311		96	367					
Adjusted Saturation Flow Rate ( s ), veh/h/ln				844	1853		827	1853		1023	1823		1077	1830					
Queue Service Time ( g s ), s				4.0	20.0		4.6	18.9		2.1	12.4		7.1	15.1					
Cycle Queue Clearance Time ( g c ), s				22.9	20.0		24.6	18.9		17.2	12.4		19.4	15.1					
Green Ratio ( g/C )				0.53	0.53		0.53	0.53		0.33	0.33		0.33	0.33					
Capacity ( c ), veh/h				353	988		337	988		250	608		291	610					
Volume-to-Capacity Ratio ( X )				0.146	0.605		0.168	0.582		0.111	0.512		0.329	0.602					
Back of Queue ( Q ), ft/ln ( 50 th percentile)				21.3	209		24.2	196.9		12.9	129.5		45.5	161.8					
Back of Queue ( Q ), veh/ln ( 50 th percentile)				0.8	8.3		1.0	7.8		0.5	5.1		1.8	6.4					
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 1 ), s/veh				22.0	14.5		22.9	14.2		32.2	24.1		31.9	25.0					
Incremental Delay ( d 2 ), s/veh				0.9	2.7		1.1	2.5		0.1	0.3		0.2	1.2					
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				22.8	17.2		24.0	16.7		32.2	24.4		32.2	26.2					
Level of Service (LOS)				C	B		C	B		C	C		C	C					
Approach Delay, s/veh / LOS				17.7	B		17.4	B		25.1	C		27.4	C					
Intersection Delay, s/veh / LOS				21.0						C									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.89	B		1.89	B		1.92	B		1.92	B					
Bicycle LOS Score / LOS				1.56	B		1.53	B		1.05	A		1.25	A					

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Girad Ave & CR 646
Agency/Co.	DD	Jurisdiction	
Date Performed	5/15/2019	East/West Street	County Route 646
Analysis Year	2019	North/South Street	Girad Avenue
Time Analyzed	Pm Build	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			605	4		17	611			2		16				
Percent Heavy Vehicles (%)						1				1		1				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.11				6.41		6.21				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.21				3.51		3.31				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						18					19					
Capacity, c (veh/h)						954					402					
v/c Ratio						0.02					0.05					
95% Queue Length, Q <sub>95</sub> (veh)						0.1					0.1					
Control Delay (s/veh)						8.8					14.4					
Level of Service (LOS)						A					B					
Approach Delay (s/veh)					0.5				14.4							
Approach LOS									B							

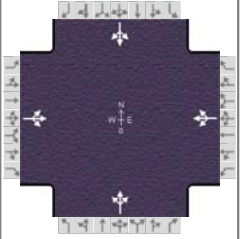
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019
Analyst		Time Period	
Jurisdiction		Analysis Year	2019
Urban Street		File Name	Hillside & 646 Pm Build.xus
Intersection	Hillside & 646		
Project Description	Pm Build		

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.95
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	57	573	20	11	533	51	15	39	12	31	90	56

## Signal Information

Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	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		2		6		8		4
Case Number		8.0		8.0		8.0		8.0
Phase Duration, s		69.0		69.0		21.0		21.0
Change Period, ( $Y+R_c$ ), s		5.0		5.0		5.0		5.0
Max Allow Headway ( $MAH$ ), s		0.0		0.0		3.2		3.2
Queue Clearance Time ( $g_s$ ), s						4.9		10.9
Green Extension Time ( $g_e$ ), s		0.0		0.0		0.4		0.2
Phase Call Probability						1.00		1.00
Max Out Probability						0.00		0.17

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h		684			626			69			186	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln		1739			1841			1717			1713	
Queue Service Time ( $g_s$ ), s		0.0			0.0			0.0			3.3	
Cycle Queue Clearance Time ( $g_c$ ), s		14.9			13.2			2.9			8.9	
Green Ratio ( $g/C$ )		0.71			0.71			0.18			0.18	
Capacity ( $c$ ), veh/h		1280			1350			354			352	
Volume-to-Capacity Ratio ( $X$ )		0.534			0.464			0.196			0.530	
Back of Queue ( $Q$ ), ft/ln ( 50 th percentile)		125.9			108.6			32			93.5	
Back of Queue ( $Q$ ), veh/ln ( 50 th percentile)		5.0			4.3			1.3			3.7	
Queue Storage Ratio ( $RQ$ ) ( 50 th percentile)		0.00			0.00			0.00			0.00	
Uniform Delay ( $d_1$ ), s/veh		5.9			5.7			31.6			34.0	
Incremental Delay ( $d_2$ ), s/veh		1.6			1.1			0.1			0.8	
Initial Queue Delay ( $d_3$ ), s/veh		0.0			0.0			0.0			0.0	
Control Delay ( $d$ ), s/veh		7.5			6.8			31.7			34.8	
Level of Service (LOS)		A			A			C			C	
Approach Delay, s/veh / LOS	7.5	A		6.8	A		31.7	C		34.8	C	
Intersection Delay, s/veh / LOS	11.6						B					

## Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	1.63	B		1.63	B		1.71	B		1.71	B	
Bicycle LOS Score / LOS	1.62	B		1.52	B		0.60	A		0.80	A	

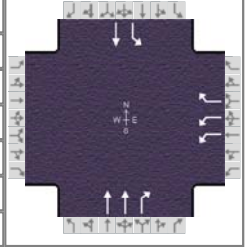
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019	Duration, h	0.250
Analyst		Time Period		Area Type	Other
Jurisdiction		Analysis Year	2019	PHF	0.98
Urban Street		File Name	Morris & 649 Pm Build.xus	Analysis Period	1> 7:00
Intersection	Morris Ave & 649				
Project Description	Pm Build				

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.98
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				324		338		877	306	281	1041	

## Signal Information

Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	12.0	45.0	18.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	3.0	3.0	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		2	1	6
Case Number				9.0		7.3	1.0	4.0
Phase Duration, s				23.0		50.0	17.0	67.0
Change Period, ( Y+R <sub>c</sub> ), s				5.0		5.0	5.0	5.0
Max Allow Headway ( MAH ), s				3.3		0.0	3.1	0.0
Queue Clearance Time ( g <sub>s</sub> ), s				20.0			7.9	
Green Extension Time ( g <sub>e</sub> ), s				0.0		0.0	0.2	0.0
Phase Call Probability				1.00			1.00	
Max Out Probability				1.00			0.44	

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	2	12		1	6	
Adjusted Flow Rate ( v ), veh/h				331		345	895	312		287	1062	
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1743			1795			1795	1885	
Queue Service Time ( g <sub>s</sub> ), s				7.5			14.9			5.9	36.1	
Cycle Queue Clearance Time ( g <sub>c</sub> ), s				7.5			14.9			5.9	36.1	
Green Ratio ( g/C )				0.20			0.50			0.66	0.69	
Capacity ( c ), veh/h				697			1795			529	1299	
Volume-to-Capacity Ratio ( X )				0.474			0.499			0.542	0.818	
Back of Queue ( Q ), ft/ln ( 50 th percentile)				78.1			147.2			49.1	338.4	
Back of Queue ( Q ), veh/ln ( 50 th percentile)				3.1			5.8			1.9	13.4	
Queue Storage Ratio ( RQ ) ( 50 th percentile)				0.00			0.00			0.00	0.00	
Uniform Delay ( d <sub>1</sub> ), s/veh				31.8			15.0			9.3	10.0	
Incremental Delay ( d <sub>2</sub> ), s/veh				0.2			1.0			0.6	5.8	
Initial Queue Delay ( d <sub>3</sub> ), s/veh				0.0			0.0			0.0	0.0	
Control Delay ( d ), s/veh				32.0		0.0	16.0	0.0		9.9	15.8	
Level of Service ( LOS )				C		A	B	A		A	B	
Approach Delay, s/veh / LOS	0.0			15.7		B	11.8		B	14.5		B
Intersection Delay, s/veh / LOS				13.8								

## Multimodal Results

	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

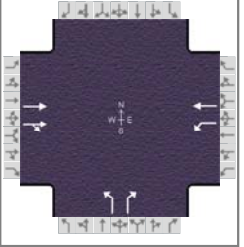
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	5/16/2019	Duration, h	0.250
Analyst		Area Type	Other	PHF	0.95
Jurisdiction		Analysis Year	2019	Analysis Period	1 > 7:00
Urban Street		File Name	Passaic & 649 Pm Build.xus		
Intersection	Passaic Ave & 649				
Project Description	Pm Build				

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.95
Analysis Period	1 > 7:00
File Name	Passaic & 649 Pm Build.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		743	97	537	832		62		448			

## Signal Information

Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	15.0	42.0	15.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	4.0	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		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		48.0	21.0	69.0		21.0		
Change Period, ( Y+R <sub>c</sub> ), s		6.0	6.0	6.0		6.0		
Max Allow Headway ( MAH ), s		0.0	3.1	0.0		3.3		
Queue Clearance Time ( g <sub>s</sub> ), s			16.8			17.0		
Green Extension Time ( g <sub>e</sub> ), s		0.0	0.0	0.0		0.0		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			1.00		

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate ( v ), veh/h		451	433	565	876		65		472			
Adjusted Saturation Flow Rate ( s ), veh/h/ln		1885	1808	1795	1885		1795		1598			
Queue Service Time ( g <sub>s</sub> ), s		15.0	15.1	14.8	23.4		2.8		15.0			
Cycle Queue Clearance Time ( g <sub>c</sub> ), s		15.0	15.1	14.8	23.4		2.8		15.0			
Green Ratio ( g/C )		0.47	0.47	0.66	0.70		0.17		0.33			
Capacity ( c ), veh/h		880	844	568	1320		299		533			
Volume-to-Capacity Ratio ( X )		0.513	0.513	0.994	0.664		0.218		0.886			
Back of Queue ( Q ), ft/ln ( 50 th percentile)		165.7	158.3	274	205.3		30.5		287.3			
Back of Queue ( Q ), veh/ln ( 50 th percentile)		6.6	6.3	10.9	8.1		1.2		11.4			
Queue Storage Ratio ( RQ ) ( 50 th percentile)		0.00	0.00	0.00	0.00		0.00		0.00			
Uniform Delay ( d <sub>1</sub> ), s/veh		16.8	16.8	14.6	7.6		32.4		28.4			
Incremental Delay ( d <sub>2</sub> ), s/veh		2.1	2.2	36.2	2.6		0.1		15.8			
Initial Queue Delay ( d <sub>3</sub> ), s/veh		0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay ( d ), s/veh		19.0	19.1	50.9	10.2		32.6		44.2			
Level of Service ( LOS )		B	B	D	B		C		D			
Approach Delay, s/veh / LOS	19.0		B	26.2		C	42.8		D	0.0		
Intersection Delay, s/veh / LOS	27.1						C					

## Multimodal Results

	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

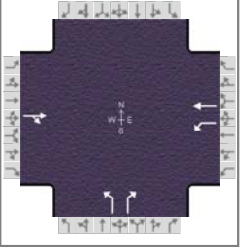
# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	4/9/2019	Duration, h	0.250
Analyst		Area Type	Other	PHF	0.97
Jurisdiction		Analysis Year	2019	Analysis Period	1> 7:00
Urban Street		File Name	Watchung & River Pm B.xus		
Intersection	Watchung Ave & River...				
Project Description	Pm Build				

## Intersection Information

Duration, h	0.250
Area Type	Other
PHF	0.97
Analysis Period	1> 7:00
File Name	Watchung & River Pm B.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		593	81	332	552		64		239			

## Signal Information

Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	13.0	37.0	26.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	4.0	3.0	0.0	0.0	0.0		
				Red	0.0	2.0	2.0	0.0	0.0	0.0		

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		43.0	16.0	59.0		31.0		
Change Period, ( Y+R <sub>c</sub> ), s		6.0	3.0	6.0		5.0		
Max Allow Headway ( MAH ), s		0.0	3.1	0.0		3.3		
Queue Clearance Time ( g <sub>s</sub> ), s			12.6			13.7		
Green Extension Time ( g <sub>e</sub> ), s		0.0	0.0	0.0		0.5		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			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		2	12	1	6		3		18			
Adjusted Flow Rate ( v ), veh/h		695		342	569		66		246			
Adjusted Saturation Flow Rate ( s ), veh/h/ln		1845		1795	1885		1795		1598			
Queue Service Time ( g <sub>s</sub> ), s		32.0		10.6	16.0		2.4		11.7			
Cycle Queue Clearance Time ( g <sub>c</sub> ), s		32.0		10.6	16.0		2.4		11.7			
Green Ratio ( g/C )		0.41		0.58	0.59		0.29		0.29			
Capacity ( c ), veh/h		759		381	1110		519		462			
Volume-to-Capacity Ratio ( X )		0.916		0.898	0.513		0.127		0.534			
Back of Queue ( Q ), ft/ln ( 95 th percentile)		588.1		235.9	264.3		45.8		195.9			
Back of Queue ( Q ), veh/ln ( 95 th percentile)		23.3		9.4	10.5		1.8		7.8			
Queue Storage Ratio ( RQ ) ( 95 th percentile)		0.00		0.00	0.00		0.00		0.00			
Uniform Delay ( d <sub>1</sub> ), s/veh		25.0		21.7	10.9		23.6		26.9			
Incremental Delay ( d <sub>2</sub> ), s/veh		17.6		22.6	1.7		0.0		0.6			
Initial Queue Delay ( d <sub>3</sub> ), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay ( d ), s/veh		42.7		44.3	12.6		23.7		27.5			
Level of Service ( LOS )		D		D	B		C		C			
Approach Delay, s/veh / LOS	42.7	D		24.5	C		26.7	C		0.0		
Intersection Delay, s/veh / LOS	31.4						C					

## Multimodal Results

	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

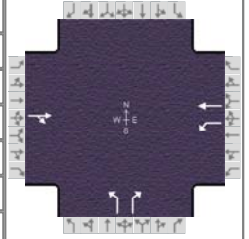


# HCS7 Signalized Intersection Results Summary

## General Information

Agency		Analysis Date	4/9/2019	Duration, h	0.250
Analyst		Time Period		Area Type	Other
Jurisdiction		Analysis Year	2019	PHF	0.97
Urban Street		File Name	Watchung & River Pm B (Opt).xus		
Intersection	Watchung Ave & River...			Analysis Period	1> 7:00
Project Description	Pm Build (Optimized)				

## 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		593	81	332	552		64		239			

## Signal Information

Cycle, s	100.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	14.0	46.0	26.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	4.0	3.0	0.0	0.0	0.0		
				Red	0.0	2.0	2.0	0.0	0.0	0.0		

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	1.0	4.0		9.0		
Phase Duration, s		52.0	17.0	69.0		31.0		
Change Period, ( Y+R <sub>c</sub> ), s		6.0	3.0	6.0		5.0		
Max Allow Headway ( MAH ), s		0.0	3.1	0.0		3.3		
Queue Clearance Time ( g <sub>s</sub> ), s			11.0			12.9		
Green Extension Time ( g <sub>e</sub> ), s		0.0	0.2	0.0		0.6		
Phase Call Probability			1.00			1.00		
Max Out Probability			1.00			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		2	12	1	6		3		18			
Adjusted Flow Rate ( v ), veh/h		695		342	569		66		246			
Adjusted Saturation Flow Rate ( s ), veh/h/ln		1845		1795	1885		1795		1598			
Queue Service Time ( g <sub>s</sub> ), s		32.6		9.0	16.0		2.8		10.9			
Cycle Queue Clearance Time ( g <sub>c</sub> ), s		32.6		9.0	16.0		2.8		10.9			
Green Ratio ( g/C )		0.46		0.62	0.63		0.26		0.40			
Capacity ( c ), veh/h		849		425	1188		467		639			
Volume-to-Capacity Ratio ( X )		0.819		0.806	0.479		0.141		0.386			
Back of Queue ( Q ), ft/ln ( 95 th percentile)		546.6		208	262.2		54.4		180			
Back of Queue ( Q ), veh/ln ( 95 th percentile)		21.7		8.3	10.4		2.2		7.1			
Queue Storage Ratio ( RQ ) ( 95 th percentile)		0.00		0.00	0.00		0.00		0.00			
Uniform Delay ( d <sub>1</sub> ), s/veh		23.4		18.5	9.8		28.4		21.3			
Incremental Delay ( d <sub>2</sub> ), s/veh		8.7		10.2	1.4		0.1		0.1			
Initial Queue Delay ( d <sub>3</sub> ), s/veh		0.0		0.0	0.0		0.0		0.0			
Control Delay ( d ), s/veh		32.0		28.6	11.2		28.5		21.4			
Level of Service ( LOS )		C		C	B		C		C			
Approach Delay, s/veh / LOS	32.0	C		17.7	B		22.9	C		0.0		
Intersection Delay, s/veh / LOS	23.8						C					

## Multimodal Results

	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

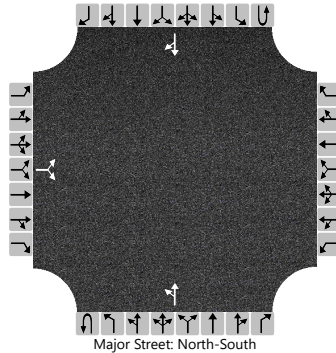


# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Site Driveway & River Rd
Agency/Co.	DD	Jurisdiction	
Date Performed	5/17/2019	East/West Street	Site Driveway
Analysis Year	2019	North/South Street	River Road
Time Analyzed	Am Build	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		72		20						5	550				207	22
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

## Delay, Queue Length, and Level of Service

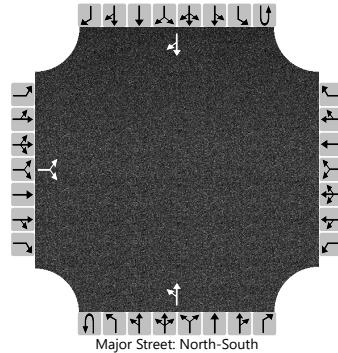
Flow Rate, v (veh/h)			100							5						
Capacity, c (veh/h)			378							1311						
v/c Ratio			0.26							0.00						
95% Queue Length, Q <sub>95</sub> (veh)			1.0							0.0						
Control Delay (s/veh)			17.9							7.8						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)	17.9								0.1							
Approach LOS	C															

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	EIC	Intersection	Site Driveway & River Rd
Agency/Co.	DD	Jurisdiction	
Date Performed	5/17/2019	East/West Street	Site Driveway
Analysis Year	2019	North/South Street	River Road
Time Analyzed	Pm Build	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description			

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		42		12						19	261				341	72
Percent Heavy Vehicles (%)		1		1						1						
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.41		6.21						4.11						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.51		3.31						2.21						

## Delay, Queue Length, and Level of Service

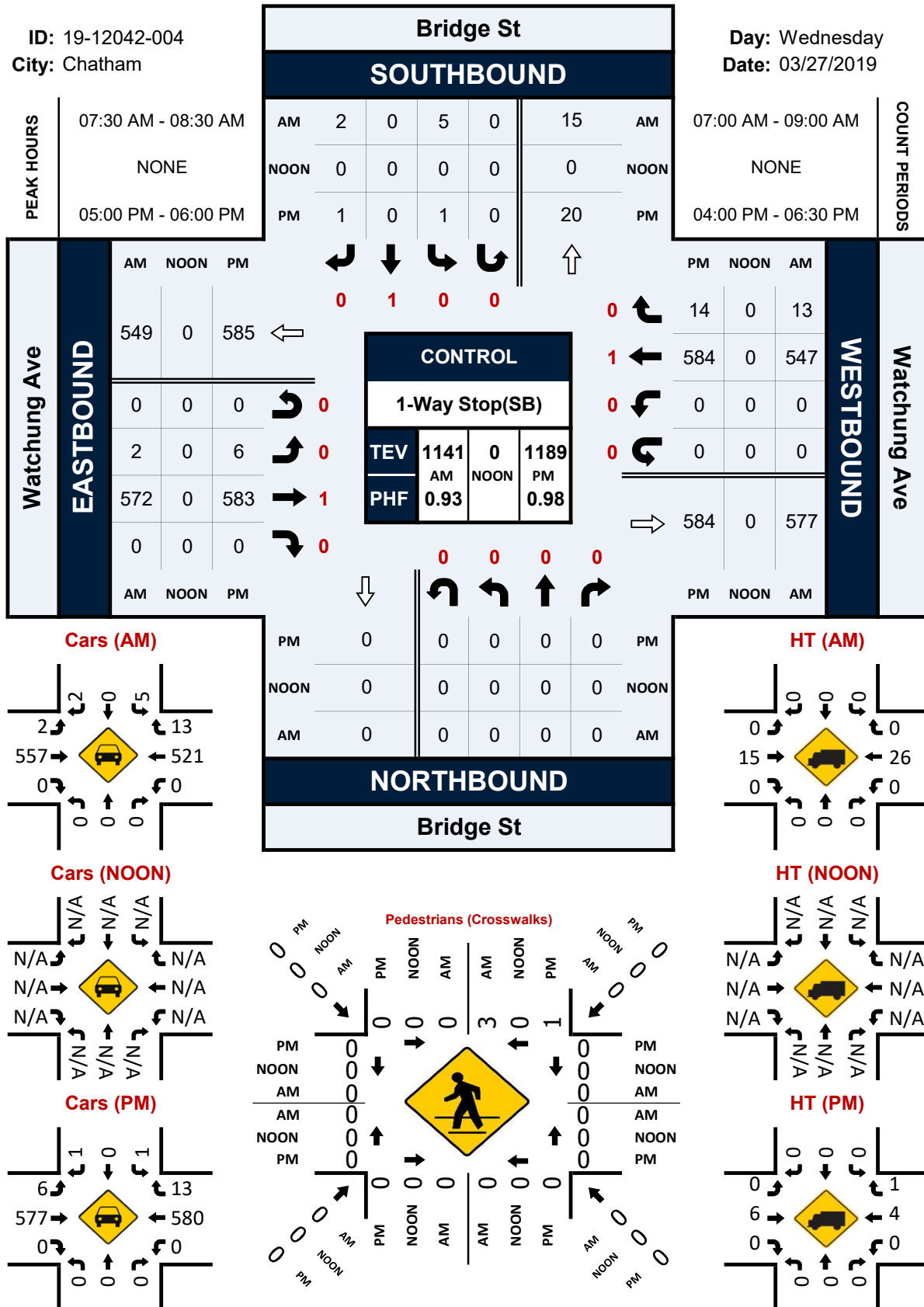
Flow Rate, v (veh/h)			59							21						
Capacity, c (veh/h)			418							1117						
v/c Ratio			0.14							0.02						
95% Queue Length, Q <sub>95</sub> (veh)			0.5							0.1						
Control Delay (s/veh)			15.0							8.3						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)	15.0								0.7							
Approach LOS	C															

# Bridge St & Watchung Ave

## Peak Hour Turning Movement Count

ID: 19-12042-004  
City: Chatham

Day: Wednesday  
Date: 03/27/2019

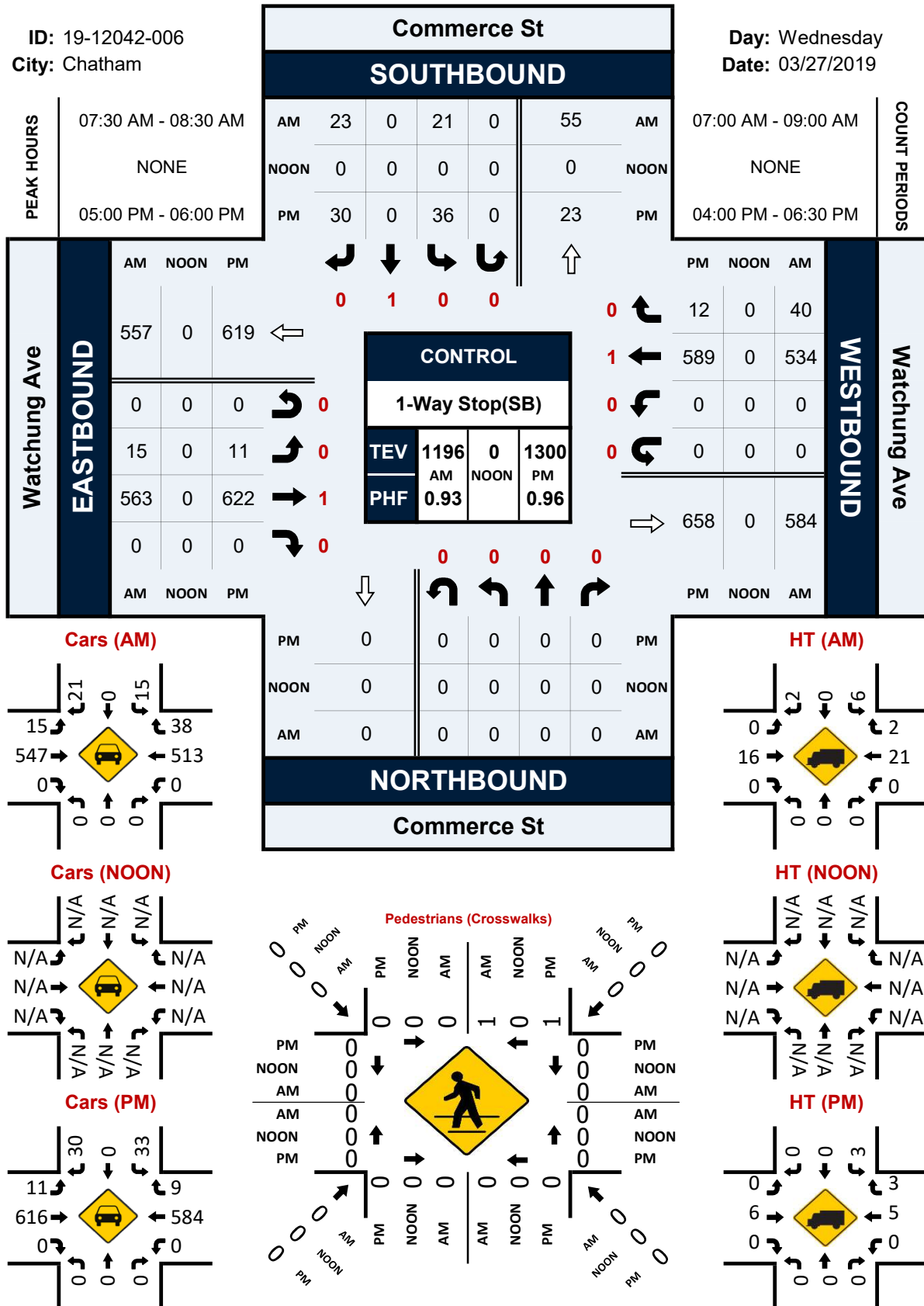


# Commerce St & Watchung Ave

## Peak Hour Turning Movement Count

ID: 19-12042-006  
City: Chatham

Day: Wednesday  
Date: 03/27/2019

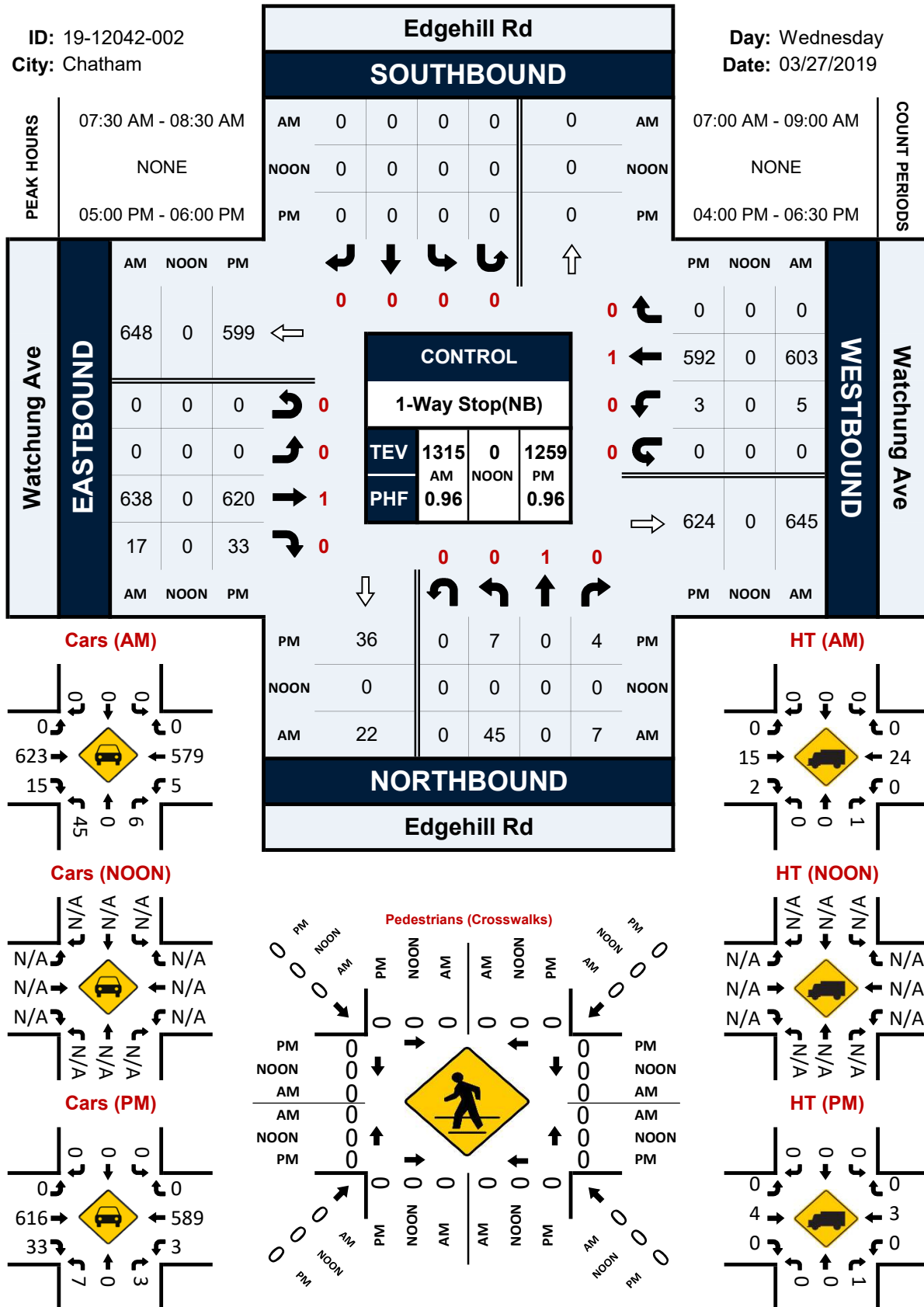


# Edgehill Rd & Watchung Ave

## Peak Hour Turning Movement Count

ID: 19-12042-002  
City: Chatham

Day: Wednesday  
Date: 03/27/2019



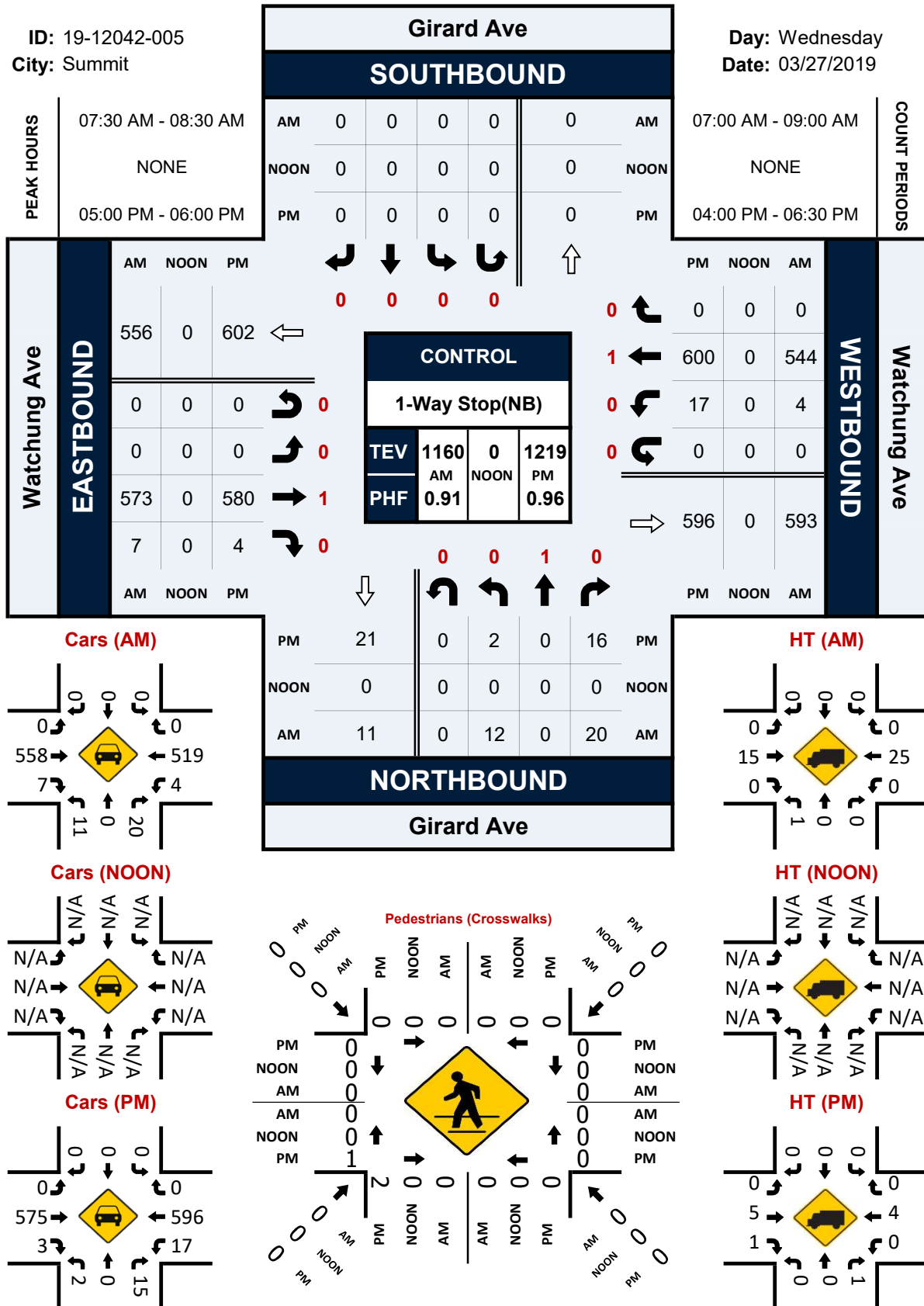


# Girard Ave & Watchung Ave

## Peak Hour Turning Movement Count

ID: 19-12042-005  
City: Summit

Day: Wednesday  
Date: 03/27/2019

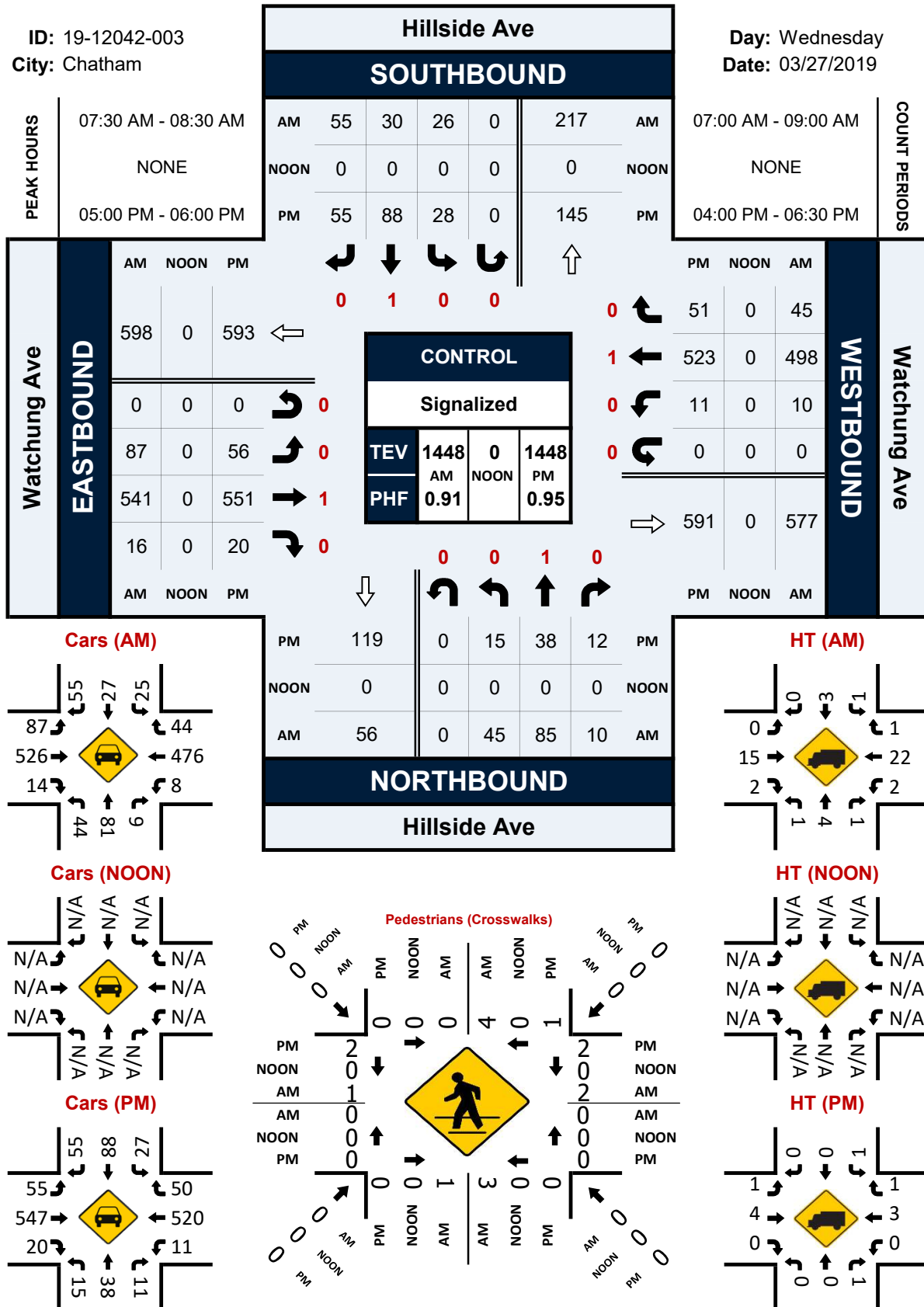


# Hillside Ave & Watchung Ave

## Peak Hour Turning Movement Count

ID: 19-12042-003  
City: Chatham

Day: Wednesday  
Date: 03/27/2019



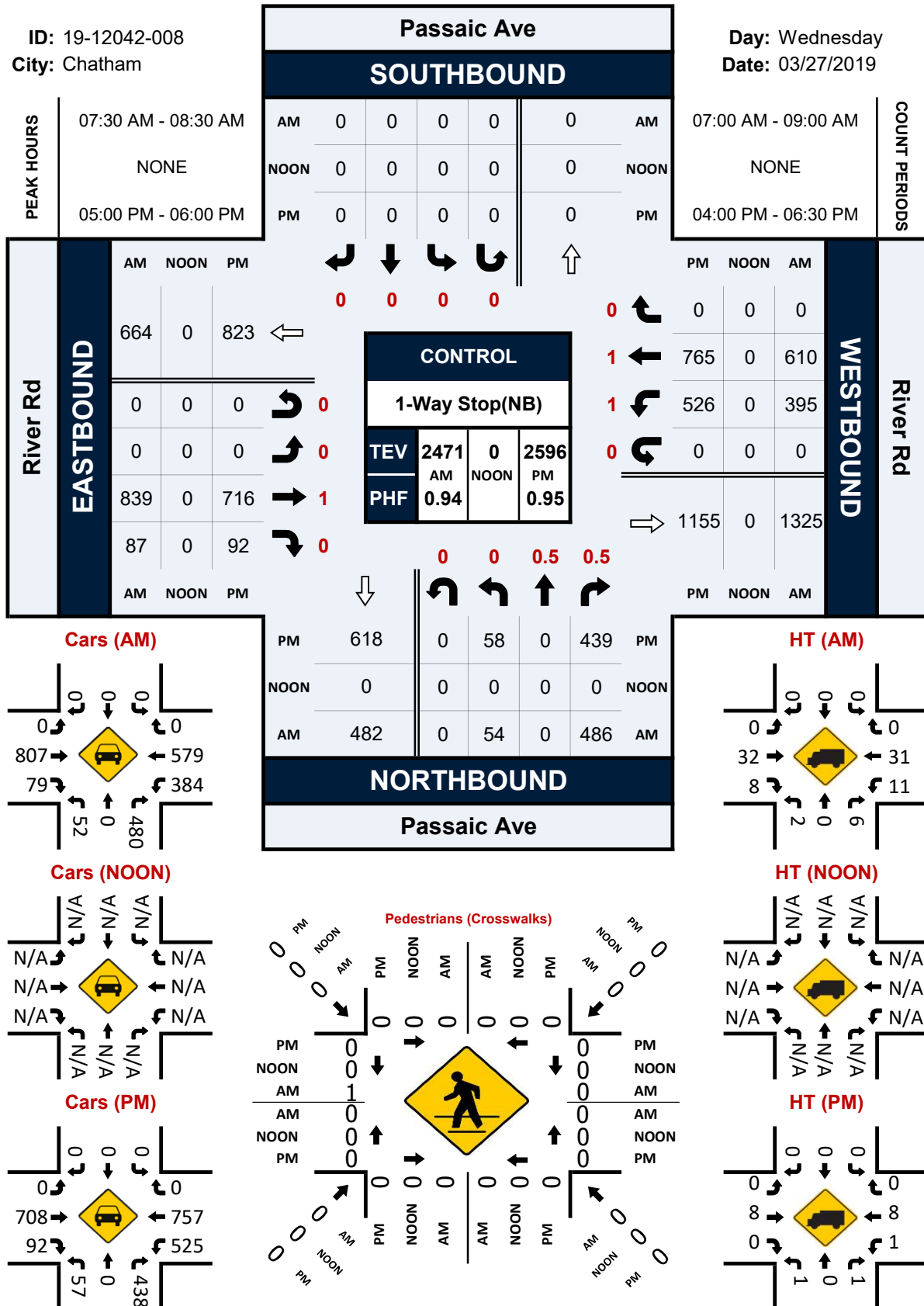


# Passaic Ave & River Rd

## Peak Hour Turning Movement Count

ID: 19-12042-008  
City: Chatham

Day: Wednesday  
Date: 03/27/2019

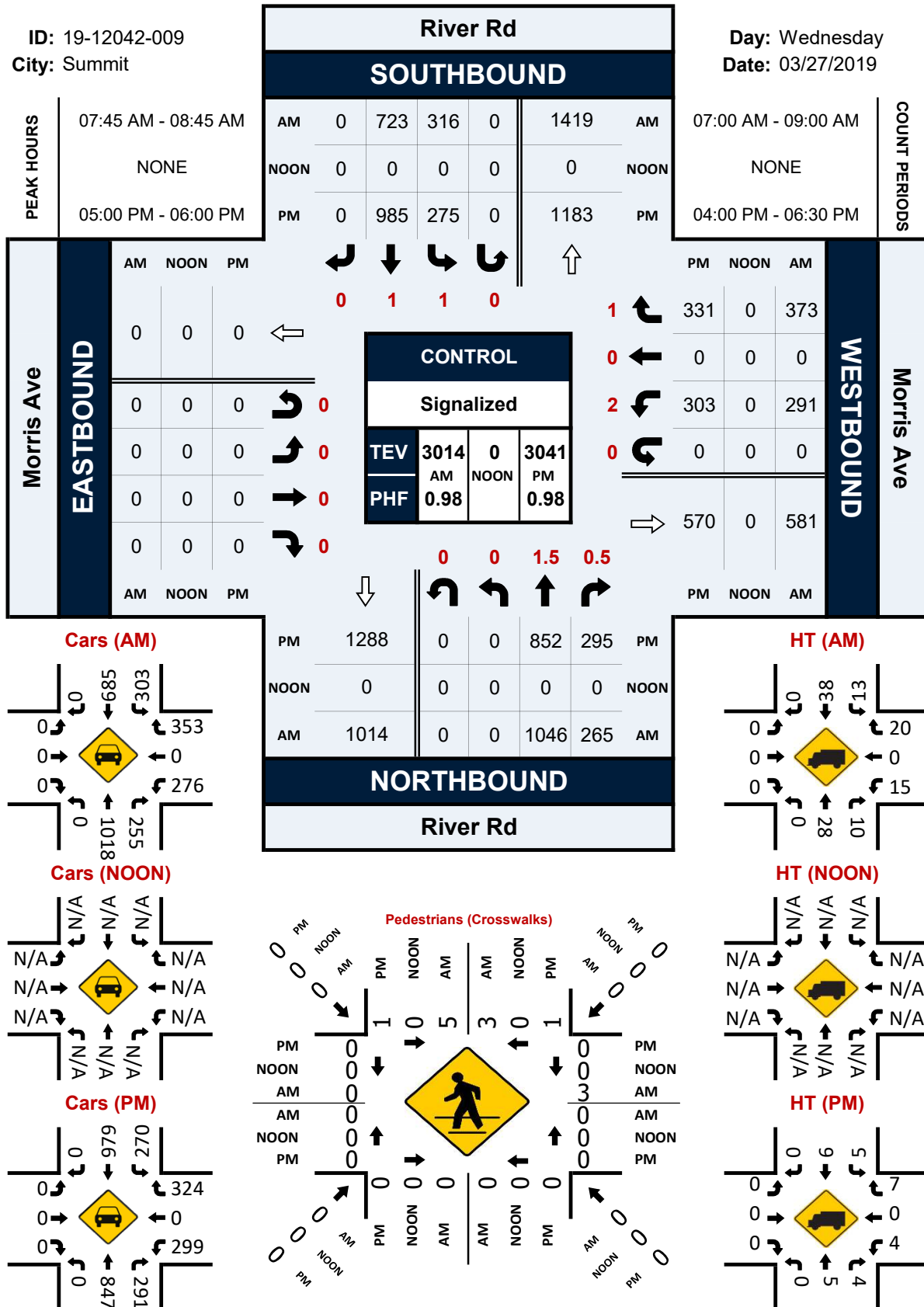


# River Rd & Morris Ave

## Peak Hour Turning Movement Count

ID: 19-12042-009  
City: Summit

Day: Wednesday  
Date: 03/27/2019



**Day:** Wednesday  
**Date:** 03/27/2019

