



**US Army Corps
of Engineers®**
New York District

**WESTCHESTER COUNTY STREAMS,
BYRAM RIVER BASIN**

FLOOD RISK MANAGEMENT FEASIBILITY STUDY

FAIRFIELD COUNTY, CONNECTICUT AND WESTCHESTER COUNTY, NEW YORK

**FINAL INTEGRATED FEASIBILITY REPORT &
ENVIRONMENTAL IMPACT STATEMENT**

APPENDIX A.10:

Traffic Analysis

The Byram River Basin Flood Risk Management Feasibility Study evaluates the replacement of two U.S. Route 1 bridges across the Byram River located at the New York-Connecticut State Line– the North Bridge on Hillside Avenue and the South Bridge on West Putnam Avenue. This document represents a feasibility level traffic study to assess construction impacts associated with roadway closures during the bridge replacement work. This study summarizes methodology, analyses, findings, and initial recommendations. Additional analyses and a final traffic plan will be developed and coordinated with applicable local and state agencies during the Preconstruction Engineering Design Phase.

1. STUDY AREA

Based on our understanding of the project and the surrounding roadway network, the study area was defined to include the following intersections:

- Hillside Avenue/ Byram Traffic Circle East
- Hillside Avenue/Byram Traffic Circle West
- Putnam Avenue/Byram Traffic Circle West
- Putnam Avenue/North Main Street
- West Putnam Avenue/Byram Road/Byram Traffic Circle East

The study area is depicted on **Figure 1**.

2. TRAFFIC STUDY

Tasks undertaken in performing this traffic study were as follows:

- Utilize traffic volumes in the Traffic Impact and Access Study for Mixed Use Development on 777 Putnam Avenue, prepared by Frederick P. Clark Associates dated July 2017.
- Conduct capacity analyses, level of service determination, and vehicle queuing analyses as appropriate for five (5) scenarios under existing weekday AM and PM peak hour conditions.
- Based on the traffic analyses, determine any operational deficiencies at the study area intersections under each of the five (5) scenarios.
- Preparation of a Traffic Impact Study summarizing our work, suitable for incorporation into other submittals to the town.

For the purposes of the traffic study, the following options will be investigated:

	Number of lanes open	
Scenario	West Putnam Avenue (Eastbound)	Hillside Avenue (Westbound)
1 – North Bridge Closure	2 (1 EB/1 WB)	0
2 – South Bridge Closure	0	2 (1 EB/1 WB)
3 – Partial Closure of Both Bridges	1 EB	1 WB
4 – Partial Closure of North Bridge	2 (1 EB/1 WB)	1
5 – Partial Closure of South Bridge	1	2 (1 EB/1 WB)



STUDY AREA

FIGURE 1

3. EXISTING CONDITIONS

The following summarizes the existing roadway characteristics in the vicinity of the project:

Hillside Avenue (U.S. Route 1)

Hillside Avenue is a two lane westbound only roadway aligned primarily in the east-west direction, serving as the opposite one-way pair roadway to West Putnam Avenue. Hillside Avenue consists of two approximately 12-13 feet wide travel lanes and a shoulder varying in width, but generally approximately 10 feet wide. The posted speed limit is 35 miles per hour.

West Putnam Avenue (U.S. Route 1)

West Putnam Avenue extends from North Main Street to the east. West Putnam Avenue consists of two eastbound travel lanes and an approximate 30-foot minimum width. Varying width shoulders are provided to the east of Byram Road. The posted speed limit is 35 miles per hour.

Byram Road

Byram Road is a north-south aligned two way roadway. Byram Road extends from West Putnam Avenue to I-95 to the south. Byram Road consists of one lane in each direction with an approximate 30-foot width. The posted speed limit is 25 miles per hour. Byram Road lies wholly within Greenwich, Connecticut.

Putnam Avenue

Putnam Avenue is an east-west roadway extending from King Street in the west to North Main Street at the Byram Traffic Circle. In the vicinity of the Byram Traffic Circle, Putnam Avenue consists of two eastbound lanes. The posted speed limit in the vicinity of the project is 30 miles per hour. Putnam Avenue lies wholly within Port Chester, New York.

North Main Street (U.S. Route 1)

North Main Street is a north-south aligned two way roadway extending northerly from Westchester Avenue to Putnam Avenue/West Putnam Avenue. North Main Street consists of one lane in each direction with an approximate width of 34 feet in the vicinity of the project. The posted speed limit in the vicinity of the project is 30 miles per hour. North Main Street lies wholly within Port Chester, New York.

Byram Traffic Circle

The Byram Traffic Circle serves to connect the eastbound West Putnam Avenue roadway with the westbound Hillside Avenue roadway. The Circle consists of two one-way connectors between the one-way pair of roadways. The connection from West Putnam Avenue to Hillside Avenue lies east of the Byram River, opposite Byram Road, additionally allowing direct access from Byram Road to Hillside Avenue. The connection from Hillside Avenue to West Putnam Avenue lies west of the Byram River and intersects Putnam Avenue. For the purposes of this study, the west connector (access from Hillside Avenue to Putnam Avenue) will be referred to

as Byram Traffic Circle West and the east connector (access from West Putnam Avenue to Hillside Avenue) will be referred to as Byram Traffic Circle East.

The following summarizes the existing study intersection characteristics:

Byram Road at West Putnam Avenue (U.S. Route 1)

Byram Road intersects West Putnam Avenue from the south while the Byram Traffic Circle extends from the intersection to Hillside Avenue to the north. The Byram Road stop controlled approach consists of an exclusive through lane to the Byram Traffic Circle and an exclusive right turn lane onto West Putnam Avenue. The uninterrupted West Putnam Avenue approach consists of a shared right turn and through lane and a shared left turn and through lane.

Putnam Avenue at North Main Street (U.S. Route 1)

Putnam Avenue intersects North Main Street from the west while the northeast leg of the intersection, West Putnam Avenue provides two departure lanes only from the intersection. The Putnam Avenue approach consists of a left turn lane and a channelized uninterrupted right turn lane. The North Main Street approach consists of one uninterrupted through only lane onto West Putnam Avenue.

Putnam Avenue at Byram Traffic Circle West

The west extent of the Byram Traffic Circle intersects Putnam Avenue from the north to form a three-legged intersection. Putnam Avenue consists of two uninterrupted eastbound only through lanes while the Byram Traffic Circle approach consists of a single stop controlled lane which allows access to the eastbound only flow along Putnam Avenue.

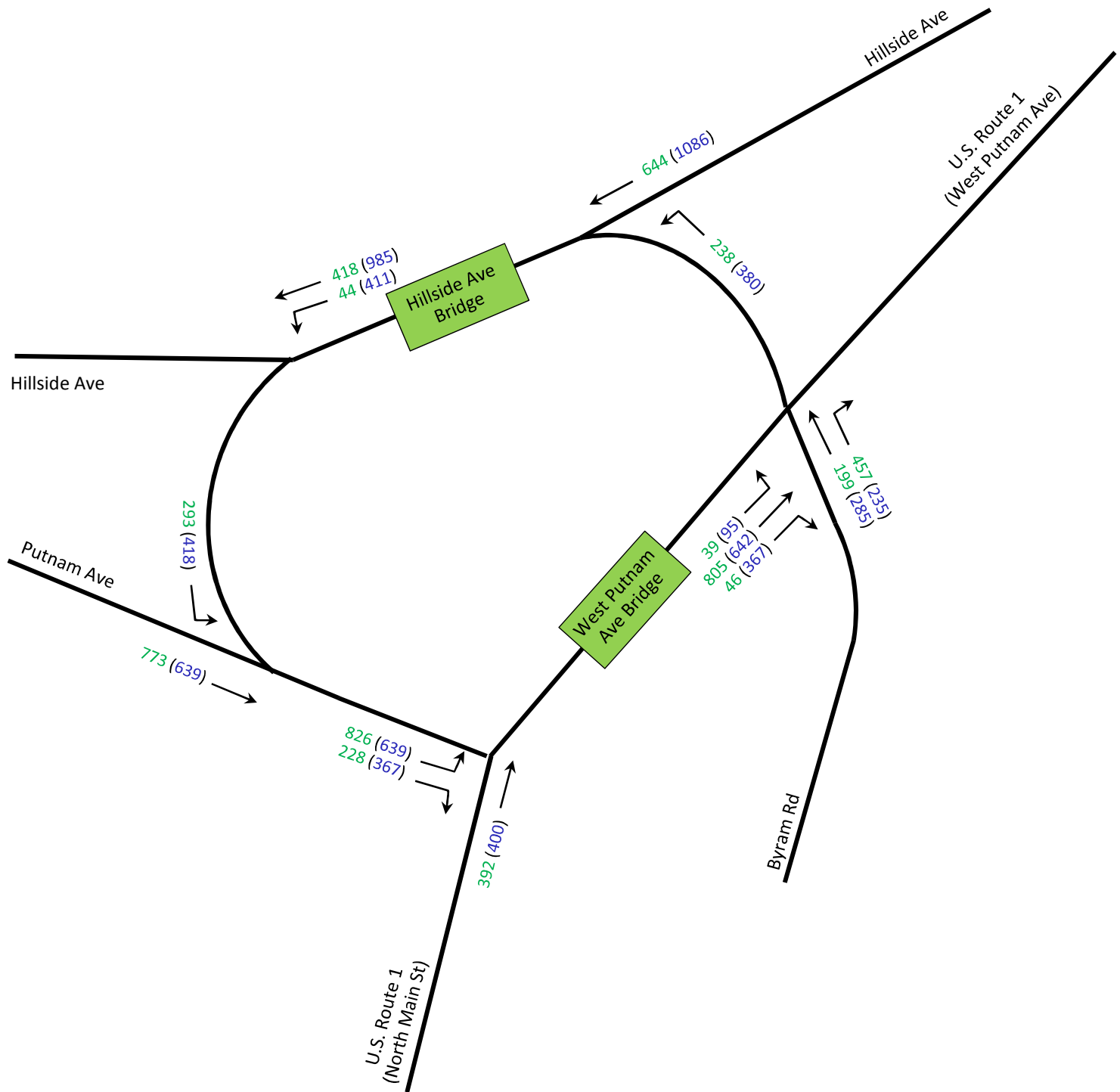
Hillside Avenue at Byram Traffic Circle West

The west extent of the Byram Traffic Circle diverges from Hillside Avenue to allow access to Putnam Avenue. Hillside Avenue consists of an exclusive through lane and a shared through and left turn lane.

Hillside Avenue at Byram Traffic Circle East

The east extent of the Byram Traffic Circle intersects Hillside Avenue from the south to form a three-legged yield controlled intersection. The Byram Traffic Circle approach consists of a single yield controlled lane providing access to the two westbound only Hillside Avenue lanes.

The traffic volumes as reported in the Traffic Impact and Access Study for Mixed Use Development on 777 Putnam Avenue, prepared by Frederick P. Clark Associates and dated July 2017, represent the existing conditions traffic volumes and are depicted in **Figure 2**. To be conservative, the Project Team used the 2019 Build Conditions traffic volumes to incorporate both ambient traffic growth and other area developments.



LEGEND

000 (000)

AM Peak — PM Peak

**EXISTING CONDITIONS
PEAK HOUR TRAFFIC VOLUMES**

FIGURE 2

4. CONSTRUCTION SCENARIO ROADWAY AND TRAFFIC VOLUME NETWORKS

Each construction scenario anticipates temporary traffic control patterns which modify the existing roadway network to facilitate the flow of traffic during construction. The following describes the restrictions to traffic flow throughout the study network relative to each construction scenario.

Scenario 1 – North Bridge Closure

Under this scenario, the North Bridge, along Hillside Avenue will be closed to traffic. West Putnam Avenue and Putnam Avenue will be converted to two-way roadways under the temporary traffic conditions, providing one eastbound and one westbound lane.

Due to the closure of westbound lanes along Hillside Avenue, the Byram Traffic Circle East and West extents are anticipated to be unused. The Byram Traffic Circle West connector may provide local access only to the service station located adjacent to it.

Byram Road will provide only left turn and right turn access at West Putnam Avenue.

The associated traffic volume network depicting anticipated traffic volumes during Scenario 1 are depicted in **Figure 3**.

Scenario 2 – South Bridge Closure

Under this scenario, the South Bridge, along West Putnam Avenue will be closed to traffic. Hillside Avenue and Putnam Avenue will be converted to two-way roadways under the temporary traffic conditions, providing one eastbound and one westbound lane.

The North Main Street approach to Putnam Avenue will only provide left turn access onto Putnam Avenue.

The Byram Traffic Circle East and West extents are anticipated to be operational under this scenario. Furthermore, the Byram Traffic Circle West connector may allow two-way traffic to facilitate access for North Main Street traffic to the temporary eastbound Hillside Avenue lane.

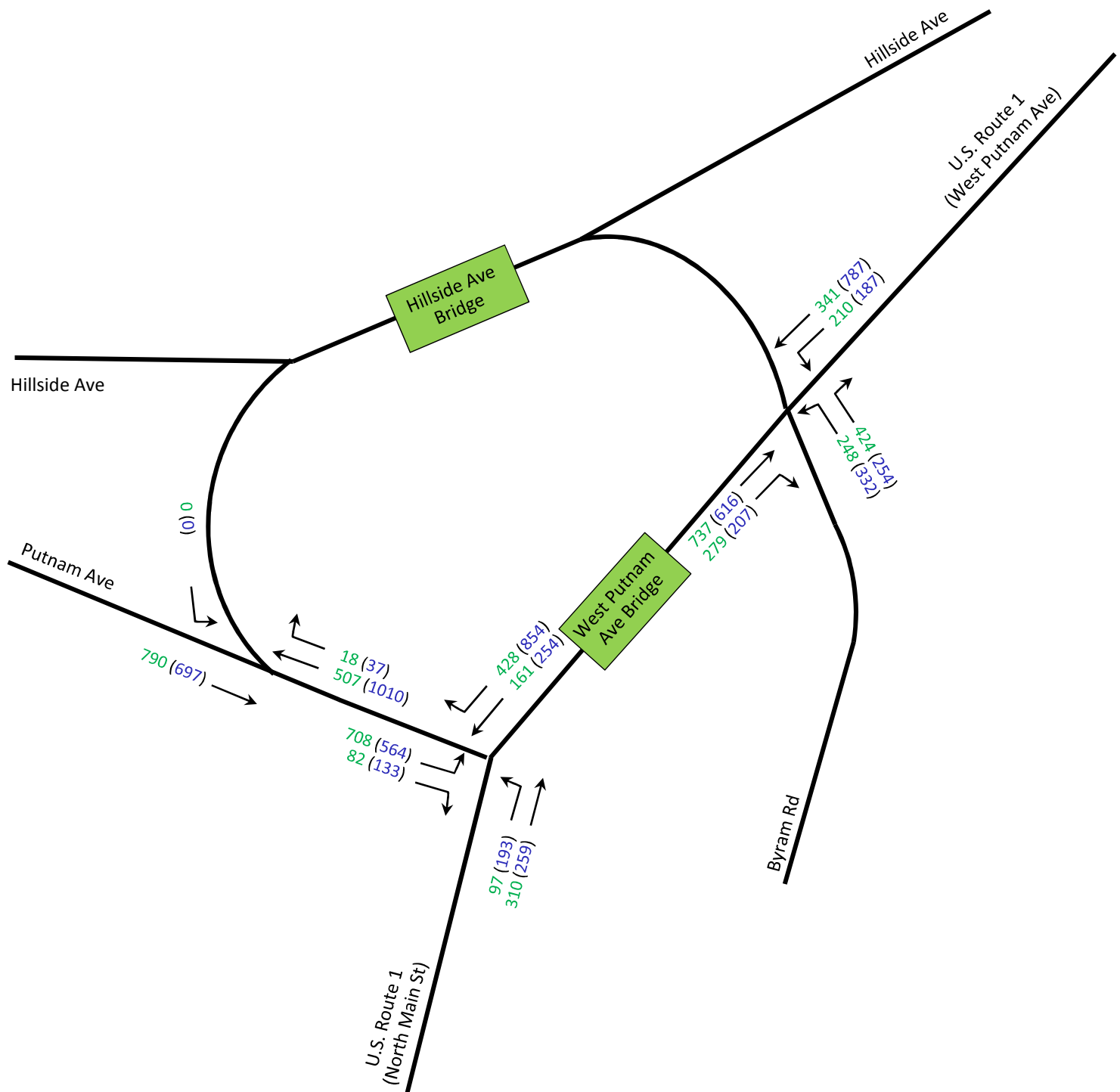
The associated traffic volume network depicting anticipated traffic volumes during Scenario 2 are depicted in **Figure 4**.

Scenario 3 – Partial Closure of Both Bridges

Under this scenario, the South Bridge and North Bridge will be restricted to one lane flow, but will retain the directionality of traffic currently provided today. Hillside Avenue will provide one lane westbound while West Putnam Avenue will provide one lane eastbound.

No other temporary changes to the study roadways or intersections are introduced.

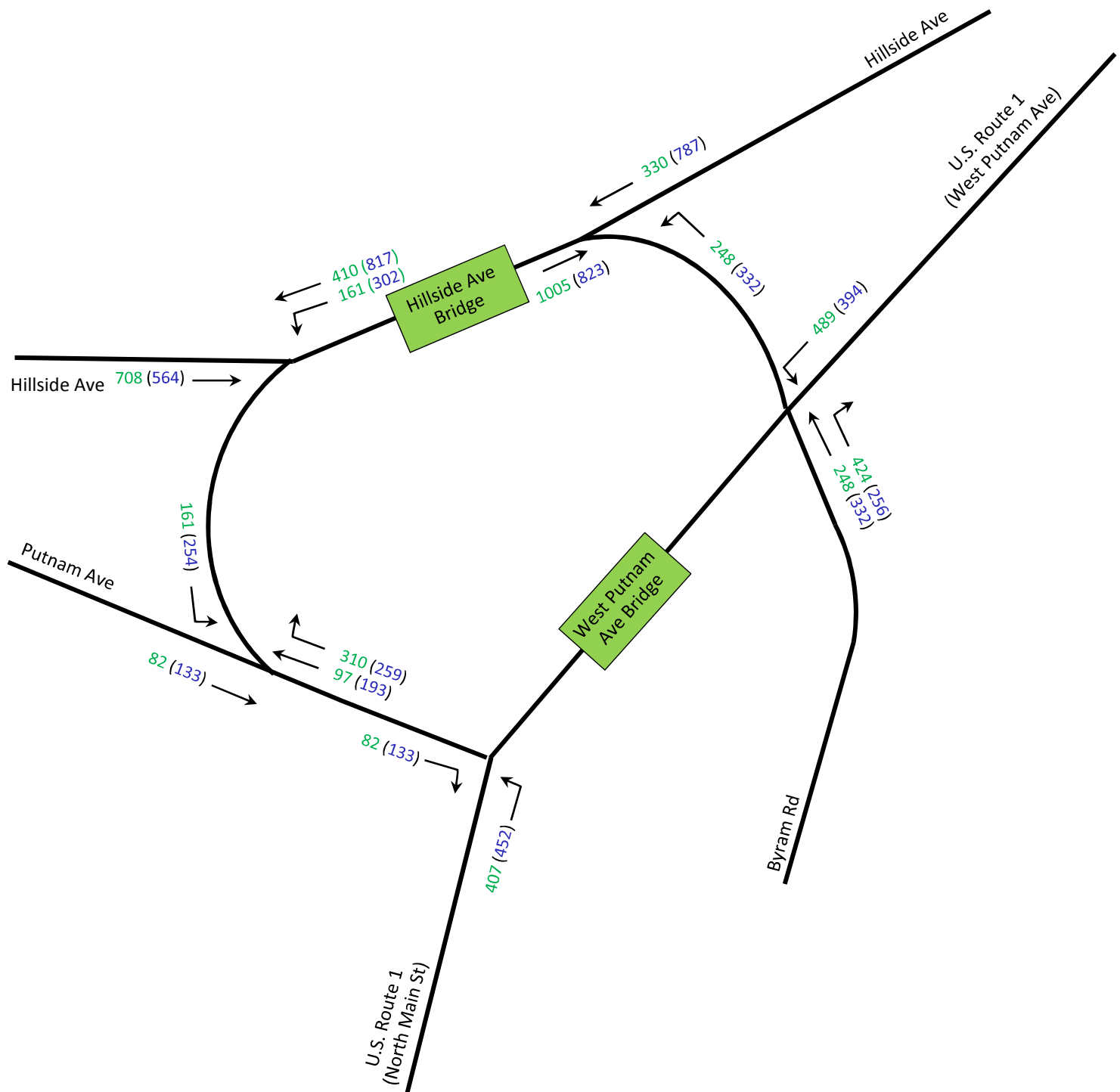
The associated traffic volume network depicting anticipated traffic volumes during Scenario 3 are depicted in **Figure 5**.



LEGEND

000 (000)
AM Peak — PM Peak

**SCENARIO 1
PEAK HOUR TRAFFIC VOLUMES**



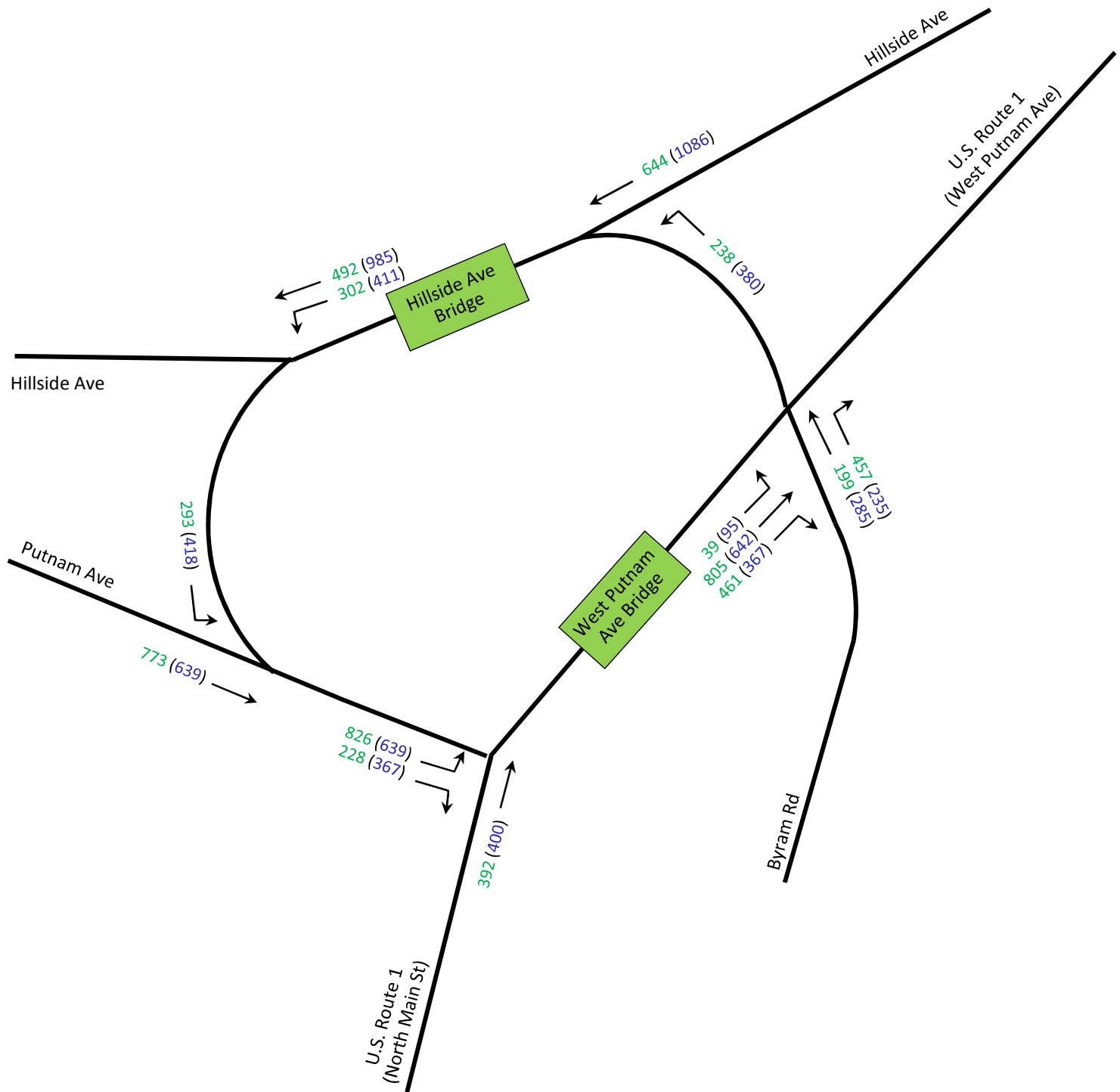
LEGEND

000 (000)

AM Peak PM Peak

SCENARIO 2
PEAK HOUR TRAFFIC VOLUMES

FIGURE 4



LEGEND

000 (000)
AM Peak — PM Peak

**SCENARIO 3
PEAK HOUR TRAFFIC VOLUMES**

FIGURE 5

Scenario 4 – Partial Closure of North Bridge

Under this scenario, the North Bridge will be restricted to one lane flow. Hillside Avenue will retain the westbound directionality of traffic currently provided today. West Putnam Avenue will provide one lane eastbound and one lane westbound.

The eastbound West Putnam Avenue lane could be signed to provide access to North Main Street to reduce left turning vehicles onto Byram Road while opposing uninterrupted eastbound traffic.

Vehicles destined for Byram Road from points east of the study area could utilize the Byram Traffic Circle West connector to Putnam Avenue, turn onto West Putnam Avenue and turn right into Byram Road.

No other temporary changes to the study roadways or intersections are introduced.

The associated traffic volume network depicting anticipated traffic volumes during Scenario 4 are depicted in **Figure 6**.

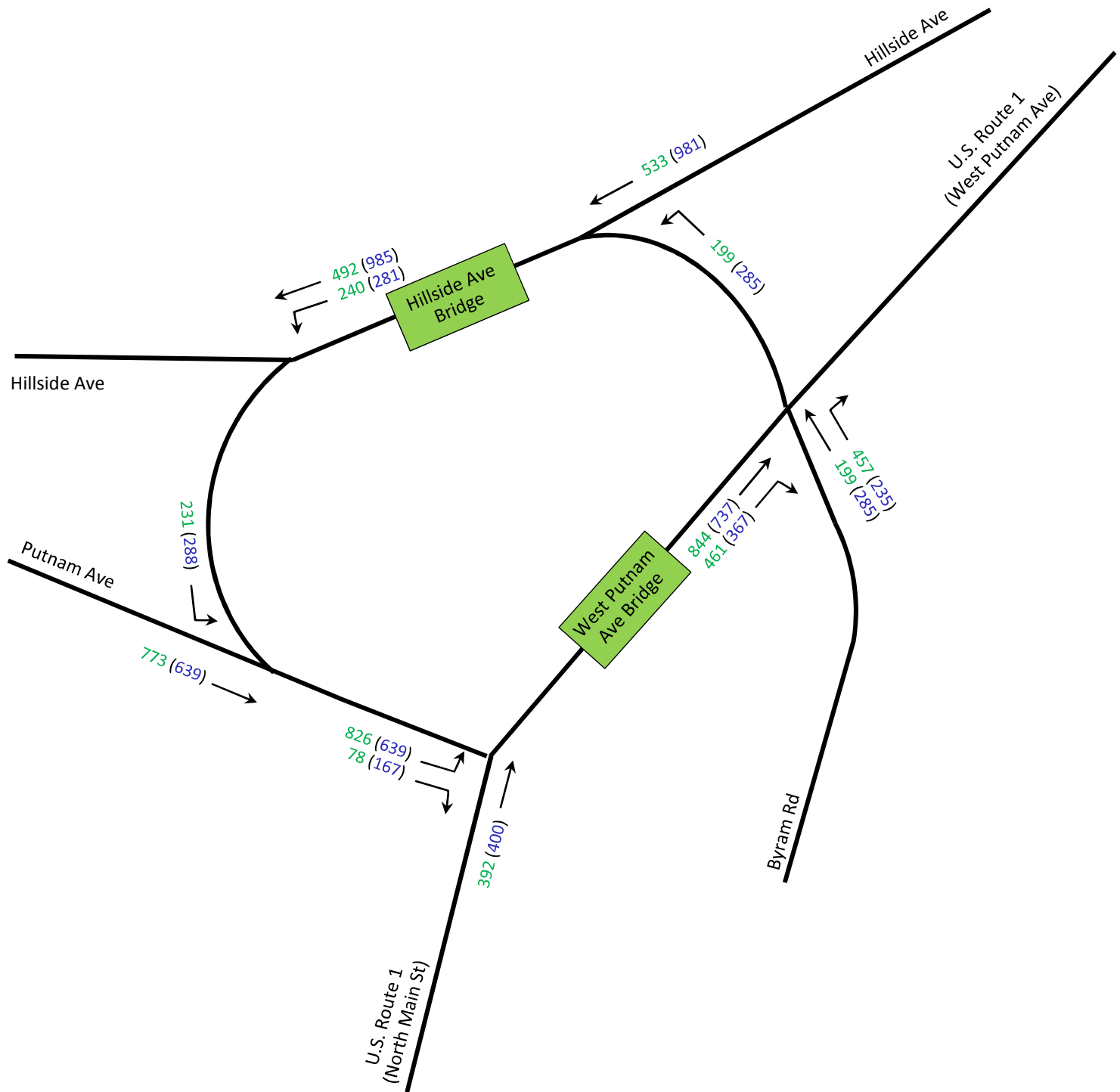
Scenario 5 – Partial Closure of South Bridge

Under this scenario, the South Bridge will be restricted to one lane flow. West Putnam Avenue will retain the eastbound directionality of traffic currently provided today. Hillside Avenue will provide one lane eastbound and one lane westbound.

This configuration will allow vehicles originating west of the study area and destined for points east of the study area to bypass the intersections of Putnam Avenue at North Main Street and West Putnam Avenue at Byram Road by travelling directly through eastbound Hillside Avenue.

No other temporary changes to the study roadways or intersections are introduced.

The associated traffic volume network depicting anticipated traffic volumes during Scenario 5 are depicted in **Figure 7**.

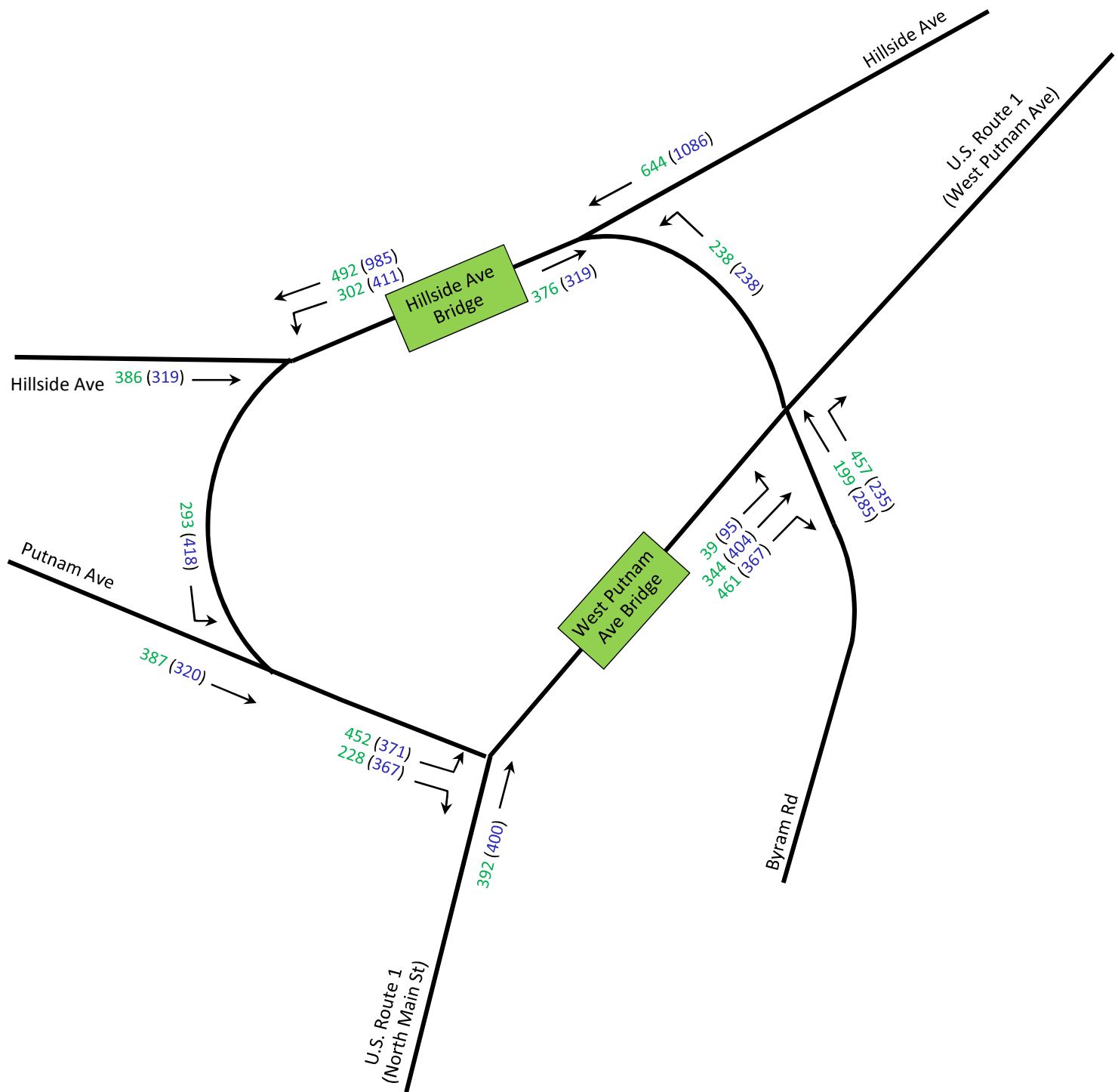


LEGEND

000 (000)
AM Peak — PM Peak

SCENARIO 4
PEAK HOUR TRAFFIC VOLUMES

FIGURE 6



LEGEND

000 (000)

AM Peak

PM Peak

**SCENARIO 5
PEAK HOUR TRAFFIC VOLUMES**

FIGURE 7

5. TRAFFIC OPERATIONS ANALYSIS

Intersection Performance Measures

The traffic operations analysis was conducted in accordance with current Highway Capacity Manual (HCM) 2010 standards. The Existing Conditions and each Construction Scenario were modeled under Weekday AM and PM Peak hour conditions in Synchro 9 traffic analysis software.

Critical performance measures evaluated for study area intersections using Synchro 9 include:

- Level of Service (Definition Below)
- Delay (in seconds)
- 95th Percentile Queue (in feet)

Level of Service (LOS) analysis provides a measurement of the delay experienced at an intersection as a result of traffic operations at that intersection. In general, there are six levels of service; Level of Service A to Level of Service F.

The highest, Level of Service A, describes a condition of free flow, with low volumes and high speeds. Level of Service B represents a stable traffic flow with operating speeds beginning to be restricted somewhat by traffic conditions. Level of Service C, which is normally utilized for design purposes, describes a stable condition of traffic operation. It entails moderately restricted movements due to higher traffic volumes, but traffic conditions are not objectionable to motorists. Level of Service D reflects a condition of more restrictive movements for motorists and influence of congestion becomes more noticeable. Level of Service E is representative of the actual capacity of the roadway or intersection and involves delay to all motorists due to congestion. The lowest, Level of Service F, is described as force flow and is characterized by volumes greater than the theoretical roadway capacity. Complete congestion occurs, and in extreme cases, the volume passing a given point drops to zero. This is considered an unacceptable traffic operating condition.

95th Percentile Queue refers to the vehicle queue formed under traffic volumes which will only be exceeded 5% of the time.

Table 1 below defines the performance parameter ratings for un-signalized intersections.

Table 1. LOS Criteria

Level of Service	Un-Signalized Intersections
	CONTROL DELAY PER VEHICLE (SECONDS)
A	≤10
B	>10 AND ≤15

C	>15 AND ≤25
D	>25 AND ≤35
E	>35 AND ≤50
F	>50

Source: 2010 Highway Capacity Manual, Transportation Research Board

Capacity Analysis Results

The following tables, **Tables 2 and 3**, detail the estimated traffic operations under Existing Condition and each Construction Scenario.

As shown in **Table 2**, there are several intersection approaches which are estimated to operate at unacceptable Levels of Service under Existing Conditions. These approaches and corresponding lanes are listed below:

Location: Hillside Avenue at Byram Traffic Circle East
 Approach/Lane: Northbound Byram Traffic Circle East
 Peak Hour: PM Peak

Location: Putnam Avenue at North Main Street
 Approach/Lane: Eastbound Putnam Avenue Left Turn
 Peak Hour: AM & PM Peak

Location: West Putnam Avenue at Byram Road
 Approach/Lane: Northbound Byram Road Through Lane
 Northbound Byram Road Right Turn Lane
 Peak Hour: AM & PM Peak

Table 2. Capacity Analysis – Existing Conditions, Scenario 1, and Scenario 2

		Existing Conditions				Scenario 1				Scenario 2			
		Weekday A.M. Peak		Weekday P.M. Peak		Weekday A.M. Peak		Weekday P.M. Peak		Weekday A.M. Peak		Weekday P.M. Peak	
Intersection	Lane Group	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Hillside Avenue / Byram Traffic Circle East	WB Hillside Avenue	0.0	A	0.0	A	-	-	-	-	0.0	A	0.0	A
	EB Hillside Avenue	-	-	-	-	-	-	-	-	0.0	A	0.0	A
	NB Byram Road	14.9	B	60.4	F	-	-	-	-	711.1	F	UNK*	F
Hillside Avenue / Byram Traffic Circle West	WB Hillside Avenue	-	-	-	-	-	-	-	-	0.0	A	0.0	A
	WBL Hillside Avenue	-	-	-	-	-	-	-	-	3.5	A	7.7	A
	EB Hillside Avenue	-	-	-	-	-	-	-	-	0.0	A	0.0	A
	NB Byram Circle	-	-	-	-	-	-	-	-	70.2	F	27.2	D
Putnam Avenue / Byram Traffic Circle West	EB Putnam Avenue	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	SB Byram Circle	19.5	C	24.7	C	0.0	A	0.0	A	0.0	A	17.3	C
	NB Main Street	-	-	-	-	-	-	-	-	12.4	B	0.0	A
Putnam Avenue / North Main Street	EBR Putnam Avenue	9.3	A	10.2	B	-	-	-	-	-	-	-	-
	EBL Putnam Avenue	268.2	F	130.3	F	UNK*	F	UNK*	F	-	-	-	-
	NB Main Street	0.0	A	0.0	A	3.2	A	9.9	A	-	-	-	-
	SB Main Street	-	-	-	-	0.0	A	0.0	A	-	-	-	-
West Putnam Avenue / Byram Road	EB Putnam Avenue	0.4	A	1.1	A	0.0	A	0.0	A	8.2	A	8.0	A
	WB Putnam Avenue	-	-	-	-	8.9	A	6.9	A	-	-	-	-
	NB Byram Road	423.9	F	468.2	F	-	-	-	-	-	-	-	-
	NBR Byram Road	423.9	F	468.2	F	UNK	F	UNK	F	376.6	F	285.3	F
	NBL Byram Road	-	-	-	-	UNK	F	UNK	F	376.6	F	285.3	F

* Under Scenario 1, this approach consists of one shared right and left turn lane.

UNK: Indicates capacity is exceeded and delay is greater than typical computational values.

Table 3. Capacity Analysis – Scenario 3, Scenario 4, and Scenario 5

		Scenario 3				Scenario 4				Scenario 5			
		Weekday A.M. Peak		Weekday P.M. Peak		Weekday A.M. Peak		Weekday P.M. Peak		Weekday A.M. Peak		Weekday P.M. Peak	
Intersection	Lane Group	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Hillside Avenue / Byram Traffic Circle East	WB Hillside Avenue	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	EB Hillside Avenue	-	-	-	-	-	-	-	-	0.0	A	0.0	A
	NB Byram Road	14.9	B	60.4	F	18.6	C	186.2	F	138.9	F	533.8	F
Hillside Avenue / Byram Traffic Circle West	WB Hillside Avenue	-	-	-	-	-	-	-	-	0.0	A	0.0	A
	WBL Hillside Avenue	-	-	-	-	-	-	-	-	9.4	A	9.6	A
	EB Hillside Avenue	-	-	-	-	-	-	-	-	0.0	A	0.0	A
Putnam Avenue / Byram Traffic Circle West	EB Putnam Avenue	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	SB Byram Circle	19.5	C	24.7	C	16.5	C	16.5	C	13.1	B	15.3	C
Putnam Avenue / North Main Street	EBR Putnam Avenue	9.3	A	10.2	B	9.5	A	10.6	B	9.3	A	10.2	B
	EBL Putnam Avenue	268.2	F	130.3	F	436.5	F	306.8	F	35.2	E	24.3	C
	NB Main Street	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	SB Main Street	-	-	-	-	0.0	A	0.0	A	-	-	-	-
West Putnam Avenue / Byram Road	EB Putnam Avenue	1.1	A	1.8	A	0.0	A	0.0	A	0.7	A	1.6	A
	NB Byram Road	847.1	F	537.2	F	N/A	F	648.2	F	106.1	F	221.5	F
	NBR Byram Road	847.1	F	537.2	F	N/A	F	648.2	F	106.1	F	221.5	F

As shown in **Table 2**, under Scenario 1, the intersection approaches of Putnam Avenue at North Main Street and Byram Road at West Putnam Avenue are anticipated to exceed capacity. With two-way one lane travel along West Putnam Avenue, the Byram Road approach to the intersection is not anticipated to process the vehicle demand within the AM and PM peak hours. In addition, the Putnam Avenue approach will exceed capacity due to the existing two lane approach being consolidated to one lane along with additional delay due to waiting for westbound West Putnam Avenue traffic turning onto North Main Street southbound.

As shown in **Table 2**, under Scenario 2, the northbound Byram Traffic Circle East connector approach to Hillside Avenue is anticipated to exceed capacity during the PM Peak Hour and operate at unacceptable Level of Service F during the AM Peak Hour due to the two-way one lane travel along Hillside Avenue. In addition, the northbound Byram Road approach to West Putnam Avenue is forecast to operate at unacceptable Level of Service F due to the potential access to southbound Byram Road from westbound West Putnam Avenue. However, the delay anticipated along this approach is less than what is estimated under current conditions due to the absence of conflicting vehicles along the eastbound West Putnam Avenue approach.

As shown in **Table 3**, there are several intersection approaches which are anticipated to operate at unacceptable Levels of Service during Construction Scenario 3. These approaches and corresponding lanes are listed below:

Location:	Hillside Avenue at Byram Traffic Circle East
Approach/Lane:	Northbound Byram Traffic Circle East
Peak Hour:	PM Peak
Location:	Putnam Avenue at North Main Street
Approach/Lane:	Eastbound Putnam Avenue Left Turn
Peak Hour:	AM & PM Peak
Location:	West Putnam Avenue at Byram Road
Approach/Lane:	Northbound Byram Road Through Lane Northbound Byram Road Right Turn Lane
Peak Hour:	AM & PM Peak

It should be noted that the northbound Byram Traffic Circle East and Eastbound Putnam Avenue Left Turn approaches are not anticipated to be impacted by the temporary traffic control during construction. The poor operations at these approaches are due to current traffic conditions. The Byram Road approach lanes, however are anticipated to experience greater delay due to the reduction of travel lanes along West Putnam Avenue. By reducing the travel lanes from two to one, West Putnam Avenue traffic is confined to one lane creating fewer vehicle gaps for Byram Road traffic to negotiate.

As shown in **Table 3**, the same intersection approaches are anticipated to operate at unacceptable Levels of Service during Construction Scenario 4 as noted under Scenario 3. The potential temporary traffic control conditions are anticipated to exacerbate the higher vehicle

delay along these approaches. The reduction in travel lanes along Hillside Avenue and West Putnam Avenue and anticipated to increase delay for vehicles attempting to enter into those roadways.

Relative to Construction Scenario 5, as shown in **Table 3**, there are several intersection approaches which are anticipated to operate at unacceptable Levels of Service. The intersection approaches anticipated to experience unacceptable delay are as follows:

Location:	Hillside Avenue at Byram Traffic Circle East
Approach/Lane:	Northbound Byram Traffic Circle East
Peak Hour:	AM & PM Peak
Location:	Putnam Avenue at North Main Street
Approach/Lane:	Eastbound Putnam Avenue Left Turn
Peak Hour:	AM Peak
Location:	West Putnam Avenue at Byram Road
Approach/Lane:	Northbound Byram Road Through Lane Northbound Byram Road Right Turn Lane
Peak Hour:	AM & PM Peak

The potential temporary traffic control conditions under Scenario 5, however, are anticipated to improve operations for several intersection approaches compared to Existing Conditions. Despite operating at unacceptable Levels of Service, the following intersection approaches may experience less delay under Scenario 5 conditions:

Location:	Putnam Avenue at North Main Street
Approach/Lane:	Eastbound Putnam Avenue Left Turn
Peak Hour:	AM Peak
Location:	West Putnam Avenue at Byram Road
Approach/Lane:	Northbound Byram Road Through Lane Northbound Byram Road Right Turn Lane
Peak Hour:	AM & PM Peak

The eastbound Putnam Avenue approach to North Main Street is anticipated to improve from a Level of Service F during the PM Peak under Existing Conditions to a Level of Service C under Scenario 5 due to a large portion of eastbound traffic being diverted from Putnam Avenue to Hillside Avenue.

Queue Analysis Results

The following tables, **Tables 4 and 5**, detail the estimated queue conditions under Existing Condition and each Construction Scenario.

Table 4: Queue Lengths – Existing Conditions, Scenario 1, and Scenario 2

			Existing Conditions		Scenario 1		Scenario 2	
			Weekday A.M. Peak	Weekday P.M. Peak	Weekday A.M. Peak	Weekday P.M. Peak	Weekday A.M. Peak	Weekday P.M. Peak
Intersection	Lane Group	Available Storage (ft)	95 th Percentile Queue Length (ft)		95 th Percentile Queue Length (ft)		95 th Percentile Queue Length (ft)	
Hillside Avenue / Byram Traffic Circle East	NB Byram Circle	110	51	274	-	-	639	UNK
Hillside Avenue / Byram Traffic Circle West	WBL Hillside Avenue	250	-	-	-	-	20	38
	NBR Byram Circle	175	-	-	-	-	245	112
Putnam Avenue / Byram Traffic Circle West	SB Byram Circle	175	88	155	-	-	25	63
Putnam Avenue / North Main Street	EBR Putnam Avenue	150	22	43	UNK*	UNK*	-	-
	EBL Putnam Avenue	150	1159	625	UNK*	UNK*	-	-
West Putnam Avenue / Byram Road	NB Byram Road	300	1152	980	-	-	-	-
	NBR Byram Road	50	1152	980	UNK	UNK	1096	849
	NBL Byram Road	300	-	-	UNK	UNK	1096	849

* Under Scenario 1, this approach consists of one shared right and left turn lane.
UNK: Indicates capacity is exceeded and queue length is greater than typical computational values.
BOLD – Indicates queue length exceeds available storage

Table 5: Queue Lengths – Scenario 3, Scenario 4, and Scenario 5

			Scenario 3		Scenario 4		Scenario 5	
			Weekday A.M. Peak	Weekday P.M. Peak	Weekday A.M. Peak	Weekday P.M. Peak	Weekday A.M. Peak	Weekday P.M. Peak
Intersection	Lane Group	Available Storage (ft)	95 th Percentile Queue Length (ft)		95 th Percentile Queue Length (ft)		95 th Percentile Queue Length (ft)	
Hillside Avenue / Byram Traffic Circle East	NB Byram Circle	110	51	274	58	387	292	522
Hillside Avenue / Byram Traffic Circle West	WBL Hillside Avenue	250	-	-	-	-	29	42
Putnam Avenue / Byram Traffic Circle West	SB Byram Circle	175	88	155	57	71	52	91
Putnam Avenue / North Main Street	EBR Putnam Avenue	150	22	43	8	21	22	43
	EBL Putnam Avenue	150	1159	625	1477	985	223	138
West Putnam Avenue / Byram Road	NB Byram Road	300	1506	1037	N/A	1114	561	687
	NBR Byram Road	50	1506	1037	N/A	1114	561	687

BOLD – Indicates queue length exceeds available storage

As shown in **Table 4**, there are several intersection approach queue lengths which are estimated to exceed the available storage under Existing Conditions. These approaches and corresponding lanes are listed below:

Location:	Hillside Avenue at Byram Traffic Circle East
Approach/Lane:	Northbound Byram Traffic Circle East
Peak Hour:	PM Peak

Location:	Putnam Avenue at North Main Street
Approach/Lane:	Eastbound Putnam Avenue Left Turn
Peak Hour:	AM & PM Peak

Location:	West Putnam Avenue at Byram Road
Approach/Lane:	Northbound Byram Road Through Lane Northbound Byram Road Right Turn Lane
Peak Hour:	AM & PM Peak

These approaches correspond to those which experience longer delays and operate at unacceptable Levels of Service.

As shown in **Table 4**, under Scenario 1, the intersection approaches of Putnam Avenue at North Main Street and Byram Road at West Putnam Avenue are anticipated to generate queue lengths which exceed the available storage. As these approaches exceed capacity, the queue lengths are indeterminable.

As shown in **Table 4**, under Scenario 2, the queue along the northbound Byram Traffic Circle East connector approach to Hillside Avenue is anticipated to exceed the available storage during all Peak Hours due to the two-way one lane travel along Hillside Avenue. In addition, the vehicle queue along northbound Byram Road approach to West Putnam Avenue is forecast to exceed the available storage due to the potential access to southbound Byram Road from westbound West Putnam Avenue. However, the queue length anticipated along this approach is less than what is estimated under current conditions due to the absence of conflicting vehicles along the eastbound West Putnam Avenue approach.

As shown in **Table 5**, the intersection approach queue lengths which are estimated to exceed available storage under Existing Conditions are anticipated to exceed available storage under Construction Scenario 3, also.

Again, the northbound Byram Traffic Circle East and Eastbound Putnam Avenue Left Turn approaches are not anticipated to be impacted by the temporary traffic control during construction. The longer vehicle queues at these approaches are due to current traffic conditions. The Byram Road approach lanes, however are anticipated to experience an increase in vehicle queues due to the reduction of travel lanes along West Putnam Avenue. By reducing the travel

lanes from two to one, West Putnam Avenue traffic is confined to one lane creating fewer vehicle gaps for Byram Road traffic to negotiate.

As shown in **Table 5**, the vehicle queue lengths for those approaches which exceed available storage under Scenario 3 are anticipated to increase further during Construction Scenario 4. The reduction in travel lanes along Hillside Avenue and West Putnam Avenue and anticipated to increase delay for vehicles attempting to enter into those roadways.

Relative to Construction Scenario 5, as shown in **Table 5**, the intersection approaches anticipated to generate vehicle queue lengths which exceed available storage include:

Location:	Hillside Avenue at Byram Traffic Circle East
Approach/Lane:	Northbound Byram Traffic Circle East
Peak Hour:	AM & PM Peak

Location:	Putnam Avenue at North Main Street
Approach/Lane:	Eastbound Putnam Avenue Left Turn
Peak Hour:	AM Peak

Location:	West Putnam Avenue at Byram Road
Approach/Lane:	Northbound Byram Road Through Lane Northbound Byram Road Right Turn Lane
Peak Hour:	AM & PM Peak

The potential temporary traffic control conditions under Scenario 5, however, are anticipated to improve operations for several intersection approaches compared to Existing Conditions. Despite generating vehicle queue lengths which exceed available storage, the following intersection approaches may experience reduced queue lengths under Scenario 5 conditions:

Location:	Putnam Avenue at North Main Street
Approach/Lane:	Eastbound Putnam Avenue Left Turn
Peak Hour:	AM Peak

Location:	West Putnam Avenue at Byram Road
Approach/Lane:	Northbound Byram Road Through Lane Northbound Byram Road Right Turn Lane
Peak Hour:	AM & PM Peak

Supplemental Microsimulation Analysis

Table 2 (Capacity Analysis – Existing Conditions, Scenario 1, and Scenario 2) indicates that several delay values exceed the deterministic computational values programmed in Synchro 9 from HCM 2010 standards. These values were required to determine road user cost as part of the project cost-benefit analysis. In order to estimate all delay values within the project area, a

supplemental microsimulation analysis was conducted using SimTraffic 9 software. This software provides a stochastic simulation of the modeled network, measuring the performance of each individual vehicle as it moves through the system. The aggregate performance values of all vehicles comprise the performance at each project location. The microsimulation output provided for the use of user cost estimation is summarized in Attachment C.

Conclusions and Future Considerations

The proposed replacement of the Byram River bridges will require a thoroughly assessed plan for temporary traffic control during construction. The Project Team has evaluated the existing conditions of the study area along with five (5) potential options for temporary traffic control to assess the impacts of roadway closures or modifications during construction.

- Scenario 1 – North Bridge Closure
- Scenario 2 – South Bridge Closure
- Scenario 3 – Partial Closure of Both Bridges
- Scenario 4 – Partial Closure of North Bridge
- Scenario 5 – Partial Closure of South Bridge

As noted under the Traffic Operations Analysis section, the study area is estimated to currently operate with operational deficiencies in terms of vehicle delay and vehicle queuing at several locations:

- Northbound Byram Traffic Circle East approach to Hillside Avenue
- Eastbound Putnam Avenue Left Turn approach to North Main Street
- Byram Road approach to West Putnam Avenue

These approaches represent critical components to the functionality of the roadway infrastructure surrounding the Byram River bridges. Byram Road serves as the main access from I-95 Exit 2 to U.S. Route 1 northbound and southbound as well as Hillside Avenue. The Byram Traffic Circle East connector serves as the main access from I-95 Exit 2 to westbound Hillside Avenue and U.S. Route 1 southbound. Putnam Avenue provides eastbound access to U.S. Route 1 southbound, U.S. Route 1 northbound as well as I-95 Exit 2 via Byram Road.

The analysis findings of Scenario 1 indicate that Hillside Avenue and the north bridge provide a critical means of access through the study area. The potential closure of the north bridge is anticipated to result in the surrounding study intersections exceeding their operating capacity and being unable to serve the resulting vehicle demand due to the redistribution of traffic. Additional analysis of potential improvements to accommodate the traffic would be necessary.

The analysis findings of Scenario 2 indicate that study intersections may accommodate the potential closure of the south bridge with the exception of operational deficiencies along the Byram Traffic Circle East connector. Additional analysis of potential improvements to accommodate the traffic along this segment to better facilitate traffic during construction would be beneficial.

The analysis findings of Scenario 3 indicate that study intersections may accommodate the potential closure of the one lane along each bridge with the exception of the northbound Byram Road approach to West Putnam Avenue which would be anticipated to experience operational deficiencies due to increased difficulty crossing or merging with West Putnam Avenue traffic restricted to one lane. Additional analysis of potential improvements to accommodate the traffic along this segment to better facilitate traffic during construction would be beneficial.

The analysis findings of Scenario 4 indicate that construction activities would exacerbate operational deficiencies at study intersections already deficient under Existing Conditions. Again, additional analysis of potential improvements to accommodate the traffic along this segment to better facilitate traffic during construction would be beneficial.

The analysis findings of Scenario 5 indicate that study intersections may accommodate the construction activities with the exception of operational deficiencies along the Byram Traffic Circle East connector. The forecasted traffic operations at many intersections, in fact, improve compared to Existing Conditions. Additional analysis of potential improvements to accommodate the traffic along the Byram Traffic Circle East connector to better facilitate traffic during construction would be beneficial.

In general, potential improvements during construction that could be considered to mitigate the exacerbation of operational deficiencies include:

- Additional larger scale detours
- Temporary intersection widening to provide auxiliary lanes
- Temporary intersection traffic signal control

6. ATTACHMENTS:

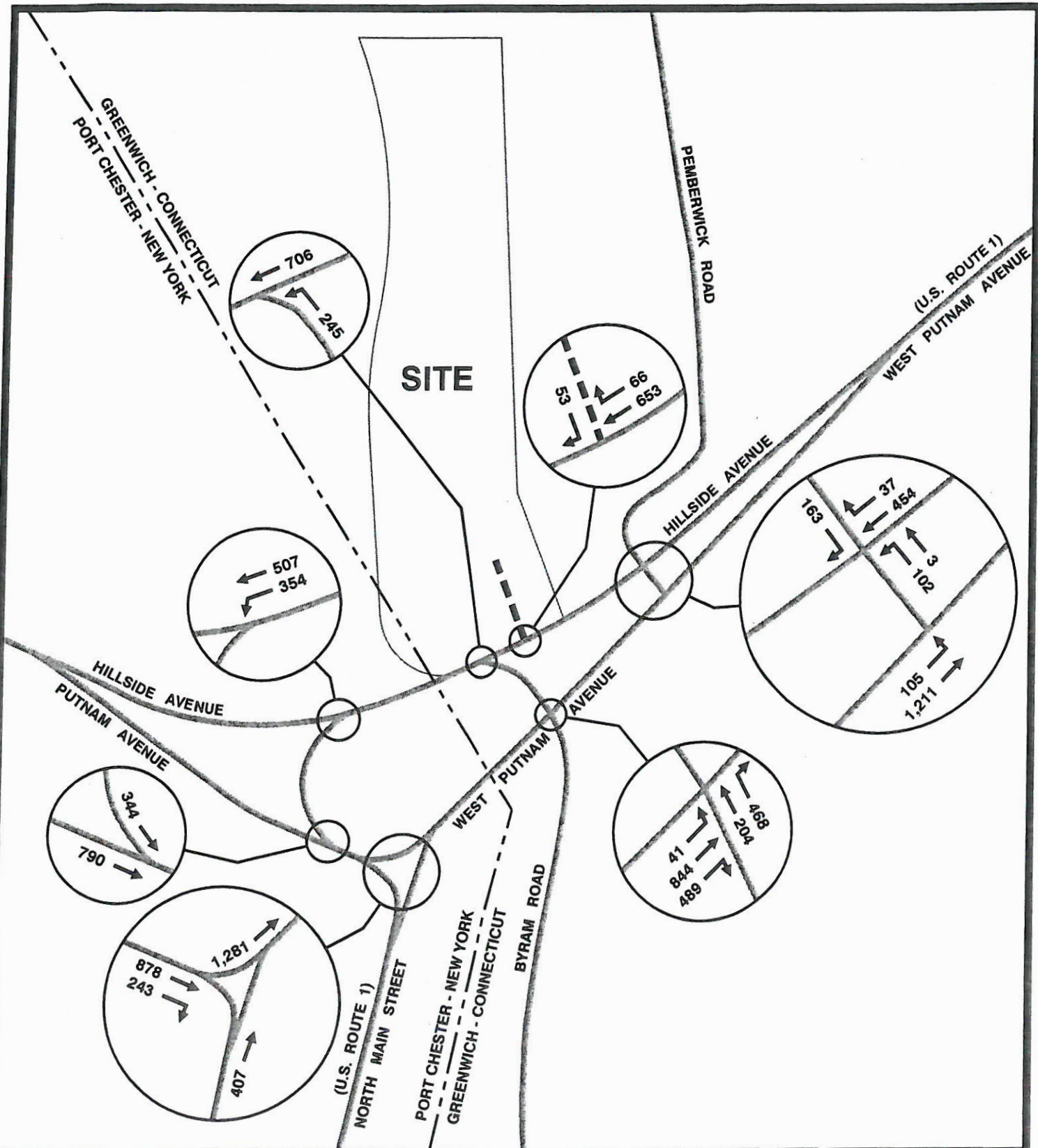
Attachment A - 2019 Build Conditions traffic volumes from Traffic Impact and Access Study for Mixed Use Development on 777 Putnam Avenue, prepared by Frederick P. Clark Associates and dated July 2017

Attachment B - Synchro Analysis Reports
B1. Existing Conditions
B2. Construction Scenario 1
B3. Construction Scenario 2
B4. Construction Scenario 3
B5. Construction Scenario 4
B6. Construction Scenario 5

Attachment C - Microsimulation SimTraffic Analysis
C1. Analysis Summary Tables
SimTraffic Analysis Reports
C2. Existing Conditions
C3. Construction Scenario 1
C4. Construction Scenario 2
C5. Construction Scenario 3
C6. Construction Scenario 4
C7. Construction Scenario 5

Attachment A

2019 Build Conditions traffic volumes from Traffic Impact and Access Study for
Mixed Use Development on 777 Putnam Avenue, prepared by Frederick P. Clark
Associates and dated July 2017



Note: The 2019 Build Traffic Volumes include the 2019 No-Build Traffic Volumes and the Site Traffic Generation.

LEGEND

- — — — — SITE ACCESS DRIVE
- - - - - TOWN/STATE LINE

**2019 BUILD TRAFFIC VOLUMES
WEEKDAY MORNING PEAK HOUR**

**MIXED-USE DEVELOPMENT
777 West Putnam Avenue
Greenwich, Connecticut**



FREDERICK P. CLARK ASSOCIATES, INC.
PLANNING, TRANSPORTATION, ENVIRONMENT AND DEVELOPMENT
RYE, NEW YORK FAIRFIELD, CONNECTICUT

19

Not to Scale

Date: 4/27/17

GREENWICH - CONNECTICUT
PORT CHESTER - NEW YORK

SITE

PEMBERWICK ROAD

(U.S. ROUTE 1)
WEST PUTNAM AVENUE

HILLSIDE AVENUE

HILLSIDE AVENUE
PUTNAM AVENUE

PUTNAM AVENUE
WEST PUTNAM AVENUE

(U.S. ROUTE 1)
NORTH MAIN STREET

PORT CHESTER - NEW YORK
GREENWICH - CONNECTICUT

BYRAM ROAD

Note: The 2019 Build Traffic Volumes include the 2019 No-Build Traffic Volumes and the Site Traffic Generation.

LEGEND
 - - - - - SITE ACCESS DRIVE
 - - - - - TOWN/STATE LINE

**2019 BUILD TRAFFIC VOLUMES
WEEKDAY AFTERNOON PEAK HOUR**

**MIXED-USE DEVELOPMENT
777 West Putnam Avenue
Greenwich, Connecticut**

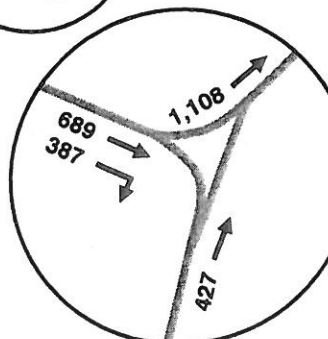
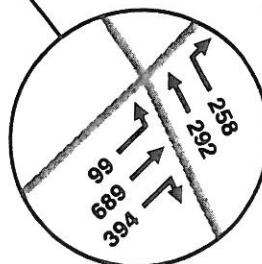
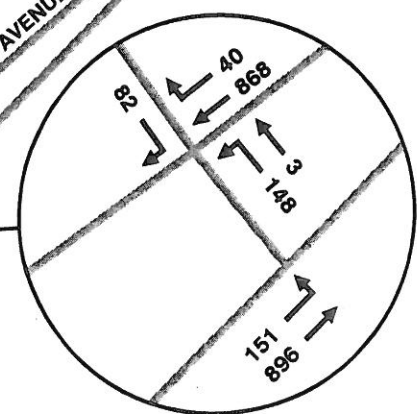
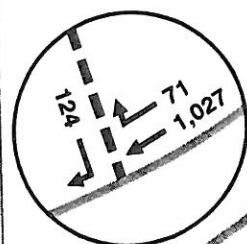
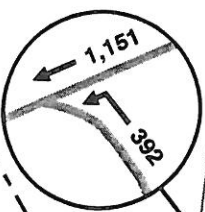
FREDERICK P. CLARK ASSOCIATES, INC.
PLANNING, TRANSPORTATION, ENVIRONMENT AND DEVELOPMENT
RYE, NEW YORK FAIRFIELD, CONNECTICUT



20

Not to Scale

Date: 4/27/17



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Attachment B

Synchro Analysis Reports

- B1. Existing Conditions
- B2. Construction Scenario 1
- B3. Construction Scenario 2
- B4. Construction Scenario 3
- B5. Construction Scenario 4
- B6. Construction Scenario 5







Westchester County Streams Byram River Basin Flood Risk Management Study Attachment B – Synchro Analysis Reports

Attachment B.1 Existing Conditions

HCM Unsignalized Intersection Capacity Analysis

3: HILLSIDE AVE.

Existing Conditions
AM Peak

						
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations				↑↑	↑	
Traffic Volume (veh/h)	0	0	0	644	238	0
Future Volume (Veh/h)	0	0	0	644	238	0
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	700	259	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		350	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		350	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		58	100
cM capacity (veh/h)			1622		621	1084
Direction, Lane #	WB 1	WB 2	NW 1			
Volume Total	350	350	259			
Volume Left	0	0	259			
Volume Right	0	0	0			
cSH	1700	1700	621			
Volume to Capacity	0.21	0.21	0.42			
Queue Length 95th (ft)	0	0	51			
Control Delay (s)	0.0	0.0	14.9			
Lane LOS			B			
Approach Delay (s)	0.0		14.9			
Approach LOS			B			
Intersection Summary						
Average Delay			4.0			
Intersection Capacity Utilization			37.7%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

4: BYRAM CIRCLE & HILLSIDE AVE.

Existing Conditions

AM Peak

	→	↗	↖	←	↘	↙
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations				↕↕		
Traffic Volume (veh/h)	0	0	302	492	0	0
Future Volume (Veh/h)	0	0	302	492	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.92	0.92
Hourly flow rate (vph)	0	0	321	523	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		904	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		904	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			80		100	100
cM capacity (veh/h)			1622		222	1084
Direction, Lane #	WB 1	WB 2				
Volume Total	495	349				
Volume Left	321	0				
Volume Right	0	0				
cSH	1622	1700				
Volume to Capacity	0.20	0.21				
Queue Length 95th (ft)	18	0				
Control Delay (s)	5.6	0.0				
Lane LOS	A					
Approach Delay (s)	3.3					
Approach LOS						
Intersection Summary						
Average Delay		3.3				
Intersection Capacity Utilization		50.4%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

5: PUTNAM AVE. & BYRAM CIRCLE

Existing Conditions
AM Peak












Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↱	
Traffic Volume (veh/h)	0	773	0	0	293	0
Future Volume (Veh/h)	0	773	0	0	293	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	840	0	0	318	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				420	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				420	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				43	100
cM capacity (veh/h)	1622				561	1084
Direction, Lane #	EB 1	EB 2	SB 1			
Volume Total	420	420	318			
Volume Left	0	0	318			
Volume Right	0	0	0			
cSH	1700	1700	561			
Volume to Capacity	0.25	0.25	0.57			
Queue Length 95th (ft)	0	0	88			
Control Delay (s)	0.0	0.0	19.5			
Lane LOS			C			
Approach Delay (s)	0.0		19.5			
Approach LOS			C			
Intersection Summary						
Average Delay			5.3			
Intersection Capacity Utilization			50.4%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: North Main Street & PUTNAM AVE.

Existing Conditions

AM Peak















						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	826	228	0	392	0	0
Future Volume (Veh/h)	826	228	0	392	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	898	248	0	426	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	426	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	426	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	77	100			
cM capacity (veh/h)	585	1085	1623			
Direction, Lane #	EB 1	EB 2	NB 1			
Volume Total	898	248	426			
Volume Left	898	0	0			
Volume Right	0	248	0			
cSH	585	1085	1700			
Volume to Capacity	1.53	0.23	0.25			
Queue Length 95th (ft)	1159	22	0			
Control Delay (s)	268.2	9.3	0.0			
Lane LOS	F	A				
Approach Delay (s)	212.1		0.0			
Approach LOS	F					
Intersection Summary						
Average Delay		154.6				
Intersection Capacity Utilization		73.1%		ICU Level of Service		D
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

7: West Putnam Avenue & Byram Road

Existing Conditions

AM Peak

										
Movement	NBL	NBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations						 				
Traffic Volume (veh/h)	199	457	0	0	39	805	461	0	0	0
Future Volume (Veh/h)	199	457	0	0	39	805	461	0	0	0
Sign Control	Stop		Stop			Free			Free	
Grade	0%		0%			0%			0%	
Peak Hour Factor	0.92	0.95	0.92	0.92	0.92	0.95	0.95	0.92	0.92	0.92
Hourly flow rate (vph)	216	481	0	0	42	847	485	0	0	0
Pedestrians										
Lane Width (ft)										
Walking Speed (ft/s)										
Percent Blockage										
Right turn flare (veh)		3								
Median type						None			None	
Median storage (veh)										
Upstream signal (ft)										
pX, platoon unblocked										
vC, conflicting volume	1174	666	616	1416	0			1332		
vC1, stage 1 conf vol										
vC2, stage 2 conf vol										
vCu, unblocked vol	1174	666	616	1416	0			1332		
tC, single (s)	6.5	6.9	7.5	6.5	4.1			4.1		
tC, 2 stage (s)										
tF (s)	4.0	3.3	3.5	4.0	2.2			2.2		
p0 queue free %	0	0	0	100	97			100		
cM capacity (veh/h)	186	402	0	133	1622			514		
Direction, Lane #	NB 1	NE 1	NE 2							
Volume Total	697	466	908							
Volume Left	0	42	0							
Volume Right	481	0	485							
cSH	374	1622	1700							
Volume to Capacity	1.87	0.03	0.53							
Queue Length 95th (ft)	1152	2	0							
Control Delay (s)	423.9	0.9	0.0							
Lane LOS	F	A								
Approach Delay (s)	423.9	0.3								
Approach LOS	F									
Intersection Summary										
Average Delay		142.9								
Intersection Capacity Utilization		73.1%				ICU Level of Service			D	
Analysis Period (min)		15								

HCM Unsignalized Intersection Capacity Analysis

3: HILLSIDE AVE.

Existing Conditions

PM Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↖	
Traffic Volume (veh/h)	0	0	0	1086	380	0
Future Volume (Veh/h)	0	0	0	1086	380	0
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1180	413	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		590	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		590	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		6	100
cM capacity (veh/h)			1622		439	1084
Direction, Lane #	WB 1	WB 2	NB 1			
Volume Total	590	590	413			
Volume Left	0	0	413			
Volume Right	0	0	0			
cSH	1700	1700	439			
Volume to Capacity	0.35	0.35	0.94			
Queue Length 95th (ft)	0	0	274			
Control Delay (s)	0.0	0.0	60.4			
Lane LOS			F			
Approach Delay (s)	0.0		60.4			
Approach LOS			F			
Intersection Summary						
Average Delay			15.7			
Intersection Capacity Utilization			101.0%	ICU Level of Service		G
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

4: BYRAM CIRCLE & HILLSIDE AVE.

Existing Conditions

PM Peak

	→	↘	↙	←	↗	↖
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations				↕↕		
Traffic Volume (veh/h)	0	0	411	985	0	0
Future Volume (Veh/h)	0	0	411	985	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.92	0.92
Hourly flow rate (vph)	0	0	437	1048	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0	1398	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0	1398	0	
tC, single (s)			4.1	6.8	6.9	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			73	100	100	
cM capacity (veh/h)			1622	96	1084	
Direction, Lane #	WB 1	WB 2				
Volume Total	786	699				
Volume Left	437	0				
Volume Right	0	0				
cSH	1622	1700				
Volume to Capacity	0.27	0.41				
Queue Length 95th (ft)	27	0				
Control Delay (s)	5.7	0.0				
Lane LOS	A					
Approach Delay (s)	3.0					
Approach LOS						
Intersection Summary						
Average Delay		3.0				
Intersection Capacity Utilization		63.5%		ICU Level of Service		B
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

5: PUTNAM AVE. & BYRAM CIRCLE

Existing Conditions

PM Peak












Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↱	
Traffic Volume (veh/h)	0	639	0	0	418	0
Future Volume (Veh/h)	0	639	0	0	418	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	695	0	0	454	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				348	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				348	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				27	100
cM capacity (veh/h)	1622				623	1084
Direction, Lane #	EB 1	EB 2	SB 1			
Volume Total	348	348	454			
Volume Left	0	0	454			
Volume Right	0	0	0			
cSH	1700	1700	623			
Volume to Capacity	0.20	0.20	0.73			
Queue Length 95th (ft)	0	0	155			
Control Delay (s)	0.0	0.0	24.7			
Lane LOS			C			
Approach Delay (s)	0.0		24.7			
Approach LOS			C			
Intersection Summary						
Average Delay		9.8				
Intersection Capacity Utilization		63.5%		ICU Level of Service		B
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

6: North Main Street & PUTNAM AVE.

Existing Conditions

PM Peak

















						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	639	367	0	400	0	0
Future Volume (Veh/h)	639	367	0	400	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	695	399	0	435	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	435	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	435	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	63	100			
cM capacity (veh/h)	578	1085	1623			
Direction, Lane #	EB 1	EB 2	NB 1			
Volume Total	695	399	435			
Volume Left	695	0	0			
Volume Right	0	399	0			
cSH	578	1085	1700			
Volume to Capacity	1.20	0.37	0.26			
Queue Length 95th (ft)	625	43	0			
Control Delay (s)	130.3	10.2	0.0			
Lane LOS	F	B				
Approach Delay (s)	86.5		0.0			
Approach LOS	F					
Intersection Summary						
Average Delay		61.9				
Intersection Capacity Utilization		63.1%		ICU Level of Service		B
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

7: West Putnam Avenue & Byram Road

Existing Conditions

PM Peak

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations								 				
Traffic Volume (veh/h)	0	285	235	0	0	0	95	642	367	0	0	0
Future Volume (Veh/h)	0	285	235	0	0	0	95	642	367	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.92	0.95	0.92	0.92	0.92	0.92	0.95	0.95	0.92	0.92	0.92
Hourly flow rate (vph)	0	310	247	0	0	0	103	676	386	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			3									
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1075	1075	531	699	1268	0	0			1062		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1075	1075	531	699	1268	0	0			1062		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	0	50	0	100	100	94			100		
cM capacity (veh/h)	165	204	493	0	157	1084	1622			652		
Direction, Lane #	NB 1	NE 1	NE 2									
Volume Total	557	441	724									
Volume Left	0	103	0									
Volume Right	247	0	386									
cSH	286	1622	1700									
Volume to Capacity	1.95	0.06	0.43									
Queue Length 95th (ft)	980	5	0									
Control Delay (s)	468.2	2.2	0.0									
Lane LOS	F	A										
Approach Delay (s)	468.2	0.8										
Approach LOS	F											
Intersection Summary												
Average Delay		152.0										
Intersection Capacity Utilization		81.8%			ICU Level of Service				D			
Analysis Period (min)		15										

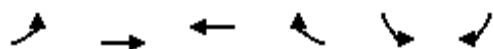
Westchester County Streams Byram River Basin Flood Risk Management Study Attachment B – Synchro Analysis Reports

Attachment B.2 Construction Scenario 1

HCM Unsignalized Intersection Capacity Analysis

4: PUTNAM AVE.

Construction Scenario 1
AM Peak












Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↱		↱	
Traffic Volume (veh/h)	0	790	507	18	0	0
Future Volume (Veh/h)	0	790	507	18	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	859	551	20	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	571				1420	561
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	571				1420	561
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1002				150	527
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	859	571	0			
Volume Left	0	0	0			
Volume Right	0	20	0			
cSH	1700	1700	1700			
Volume to Capacity	0.51	0.34	0.00			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization		44.9%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

6: North Main Street & PUTNAM AVE.











Construction Scenario 1
AM Peak

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	708	82	97	310	161	428
Future Volume (Veh/h)	708	82	97	310	161	428
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	770	89	105	337	175	465
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	954	408	640			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	954	408	640			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	86	89			
cM capacity (veh/h)	255	644	944			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	859	442	640			
Volume Left	770	105	0			
Volume Right	89	0	465			
cSH	272	944	1700			
Volume to Capacity	3.16	0.11	0.38			
Queue Length 95th (ft)	Err	9	0			
Control Delay (s)	Err	3.2	0.0			
Lane LOS	F	A				
Approach Delay (s)	Err	3.2	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay		4425.8				
Intersection Capacity Utilization		110.7%		ICU Level of Service		H
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

7: West Putnam Avenue & Byram Road

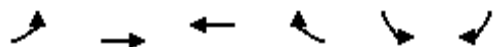
Construction Scenario 1
AM Peak

						
Movement	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (veh/h)	248	424	737	279	210	341
Future Volume (Veh/h)	248	424	737	279	210	341
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.92	0.92
Hourly flow rate (vph)	261	446	776	294	228	371
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1750	923			1070	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1750	923			1070	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	0			65	
cM capacity (veh/h)	61	327			651	
Direction, Lane #	NB 1	NE 1	SW 1			
Volume Total	707	1070	599			
Volume Left	261	0	228			
Volume Right	446	294	0			
cSH	127	1700	651			
Volume to Capacity	5.58	0.63	0.35			
Queue Length 95th (ft)	Err	0	39			
Control Delay (s)	Err	0.0	8.9			
Lane LOS	F		A			
Approach Delay (s)	Err	0.0	8.9			
Approach LOS	F					
Intersection Summary						
Average Delay		2977.5				
Intersection Capacity Utilization		109.1%		ICU Level of Service		H
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

4: PUTNAM AVE.

Construction Scenario 1
PM Peak












Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↑	
Traffic Volume (veh/h)	0	697	1010	37	0	0
Future Volume (Veh/h)	0	697	1010	37	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	758	1098	40	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1138				1876	1118
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1138				1876	1118
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	614				79	252
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	758	1138	0			
Volume Left	0	0	0			
Volume Right	0	40	0			
cSH	1700	1700	1700			
Volume to Capacity	0.45	0.67	0.00			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization		58.7%		ICU Level of Service		B
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

6: North Main Street & PUTNAM AVE.











Construction Scenario 1
PM Peak

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	564	133	193	259	254	854
Future Volume (Veh/h)	564	133	193	259	254	854
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	613	145	210	282	276	928
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1442	740	1204			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1442	740	1204			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	65	64			
cM capacity (veh/h)	93	417	580			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	758	492	1204			
Volume Left	613	210	0			
Volume Right	145	0	928			
cSH	109	580	1700			
Volume to Capacity	6.94	0.36	0.71			
Queue Length 95th (ft)	Err	41	0			
Control Delay (s)	Err	9.9	0.0			
Lane LOS	F	A				
Approach Delay (s)	Err	9.9	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay		3090.5				
Intersection Capacity Utilization		139.6%		ICU Level of Service		H
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

7: West Putnam Avenue & Byram Road

Construction Scenario 1
PM Peak

						
Movement	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (veh/h)	332	254	616	207	187	787
Future Volume (Veh/h)	332	254	616	207	187	787
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.92	0.92
Hourly flow rate (vph)	349	267	648	218	203	855
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2018	757			866	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2018	757			866	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	34			74	
cM capacity (veh/h)	47	408			777	
Direction, Lane #	NB 1	NE 1	SW 1			
Volume Total	616	866	1058			
Volume Left	349	0	203			
Volume Right	267	218	0			
cSH	77	1700	777			
Volume to Capacity	8.01	0.51	0.26			
Queue Length 95th (ft)	Err	0	26			
Control Delay (s)	Err	0.0	6.9			
Lane LOS	F		A			
Approach Delay (s)	Err	0.0	6.9			
Approach LOS	F					
Intersection Summary						
Average Delay		2427.8				
Intersection Capacity Utilization		125.2%		ICU Level of Service		H
Analysis Period (min)		15				

Westchester County Streams Byram River Basin Flood Risk Management Study Attachment B – Synchro Analysis Reports










Attachment B.3 Construction Scenario 2

HCM Unsignalized Intersection Capacity Analysis

3: BYRAM CIRCLE & HILLSIDE AVE.

Construction Scenario 2










AM Peak

						
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	1005	0	0	330	248	0
Future Volume (Veh/h)	1005	0	0	330	248	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	1182	0	0	388	292	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1182		1570	1182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1182		1570	1182
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	100
cM capacity (veh/h)			591		122	231
Direction, Lane #	EB 1	WB 1	NW 1			
Volume Total	1182	388	292			
Volume Left	0	0	292			
Volume Right	0	0	0			
cSH	1700	1700	122			
Volume to Capacity	0.70	0.23	2.40			
Queue Length 95th (ft)	0	0	639			
Control Delay (s)	0.0	0.0	711.1			
Lane LOS			F			
Approach Delay (s)	0.0	0.0	711.1			
Approach LOS			F			
Intersection Summary						
Average Delay		111.5				
Intersection Capacity Utilization		73.3%		ICU Level of Service		D
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

4: BYRAM CIRCLE & HILLSIDE AVE.

Construction Scenario 2
AM Peak

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	708	0	161	410	0	297
Future Volume (Veh/h)	708	0	161	410	0	297
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	770	0	175	446	0	323
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			770		1343	770
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			770		1343	770
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			79		100	6
cM capacity (veh/h)			840		113	343
Direction, Lane #	EB 1	WB 1	WB 2	NB 1		
Volume Total	770	324	297	323		
Volume Left	0	175	0	0		
Volume Right	0	0	0	323		
cSH	1700	840	1700	343		
Volume to Capacity	0.45	0.21	0.17	0.94		
Queue Length 95th (ft)	0	20	0	245		
Control Delay (s)	0.0	6.7	0.0	70.2		
Lane LOS		A		F		
Approach Delay (s)	0.0	3.5		70.2		
Approach LOS				F		
Intersection Summary						
Average Delay		14.5				
Intersection Capacity Utilization		62.3%		ICU Level of Service	B	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

5: PUTNAM AVE. & BYRAM CIRCLE

Construction Scenario 2
AM Peak












Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↱		↱	
Traffic Volume (veh/h)	0	82	97	310	161	0
Future Volume (Veh/h)	0	82	97	310	161	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	85	100	320	166	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	420				345	260
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	420				345	260
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				75	100
cM capacity (veh/h)	1139				652	779
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	85	420	166			
Volume Left	0	0	166			
Volume Right	0	320	0			
cSH	1700	1700	652			
Volume to Capacity	0.05	0.25	0.25			
Queue Length 95th (ft)	0	0	25			
Control Delay (s)	0.0	0.0	12.4			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	12.4			
Approach LOS			B			
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization			39.8%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Byram Road & Byram Circle & West Putnam Avenue

Construction Scenario 2
AM Peak










						
Movement	NBL	NBR	SEL	SER	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	248	424	0	0	489	0
Future Volume (Veh/h)	248	424	0	0	489	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	258	442	0	0	509	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1018	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1018	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	59			69	
cM capacity (veh/h)	180	1085			1623	
Direction, Lane #	NB 1	SW 1				
Volume Total	700	509				
Volume Left	258	509				
Volume Right	442	0				
cSH	397	1623				
Volume to Capacity	1.76	0.31				
Queue Length 95th (ft)	1096	34				
Control Delay (s)	376.6	8.2				
Lane LOS	F	A				
Approach Delay (s)	376.6	8.2				
Approach LOS	F					
Intersection Summary						
Average Delay		221.5				
Intersection Capacity Utilization		47.5%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

3: BYRAM CIRCLE & HILLSIDE AVE.

Construction Scenario 2










PM Peak

						
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	823	0	0	787	332	0
Future Volume (Veh/h)	823	0	0	787	332	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	968	0	0	926	391	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			968		1894	968
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			968		1894	968
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	100
cM capacity (veh/h)			712		77	308
Direction, Lane #	EB 1	WB 1	NW 1			
Volume Total	968	926	391			
Volume Left	0	0	391			
Volume Right	0	0	0			
cSH	1700	1700	77			
Volume to Capacity	0.57	0.54	5.10			
Queue Length 95th (ft)	0	0	Err			
Control Delay (s)	0.0	0.0	Err			
Lane LOS			F			
Approach Delay (s)	0.0	0.0	Err			
Approach LOS			F			
Intersection Summary						
Average Delay		1711.0				
Intersection Capacity Utilization		68.4%		ICU Level of Service		C
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

4: BYRAM CIRCLE & HILLSIDE AVE.

Construction Scenario 2
PM Peak

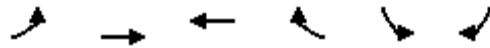
						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	564	0	302	817	0	259
Future Volume (Veh/h)	564	0	302	817	0	259
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	613	0	328	888	0	282
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			613		1713	613
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			613		1713	613
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			66		100	35
cM capacity (veh/h)			962		54	435
Direction, Lane #	EB 1	WB 1	WB 2	NB 1		
Volume Total	613	624	592	282		
Volume Left	0	328	0	0		
Volume Right	0	0	0	282		
cSH	1700	962	1700	435		
Volume to Capacity	0.36	0.34	0.35	0.65		
Queue Length 95th (ft)	0	38	0	112		
Control Delay (s)	0.0	7.7	0.0	27.2		
Lane LOS		A		D		
Approach Delay (s)	0.0	3.9		27.2		
Approach LOS				D		
Intersection Summary						
Average Delay			5.9			
Intersection Capacity Utilization			67.7%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: PUTNAM AVE. & BYRAM CIRCLE

Construction Scenario 2

PM Peak












Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↑	
Traffic Volume (veh/h)	0	133	193	259	254	0
Future Volume (Veh/h)	0	133	193	259	254	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	137	199	267	262	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	466				470	332
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	466				470	332
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				53	100
cM capacity (veh/h)	1095				552	709
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	137	466	262			
Volume Left	0	0	262			
Volume Right	0	267	0			
cSH	1700	1700	552			
Volume to Capacity	0.08	0.27	0.47			
Queue Length 95th (ft)	0	0	63			
Control Delay (s)	0.0	0.0	17.3			
Lane LOS			C			
Approach Delay (s)	0.0	0.0	17.3			
Approach LOS			C			
Intersection Summary						
Average Delay		5.2				
Intersection Capacity Utilization		46.8%	ICU Level of Service	A		
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

7: Byram Road & Byram Circle & West Putnam Avenue

Construction Scenario 2
PM Peak

						
Movement	NBL	NBR	SEL	SER	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	332	256	0	0	394	0
Future Volume (Veh/h)	332	256	0	0	394	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	346	267	0	0	410	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		3				
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	820	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	820	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	75			75	
cM capacity (veh/h)	258	1085			1623	
Direction, Lane #	NB 1	SW 1				
Volume Total	613	410				
Volume Left	346	410				
Volume Right	267	0				
cSH	395	1623				
Volume to Capacity	1.55	0.25				
Queue Length 95th (ft)	849	25				
Control Delay (s)	285.3	8.0				
Lane LOS	F	A				
Approach Delay (s)	285.3	8.0				
Approach LOS	F					
Intersection Summary						
Average Delay		174.2				
Intersection Capacity Utilization		46.9%		ICU Level of Service		A
Analysis Period (min)		15				







Westchester County Streams Byram River Basin Flood Risk Management Study Attachment B – Synchro Analysis Reports

Attachment B.4 Construction Scenario 3

HCM Unsignalized Intersection Capacity Analysis

3: HILLSIDE AVE.

Construction Scenario 3
AM Peak

						
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations				↑↑	↑	
Traffic Volume (veh/h)	0	0	0	644	238	0
Future Volume (Veh/h)	0	0	0	644	238	0
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	700	259	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		350	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		350	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		58	100
cM capacity (veh/h)			1622		621	1084
Direction, Lane #	WB 1	WB 2	NW 1			
Volume Total	350	350	259			
Volume Left	0	0	259			
Volume Right	0	0	0			
cSH	1700	1700	621			
Volume to Capacity	0.21	0.21	0.42			
Queue Length 95th (ft)	0	0	51			
Control Delay (s)	0.0	0.0	14.9			
Lane LOS			B			
Approach Delay (s)	0.0		14.9			
Approach LOS			B			
Intersection Summary						
Average Delay			4.0			
Intersection Capacity Utilization			37.7%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

4: BYRAM CIRCLE & HILLSIDE AVE.

Construction Scenario 3
AM Peak

	→	↗	↖	←	↘	↙
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations				4		
Traffic Volume (veh/h)	0	0	302	492	0	0
Future Volume (Veh/h)	0	0	302	492	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.92	0.92
Hourly flow rate (vph)	0	0	321	523	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0	1165	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0	1165	0	
tC, single (s)			4.1	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			80	100	100	
cM capacity (veh/h)			1623	172	1085	
Direction, Lane #	WB 1					
Volume Total	844					
Volume Left	321					
Volume Right	0					
cSH	1623					
Volume to Capacity	0.20					
Queue Length 95th (ft)	18					
Control Delay (s)	4.3					
Lane LOS	A					
Approach Delay (s)	4.3					
Approach LOS						
Intersection Summary						
Average Delay	4.3					
Intersection Capacity Utilization	70.6%		ICU Level of Service		C	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

5: PUTNAM AVE. & BYRAM CIRCLE

Construction Scenario 3
AM Peak
















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↱	
Traffic Volume (veh/h)	0	773	0	0	293	0
Future Volume (Veh/h)	0	773	0	0	293	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	840	0	0	318	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				420	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				420	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				43	100
cM capacity (veh/h)	1622				561	1084
Direction, Lane #	EB 1	EB 2	SB 1			
Volume Total	420	420	318			
Volume Left	0	0	318			
Volume Right	0	0	0			
cSH	1700	1700	561			
Volume to Capacity	0.25	0.25	0.57			
Queue Length 95th (ft)	0	0	88			
Control Delay (s)	0.0	0.0	19.5			
Lane LOS			C			
Approach Delay (s)	0.0		19.5			
Approach LOS			C			
Intersection Summary						
Average Delay			5.3			
Intersection Capacity Utilization			70.6%	ICU Level of Service		C
Analysis Period (min)			15			

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

7: West Putnam Avenue & Byram Road

Construction Scenario 3
AM Peak

										
Movement	NBL	NBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (veh/h)	199	457	0	0	39	805	461	0	0	0
Future Volume (Veh/h)	199	457	0	0	39	805	461	0	0	0
Sign Control	Stop		Stop			Free			Free	
Grade	0%		0%			0%			0%	
Peak Hour Factor	0.92	0.95	0.92	0.92	0.92	0.95	0.95	0.92	0.92	0.92
Hourly flow rate (vph)	216	481	0	0	42	847	485	0	0	0
Pedestrians										
Lane Width (ft)										
Walking Speed (ft/s)										
Percent Blockage										
Right turn flare (veh)		3								
Median type						None			None	
Median storage (veh)										
Upstream signal (ft)										
pX, platoon unblocked										
vC, conflicting volume	1174	1090	1282	1416	0			1332		
vC1, stage 1 conf vol										
vC2, stage 2 conf vol										
vCu, unblocked vol	1174	1090	1282	1416	0			1332		
tC, single (s)	6.5	6.2	7.1	6.5	4.1			4.1		
tC, 2 stage (s)										
tF (s)	4.0	3.3	3.5	4.0	2.2			2.2		
p0 queue free %	0	0	0	100	97			100		
cM capacity (veh/h)	187	262	0	134	1623			518		
Direction, Lane #	NB 1	NE 1								
Volume Total	697	1374								
Volume Left	0	42								
Volume Right	481	485								
cSH	250	1623								
Volume to Capacity	2.79	0.03								
Queue Length 95th (ft)	1506	2								
Control Delay (s)	847.1	1.1								
Lane LOS	F	A								
Approach Delay (s)	847.1	1.1								
Approach LOS	F									
Intersection Summary										
Average Delay		285.8								
Intersection Capacity Utilization		107.6%			ICU Level of Service			G		
Analysis Period (min)		15								

HCM Unsignalized Intersection Capacity Analysis

3: HILLSIDE AVE.








Construction Scenario 3
PM Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↖	
Traffic Volume (veh/h)	0	0	0	1086	380	0
Future Volume (Veh/h)	0	0	0	1086	380	0
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1180	413	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		590	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		590	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		6	100
cM capacity (veh/h)			1622		439	1084
Direction, Lane #	WB 1	WB 2	NB 1			
Volume Total	590	590	413			
Volume Left	0	0	413			
Volume Right	0	0	0			
cSH	1700	1700	439			
Volume to Capacity	0.35	0.35	0.94			
Queue Length 95th (ft)	0	0	274			
Control Delay (s)	0.0	0.0	60.4			
Lane LOS			F			
Approach Delay (s)	0.0		60.4			
Approach LOS			F			
Intersection Summary						
Average Delay		15.7				
Intersection Capacity Utilization		130.2%	ICU Level of Service	H		
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

4: BYRAM CIRCLE & HILLSIDE AVE.

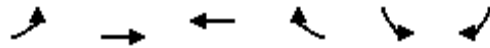
Construction Scenario 3
PM Peak

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	0	0	411	985	0	0
Future Volume (Veh/h)	0	0	411	985	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.92	0.92
Hourly flow rate (vph)	0	0	437	1048	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		1922	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		1922	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			73		100	100
cM capacity (veh/h)			1623		54	1085
Direction, Lane #	WB 1					
Volume Total	1485					
Volume Left	437					
Volume Right	0					
cSH	1623					
Volume to Capacity	0.27					
Queue Length 95th (ft)	27					
Control Delay (s)	6.3					
Lane LOS	A					
Approach Delay (s)	6.3					
Approach LOS						
Intersection Summary						
Average Delay	6.3					
Intersection Capacity Utilization	98.9%					
ICU Level of Service	F					
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 5: PUTNAM AVE. & BYRAM CIRCLE

Construction Scenario 3

PM Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↱	
Traffic Volume (veh/h)	0	639	0	0	418	0
Future Volume (Veh/h)	0	639	0	0	418	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	695	0	0	454	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				348	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				348	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				27	100
cM capacity (veh/h)	1622				623	1084
Direction, Lane #	EB 1	EB 2	SB 1			
Volume Total	348	348	454			
Volume Left	0	0	454			
Volume Right	0	0	0			
cSH	1700	1700	623			
Volume to Capacity	0.20	0.20	0.73			
Queue Length 95th (ft)	0	0	155			
Control Delay (s)	0.0	0.0	24.7			
Lane LOS			C			
Approach Delay (s)	0.0		24.7			
Approach LOS			C			
Intersection Summary						
Average Delay		9.8				
Intersection Capacity Utilization		98.9%		ICU Level of Service		F
Analysis Period (min)		15				
















Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

7: West Putnam Avenue & Byram Road

Construction Scenario 3

PM Peak

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	0	285	235	0	0	0	95	642	367	0	0	0
Future Volume (Veh/h)	0	285	235	0	0	0	95	642	367	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.92	0.95	0.92	0.92	0.92	0.92	0.95	0.95	0.92	0.92	0.92
Hourly flow rate (vph)	0	310	247	0	0	0	103	676	386	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			3									
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1075	1075	869	1230	1268	0	0			1062		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1075	1075	869	1230	1268	0	0			1062		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	0	30	0	100	100	94			100		
cM capacity (veh/h)	188	206	351	0	158	1085	1623			656		
Direction, Lane #	NB 1	NE 1										
Volume Total	557	1165										
Volume Left	0	103										
Volume Right	247	386										
cSH	266	1623										
Volume to Capacity	2.10	0.06										
Queue Length 95th (ft)	1037	5										
Control Delay (s)	537.2	1.8										
Lane LOS	F	A										
Approach Delay (s)	537.2	1.8										
Approach LOS	F											
Intersection Summary												
Average Delay		175.0										
Intersection Capacity Utilization		111.1%			ICU Level of Service				H			
Analysis Period (min)		15										

Westchester County Streams Byram River Basin Flood Risk Management Study Attachment B – Synchro Analysis Reports

Attachment B.5 Construction Scenario 4

HCM Unsignalized Intersection Capacity Analysis

3: HILLSIDE AVE.

Construction Scenario 4
AM Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑	↖	
Traffic Volume (veh/h)	0	0	0	533	199	0
Future Volume (Veh/h)	0	0	0	533	199	0
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	579	216	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		579	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		579	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		55	100
cM capacity (veh/h)			1623		477	1085
Direction, Lane #	WB 1	NB 1				
Volume Total	579	216				
Volume Left	0	216				
Volume Right	0	0				
cSH	1700	477				
Volume to Capacity	0.34	0.45				
Queue Length 95th (ft)	0	58				
Control Delay (s)	0.0	18.6				
Lane LOS		C				
Approach Delay (s)	0.0	18.6				
Approach LOS		C				
Intersection Summary						
Average Delay		5.1				
Intersection Capacity Utilization		45.7%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

4: BYRAM CIRCLE & HILLSIDE AVE.

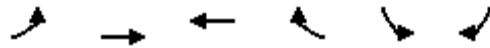
Construction Scenario 4
AM Peak

	→	↗	↖	←	↘	↙
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations				↖		
Traffic Volume (veh/h)	0	0	240	492	0	0
Future Volume (Veh/h)	0	0	240	492	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.92	0.92
Hourly flow rate (vph)	0	0	255	523	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0	1033	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0	1033	0	
tC, single (s)			4.1	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			84	100	100	
cM capacity (veh/h)			1623	217	1085	
Direction, Lane #	WB 1					
Volume Total	778					
Volume Left	255					
Volume Right	0					
cSH	1623					
Volume to Capacity	0.16					
Queue Length 95th (ft)	14					
Control Delay (s)	3.7					
Lane LOS	A					
Approach Delay (s)	3.7					
Approach LOS						
Intersection Summary						
Average Delay			3.7			
Intersection Capacity Utilization			67.2%	ICU Level of Service	C	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 5: PUTNAM AVE. & BYRAM CIRCLE

Construction Scenario 4

AM Peak













Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↵	
Traffic Volume (veh/h)	0	773	0	0	231	0
Future Volume (Veh/h)	0	773	0	0	231	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	840	0	0	251	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				420	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				420	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				55	100
cM capacity (veh/h)	1622				561	1084
Direction, Lane #	EB 1	EB 2	SB 1			
Volume Total	420	420	251			
Volume Left	0	0	251			
Volume Right	0	0	0			
cSH	1700	1700	561			
Volume to Capacity	0.25	0.25	0.45			
Queue Length 95th (ft)	0	0	57			
Control Delay (s)	0.0	0.0	16.5			
Lane LOS			C			
Approach Delay (s)	0.0		16.5			
Approach LOS			C			
Intersection Summary						
Average Delay			3.8			
Intersection Capacity Utilization			67.2%	ICU Level of Service		C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: North Main Street & PUTNAM AVE.

















Construction Scenario 4
AM Peak

						
Movement	EBL	EBR	NBL	NBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	826	78	0	392	150	0
Future Volume (Veh/h)	826	78	0	392	150	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	898	85	0	426	163	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	589	163	163			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	589	163	163			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	90	100			
cM capacity (veh/h)	471	882	1416			
Direction, Lane #	EB 1	EB 2	NB 1	SW 1		
Volume Total	898	85	426	163		
Volume Left	898	0	0	0		
Volume Right	0	85	0	0		
cSH	471	882	1700	1700		
Volume to Capacity	1.91	0.10	0.25	0.10		
Queue Length 95th (ft)	1477	8	0	0		
Control Delay (s)	436.5	9.5	0.0	0.0		
Lane LOS	F	A				
Approach Delay (s)	399.5		0.0	0.0		
Approach LOS	F					
Intersection Summary						
Average Delay			249.8			
Intersection Capacity Utilization			60.7%	ICU Level of Service		B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: West Putnam Avenue & Byram Road









Construction Scenario 4
AM Peak

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	0	199	457	0	0	0	0	844	461	0	150	0
Future Volume (Veh/h)	0	199	457	0	0	0	0	844	461	0	150	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.92	0.95	0.92	0.92	0.92	0.92	0.95	0.95	0.92	0.92	0.92
Hourly flow rate (vph)	0	216	481	0	0	0	0	888	485	0	163	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			3									
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1294	1294	1130	1642	1536	163	163			1373		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1294	1294	1130	1642	1536	163	163			1373		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	0	0	0	100	100	100			100		
cM capacity (veh/h)	140	163	248	0	116	882	1416			500		
Direction, Lane #	NB 1	NE 1	SW 1									
Volume Total	697	1373	163									
Volume Left	0	0	0									
Volume Right	481	485	0									
cSH	228	1700	1700									
Volume to Capacity	3.05	0.81	0.10									
Queue Length 95th (ft)	Err	0	0									
Control Delay (s)	Err	0.0	0.0									
Lane LOS	F											
Approach Delay (s)	Err	0.0	0.0									
Approach LOS	F											
Intersection Summary												
Average Delay			3121.0									
Intersection Capacity Utilization			107.5%			ICU Level of Service				G		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

3: HILLSIDE AVE.

Construction Scenario 4
PM Peak

						
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	981	285	0
Future Volume (Veh/h)	0	0	0	981	285	0
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1066	310	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0	1066	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0	1066	0	
tC, single (s)			4.1	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			100	0	100	
cM capacity (veh/h)			1623	246	1085	
Direction, Lane #	WB 1	NW 1				
Volume Total	1066	310				
Volume Left	0	310				
Volume Right	0	0				
cSH	1700	246				
Volume to Capacity	0.63	1.26				
Queue Length 95th (ft)	0	387				
Control Delay (s)	0.0	186.2				
Lane LOS		F				
Approach Delay (s)	0.0	186.2				
Approach LOS		F				
Intersection Summary						
Average Delay		41.9				
Intersection Capacity Utilization		74.1%		ICU Level of Service		D
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

4: BYRAM CIRCLE & HILLSIDE AVE.

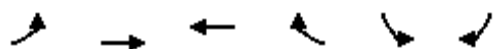
Construction Scenario 4
PM Peak

	→	↗	↖	←	↘	↙
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations				↖		
Traffic Volume (veh/h)	0	0	281	985	0	0
Future Volume (Veh/h)	0	0	281	985	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.92	0.92
Hourly flow rate (vph)	0	0	299	1048	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		1646	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		1646	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			82		100	100
cM capacity (veh/h)			1623		89	1085
Direction, Lane #	WB 1					
Volume Total	1347					
Volume Left	299					
Volume Right	0					
cSH	1623					
Volume to Capacity	0.18					
Queue Length 95th (ft)	17					
Control Delay (s)	4.6					
Lane LOS	A					
Approach Delay (s)	4.6					
Approach LOS						
Intersection Summary						
Average Delay	4.6					
Intersection Capacity Utilization	91.7%					
Analysis Period (min)	15					
	ICU Level of Service F					

HCM Unsignalized Intersection Capacity Analysis

5: PUTNAM AVE. & BYRAM CIRCLE

Construction Scenario 4
PM Peak



















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↱	
Traffic Volume (veh/h)	0	639	0	0	288	0
Future Volume (Veh/h)	0	639	0	0	288	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	695	0	0	313	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				348	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				348	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				50	100
cM capacity (veh/h)	1622				623	1084
Direction, Lane #	EB 1	EB 2	SB 1			
Volume Total	348	348	313			
Volume Left	0	0	313			
Volume Right	0	0	0			
cSH	1700	1700	623			
Volume to Capacity	0.20	0.20	0.50			
Queue Length 95th (ft)	0	0	71			
Control Delay (s)	0.0	0.0	16.5			
Lane LOS			C			
Approach Delay (s)	0.0		16.5			
Approach LOS			C			
Intersection Summary						
Average Delay			5.1			
Intersection Capacity Utilization			91.7%	ICU Level of Service		F
Analysis Period (min)			15			

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

7: West Putnam Avenue & Byram Road

Construction Scenario 4
PM Peak

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	285	235	0	737	367	0	200	0
Future Volume (Veh/h)	0	0	0	0	285	235	0	737	367	0	200	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.95	0.92	0.95	0.92	0.95	0.95	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	310	247	0	776	386	0	217	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						3						
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1464	1379	217	1186	1186	969	217			1162		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1464	1379	217	1186	1186	969	217			1162		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	100	100	0	20	100			100		
cM capacity (veh/h)	0	144	823	166	189	308	1353			601		
Direction, Lane #	NW 1	NE 1	SW 1									
Volume Total	557	1162	217									
Volume Left	0	0	0									
Volume Right	247	386	0									
cSH	238	1700	1700									
Volume to Capacity	2.34	0.68	0.13									
Queue Length 95th (ft)	1114	0	0									
Control Delay (s)	648.2	0.0	0.0									
Lane LOS	F											
Approach Delay (s)	648.2	0.0	0.0									
Approach LOS	F											
Intersection Summary												
Average Delay			186.5									
Intersection Capacity Utilization			82.8%			ICU Level of Service				E		
Analysis Period (min)			15									










Westchester County Streams Byram River Basin Flood Risk Management Study Attachment B – Synchro Analysis Reports

Attachment B.6 Construction Scenario 5

HCM Unsignalized Intersection Capacity Analysis

3: HILLSIDE AVE.










Construction Scenario 5
AM Peak

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	376	0	0	644	238	0
Future Volume (Veh/h)	376	0	0	644	238	0
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	409	0	0	700	259	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			409		1109	409
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			409		1109	409
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	100
cM capacity (veh/h)			1150		232	642
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	409	700	259			
Volume Left	0	0	259			
Volume Right	0	0	0			
cSH	1700	1700	232			
Volume to Capacity	0.24	0.41	1.12			
Queue Length 95th (ft)	0	0	292			
Control Delay (s)	0.0	0.0	138.9			
Lane LOS						
Approach Delay (s)	0.0	0.0	138.9			
Approach LOS						
Intersection Summary						
Average Delay			26.3			
Intersection Capacity Utilization			77.4%		ICU Level of Service	
Analysis Period (min)			15		D	

HCM Unsignalized Intersection Capacity Analysis

4: BYRAM CIRCLE & HILLSIDE AVE.

Construction Scenario 5
AM Peak

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	386	0	302	492	0	0
Future Volume (Veh/h)	386	0	302	492	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.92	0.92
Hourly flow rate (vph)	420	0	321	523	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			420		1585	420
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			420		1585	420
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			72		100	100
cM capacity (veh/h)			1139		86	633
Direction, Lane #	EB 1	WB 1	WB 2			
Volume Total	420	321	523			
Volume Left	0	321	0			
Volume Right	0	0	0			
cSH	1700	1139	1700			
Volume to Capacity	0.25	0.28	0.31			
Queue Length 95th (ft)	0	29	0			
Control Delay (s)	0.0	9.4	0.0			
Lane LOS						
Approach Delay (s)	0.0	3.6				
Approach LOS						
Intersection Summary						
Average Delay						
			2.4			
Intersection Capacity Utilization			77.4%	ICU Level of Service		D
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: PUTNAM AVE. & BYRAM CIRCLE

Construction Scenario 5
AM Peak












Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↱	
Traffic Volume (veh/h)	0	387	0	0	293	0
Future Volume (Veh/h)	0	387	0	0	293	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	421	0	0	318	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				210	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				210	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				58	100
cM capacity (veh/h)	1622				759	1084
Direction, Lane #	EB 1	EB 2	SB 1			
Volume Total	210	210	318			
Volume Left	0	0	318			
Volume Right	0	0	0			
cSH	1700	1700	759			
Volume to Capacity	0.12	0.12	0.42			
Queue Length 95th (ft)	0	0	52			
Control Delay (s)	0.0	0.0	13.1			
Lane LOS			B			
Approach Delay (s)	0.0		13.1			
Approach LOS			B			
Intersection Summary						
Average Delay			5.6			
Intersection Capacity Utilization			33.6%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: North Main Street & PUTNAM AVE.

Construction Scenario 5
















AM Peak

						
Movement	EBL	EBR	NBL	NBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	452	228	0	392	0	0
Future Volume (Veh/h)	452	228	0	392	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	491	248	0	426	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	426	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	426	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	16	77	100			
cM capacity (veh/h)	585	1085	1623			
Direction, Lane #	EB 1	EB 2	NB 1			
Volume Total	491	248	426			
Volume Left	491	0	0			
Volume Right	0	248	0			
cSH	585	1085	1700			
Volume to Capacity	0.84	0.23	0.25			
Queue Length 95th (ft)	223	22	0			
Control Delay (s)	35.2	9.3	0.0			
Lane LOS	E	A				
Approach Delay (s)	26.5		0.0			
Approach LOS	D					
Intersection Summary						
Average Delay		16.8				
Intersection Capacity Utilization		28.4%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

7: West Putnam Avenue & Byram Road










Construction Scenario 5
AM Peak

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	0	199	457	0	0	0	39	344	461	0	0	0
Future Volume (Veh/h)	0	199	457	0	0	0	39	344	461	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.92	0.95	0.92	0.92	0.92	0.92	0.95	0.95	0.92	0.92	0.92
Hourly flow rate (vph)	0	216	481	0	0	0	42	362	485	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			3									
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	688	688	604	796	931	0	0			847		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	688	688	604	796	931	0	0			847		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	40	3	100	100	100	97			100		
cM capacity (veh/h)	353	359	498	5	260	1085	1623			790		
Direction, Lane #	NB 1	NE 1										
Volume Total	697	889										
Volume Left	0	42										
Volume Right	481	485										
cSH	611	1623										
Volume to Capacity	1.14	0.03										
Queue Length 95th (ft)	561	2										
Control Delay (s)	106.1	0.7										
Lane LOS	F	A										
Approach Delay (s)	106.1	0.7										
Approach LOS	F											
Intersection Summary												
Average Delay		47.0										
Intersection Capacity Utilization		83.5%			ICU Level of Service				E			
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis

3: HILLSIDE AVE.










Construction Scenario 1
PM Peak

						
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	319	0	0	1086	238	0
Future Volume (Veh/h)	319	0	0	1086	238	0
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	347	0	0	1180	259	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			347		1527	347
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			347		1527	347
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	100
cM capacity (veh/h)			1212		129	696
Direction, Lane #	EB 1	WB 1	NW 1			
Volume Total	347	1180	259			
Volume Left	0	0	259			
Volume Right	0	0	0			
cSH	1700	1700	129			
Volume to Capacity	0.20	0.69	2.00			
Queue Length 95th (ft)	0	0	522			
Control Delay (s)	0.0	0.0	533.8			
Lane LOS			F			
Approach Delay (s)	0.0	0.0	533.8			
Approach LOS			F			
Intersection Summary						
Average Delay		77.4				
Intersection Capacity Utilization		97.1%		ICU Level of Service		F
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

4: BYRAM CIRCLE & HILLSIDE AVE.

Construction Scenario 1
PM Peak

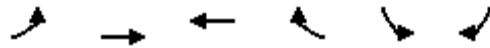
						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	319	0	411	985	0	0
Future Volume (Veh/h)	319	0	411	985	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.92	0.92
Hourly flow rate (vph)	347	0	437	1048	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			347		2269	347
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			347		2269	347
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			64		100	100
cM capacity (veh/h)			1212		28	696
Direction, Lane #	EB 1	WB 1	WB 2			
Volume Total	347	437	1048			
Volume Left	0	437	0			
Volume Right	0	0	0			
cSH	1700	1212	1700			
Volume to Capacity	0.20	0.36	0.62			
Queue Length 95th (ft)	0	42	0			
Control Delay (s)	0.0	9.6	0.0			
Lane LOS		A				
Approach Delay (s)	0.0	2.8				
Approach LOS						
Intersection Summary						
Average Delay		2.3				
Intersection Capacity Utilization		97.1%		ICU Level of Service		F
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

5: PUTNAM AVE. & BYRAM CIRCLE

Construction Scenario 1

PM Peak












Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↱	
Traffic Volume (veh/h)	0	320	0	0	418	0
Future Volume (Veh/h)	0	320	0	0	418	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	348	0	0	454	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				174	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				174	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				43	100
cM capacity (veh/h)	1622				799	1084
Direction, Lane #	EB 1	EB 2	SB 1			
Volume Total	174	174	454			
Volume Left	0	0	454			
Volume Right	0	0	0			
cSH	1700	1700	799			
Volume to Capacity	0.10	0.10	0.57			
Queue Length 95th (ft)	0	0	91			
Control Delay (s)	0.0	0.0	15.3			
Lane LOS			C			
Approach Delay (s)	0.0		15.3			
Approach LOS			C			
Intersection Summary						
Average Delay			8.6			
Intersection Capacity Utilization			38.7%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: North Main Street & PUTNAM AVE.
















Construction Scenario 1
PM Peak

						
Movement	EBL	EBR	NBL	NBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	371	367	0	400	0	0
Future Volume (Veh/h)	371	367	0	400	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	403	399	0	435	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	435	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	435	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	30	63	100			
cM capacity (veh/h)	578	1085	1623			
Direction, Lane #	EB 1	EB 2	NB 1			
Volume Total	403	399	435			
Volume Left	403	0	0			
Volume Right	0	399	0			
cSH	578	1085	1700			
Volume to Capacity	0.70	0.37	0.26			
Queue Length 95th (ft)	138	43	0			
Control Delay (s)	24.3	10.2	0.0			
Lane LOS	C	B				
Approach Delay (s)	17.3		0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			11.2			
Intersection Capacity Utilization			28.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: West Putnam Avenue & Byram Road

Construction Scenario 1
PM Peak

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	285	235	95	404	367	0	0	0
Future Volume (Veh/h)	0	0	0	0	285	235	95	404	367	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.95	0.92	0.95	0.92	0.95	0.95	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	310	247	103	425	386	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						3						
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	979	1017	0	824	824	618	0			811		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	979	1017	0	824	824	618	0			811		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	100	100	0	50	94			100		
cM capacity (veh/h)	0	222	1085	278	289	489	1623			815		
Direction, Lane #	NW 1	NE 1										
Volume Total	557	914										
Volume Left	0	103										
Volume Right	247	386										
cSH	398	1623										
Volume to Capacity	1.40	0.06										
Queue Length 95th (ft)	687	5										
Control Delay (s)	221.5	1.6										
Lane LOS	F	A										
Approach Delay (s)	221.5	1.6										
Approach LOS	F											
Intersection Summary												
Average Delay		84.9										
Intersection Capacity Utilization		70.6%			ICU Level of Service				C			
Analysis Period (min)		15										

Attachment C

Microsimulation SimTraffic Analysis

C1. Analysis Summary Tables

SimTraffic Analysis Reports

- C2. Existing Conditions
- C3. Construction Scenario 1
- C4. Construction Scenario 2
- C5. Construction Scenario 3
- C6. Construction Scenario 4
- C7. Construction Scenario 5

Westchester County Streams Byram River Basin Flood Risk Management Study Attachment C – Microsimulation SimTraffic Analysis

Attachment C.1 Analysis Summary Tables

Microsimulation Capacity Analysis – Existing Conditions, Scenario 1, and Scenario 2

		Existing Conditions				Scenario 1				Scenario 2			
		Weekday A.M. Peak		Weekday P.M. Peak		Weekday A.M. Peak		Weekday P.M. Peak		Weekday A.M. Peak		Weekday P.M. Peak	
Intersection	Lane Group	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Hillside Avenue / Byram Traffic Circle East	WB Hillside Avenue	10.3	B	2.9	A	-	-	-	-	0.2	A	0.3	A
	EB Hillside Avenue	-	-	-	-	-	-	-	-	0.5	A	279.5	F
	NB Byram Road	58.8	F	8.5	A	-	-	-	-	84.1	F	6.0	A
Hillside Avenue / Byram Traffic Circle West	WB Hillside Avenue	-	-	-	-	-	-	-	-	0.2	A	0.8	A
	WBL Hillside Avenue	193.3	F	27.1	D	-	-	-	-	0.4	A	3.1	A
	EB Hillside Avenue	-	-	-	-	-	-	-	-	1.1	A	23.3	C
	NB Byram Circle	-	-	-	-	-	-	-	-	47.8	E	280.2	F
Putnam Avenue / Byram Traffic Circle West	EB Putnam Avenue	87.1	F	1.7	A	14.6	B	308.4	F	2.1	A	2.2	A
	SB Byram Circle	244.1	F	64.3	F	-	-	-	-	5.7	A	5.9	A
	NB Main Street	-	-	-	-	-	-	-	-	16.7	B	103.8	F
Putnam Avenue / North Main Street	EBR Putnam Avenue	1.0	A	1.2	A	-	-	-	-	-	-	-	-
	EBL Putnam Avenue	19.3	C	10.8	B	25.6	D	444.5	F	-	-	-	-
	NB Main Street	0.3	A	0.2	A	0.9	A	33.8	D	-	-	-	-
	SB Main Street	-	-	-	-	1.3	A	4.8	A	-	-	-	-
West Putnam Avenue / Byram Road	EB Putnam Avenue	5.3	A	2.2	A	0.6	A	0.5	A	0.9	A	0.4	A
	WB Putnam Avenue	-	-	-	-	26.2	D	1.6	A	-	-	-	-
	NB Byram Road	1051.0	F	194.5	F	-	-	-	-	-	-	-	-
	NBR Byram Road	986.2	F	141.2	F	1716.7	F	386.5	F	1111.7	F	355.1	F
	NBL Byram Road	-	-	-	-	1942.1	F	429.6	F	1232.4	F	386.5	F

* Under Scenario 1, this approach consists of one shared right and left turn lane.

Microsimulation Capacity Analysis – Scenario 3, Scenario 4, and Scenario 5

		Scenario 3				Scenario 4				Scenario 5			
		Weekday A.M. Peak		Weekday P.M. Peak		Weekday A.M. Peak		Weekday P.M. Peak		Weekday A.M. Peak		Weekday P.M. Peak	
Intersection	Lane Group	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Hillside Avenue / Byram Traffic Circle East	WB Hillside Avenue	0.2	A	7.5	A	8.3	A	1.1	A	0.3	A	0.8	A
	EB Hillside Avenue	-	-	-	-	-	-	-	-	0.3	A	0.3	A
	NB Byram Road	1.5	A	272.2	F	125.7	F	7.2	A	13.4	B	17.6	C
Hillside Avenue / Byram Traffic Circle West	WB Hillside Avenue	-	-	-	-	-	-	-	-	0.5	A	0.7	A
	WBL Hillside Avenue	-	-	-	-	-	-	-	-	7.4	A	6.1	A
	EB Hillside Avenue	-	-	-	-	-	-	-	-	0.2	A	0.4	A
Putnam Avenue / Byram Traffic Circle West	EB Putnam Avenue	644.8	F	939.3	F	825.8	F	443.9	F	7.1	A	7.5	A
	SB Byram Circle	52.2	F	359.6	F	250.8	F	40.6	E	8.6	A	7.1	C
Putnam Avenue / North Main Street	EBR Putnam Avenue	1.9	A	2.1	A	4.9	A	6.1	A	1.6	A	1.7	A
	EBL Putnam Avenue	20.0	C	96.3	F	28.2	D	30.5	D	11.4	B	11.9	B
	NB Main Street	11.1	B	110.2	F	21.4	C	26.1	D	10.1	B	11.2	B
	SB Main Street	-	-	-	-	0.3	A	0.5	A	-	-	-	-
West Putnam Avenue / Byram Road	EB Putnam Avenue	5.0	A	119.7	F	0.7	A	3.6	A	4.5	A	4.8	A
	NB Byram Road	522.4	F	2192.4	F	1500.5	F	566.1	F	40.8	E	116.9	F
	NBR Byram Road	511.5	F	2010.2	F	1294.4	F	529.7	F	14.1	B	81.8	F

Westchester County Streams Byram River Basin Flood Risk Management Study Attachment C – Microsimulation SimTraffic Analysis

Attachment C.2 Existing Conditions

Summary of All Intervals

Start Time	4:00
End Time	5:05
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	911
Vehs Exited	815
Starting Vehs	52
Ending Vehs	148
Travel Distance (mi)	198
Travel Time (hr)	822.5
Total Delay (hr)	814.9
Total Stops	899
Fuel Used (gal)	194.1

Interval #0 Information Seeding

Start Time	4:00
End Time	4:05
Total Time (min)	5
Volumes adjusted by PHF, Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	4:05
End Time	5:05
Total Time (min)	60
Volumes adjusted by PHF, Growth Factors.	
Vehs Entered	911
Vehs Exited	815
Starting Vehs	52
Ending Vehs	148
Travel Distance (mi)	198
Travel Time (hr)	822.5
Total Delay (hr)	814.9
Total Stops	899
Fuel Used (gal)	194.1

1: HILLSIDE AVE./W. Putnam Avenue & Connector & Pemberwick Road Performance by movement

Movement	NBL2	SER2	SWT	SWR	All
Denied Delay (hr)	0.0	10.4	173.8	6.1	190.2
Denied Del/Veh (s)	0.0	444.1	738.7	726.7	693.8
Total Delay (hr)	0.1	5.3	15.3	0.0	20.7
Total Del/Veh (s)	12.6	456.5	183.9	0.1	197.6
Avg Speed (mph)	2	0	1	20	1
Fuel Used (gal)	0.0	3.6	43.6	1.4	48.6
HC Emissions (g)	0	0	83	0	84
CO Emissions (g)	2	173	3128	73	3376
NOx Emissions (g)	0	1	69	1	70

2: HILLSIDE AVE. & SITE ACCESS DR. Performance by movement

Movement	WBT	WBR	SBR	All
Denied Delay (hr)	5.2	0.0	5.9	11.1
Denied Del/Veh (s)	52.3	0.0	274.9	89.7
Total Delay (hr)	7.9	0.0	1.5	9.4
Total Del/Veh (s)	83.3	0.6	111.2	84.6
Avg Speed (mph)	2	17	0	1
Fuel Used (gal)	3.5	0.0	1.7	5.2
HC Emissions (g)	3	0	0	3
CO Emissions (g)	248	2	83	332
NOx Emissions (g)	13	0	0	13

3: HILLSIDE AVE. Performance by movement

Movement	WBT	NBL	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0
Total Delay (hr)	1.3	4.6	5.9
Total Del/Veh (s)	12.9	245.3	48.0
Avg Speed (mph)	4	0	1
Fuel Used (gal)	0.6	1.2	1.7
HC Emissions (g)	1	1	2
CO Emissions (g)	70	71	141
NOx Emissions (g)	8	4	12

4: BYRAM CIRCLE & HILLSIDE AVE. Performance by movement

Movement	WBL	WBT	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0
Total Delay (hr)	8.5	0.7	9.2
Total Del/Veh (s)	262.3	7.8	74.6
Avg Speed (mph)	1	13	2
Fuel Used (gal)	2.1	0.9	3.0
HC Emissions (g)	0	7	7
CO Emissions (g)	119	303	422
NOx Emissions (g)	4	31	35

5: PUTNAM AVE. & BYRAM CIRCLE Performance by movement

Movement	EBT	SBL	All
Denied Delay (hr)	165.0	9.0	174.0
Denied Del/Veh (s)	805.0	267.9	729.4
Total Delay (hr)	14.1	9.2	23.3
Total Del/Veh (s)	205.5	291.8	232.7
Avg Speed (mph)	1	0	1
Fuel Used (gal)	41.4	4.3	45.7
HC Emissions (g)	81	0	82
CO Emissions (g)	2990	221	3211
NOx Emissions (g)	67	3	70

6: North Main Street & PUTNAM AVE. Performance by movement

Movement	EBL	EBT	EBR	NBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	3.5	0.0	0.0	4.8	8.4
Total Del/Veh (s)	67.1	3.8	1.0	113.9	61.7
Avg Speed (mph)	2	11	15	1	2
Fuel Used (gal)	0.9	0.0	0.1	1.2	2.3
HC Emissions (g)	1	0	1	1	3
CO Emissions (g)	68	6	22	83	178
NOx Emissions (g)	6	1	3	3	13

7: West Putnam Avenue & Byram Road Performance by movement

Movement	NBT	NBR	NEL	NET	NER	All
Denied Delay (hr)	123.5	107.0	2.3	5.6	3.3	241.8
Denied Del/Veh (s)	1393.5	1585.3	227.2	95.2	95.3	928.9
Total Delay (hr)	10.7	3.2	4.4	5.5	0.0	23.7
Total Del/Veh (s)	770.7	333.6	510.1	99.6	1.5	198.8
Avg Speed (mph)	0	1	0	2	17	1
Fuel Used (gal)	30.8	25.2	1.6	3.2	1.0	61.8
HC Emissions (g)	12	52	0	24	3	91
CO Emissions (g)	1599	1805	93	714	139	4349
NOx Emissions (g)	11	38	2	38	11	100

8: West Putnam Avenue & Connector Performance by movement

Movement	NEL	NET	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0
Total Delay (hr)	0.1	0.0	0.2
Total Del/Veh (s)	14.7	0.8	2.4
Avg Speed (mph)	10	29	23
Fuel Used (gal)	0.1	0.7	0.8
HC Emissions (g)	0	6	6
CO Emissions (g)	16	389	405
NOx Emissions (g)	2	23	24

Total Network Performance

Denied Delay (hr)	703.1
Denied Del/Veh (s)	886.6
Total Delay (hr)	111.7
Total Del/Veh (s)	417.6
Avg Speed (mph)	2
Fuel Used (gal)	194.1
HC Emissions (g)	358
CO Emissions (g)	15289
NOx Emissions (g)	478

Intersection: 1: HILLSIDE AVE./W. Putnam Avenue & Connector & Pemberwick Road

Movement	NB	SE	SW	SW
Directions Served	<L	>	T	T
Maximum Queue (ft)	79	195	260	244
Average Queue (ft)	15	124	184	159
95th Queue (ft)	54	243	361	331
Link Distance (ft)	-1	186	245	245
Upstream Blk Time (%)	8	54	65	64
Queuing Penalty (veh)	9	0	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				65
Queuing Penalty (veh)				27

Intersection: 2: HILLSIDE AVE. & SITE ACCESS DR.

Movement	WB	WB	SB
Directions Served	T	TR	R
Maximum Queue (ft)	163	156	81
Average Queue (ft)	119	114	52
95th Queue (ft)	212	208	77
Link Distance (ft)	144	144	70
Upstream Blk Time (%)	70	66	45
Queuing Penalty (veh)	380	355	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: HILLSIDE AVE.

Movement	WB	WB	NB
Directions Served	T	T	L
Maximum Queue (ft)	32	55	118
Average Queue (ft)	22	17	113
95th Queue (ft)	38	41	119
Link Distance (ft)	24	24	112
Upstream Blk Time (%)	73	50	85
Queuing Penalty (veh)	432	297	353
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: BYRAM CIRCLE & HILLSIDE AVE.

Movement	WB	WB
Directions Served	LT	T
Maximum Queue (ft)	239	249
Average Queue (ft)	221	61
95th Queue (ft)	263	220
Link Distance (ft)	230	230
Upstream Blk Time (%)	73	3
Queuing Penalty (veh)	584	22
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: PUTNAM AVE. & BYRAM CIRCLE

Movement	EB	EB	SB
Directions Served	T	T	L
Maximum Queue (ft)	375	376	220
Average Queue (ft)	275	255	210
95th Queue (ft)	500	530	225
Link Distance (ft)	365	365	130
Upstream Blk Time (%)	69	67	99
Queuing Penalty (veh)	0	0	431
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Main Street & PUTNAM AVE.

Movement	EB	NB	B14
Directions Served	L	T	T
Maximum Queue (ft)	135	147	371
Average Queue (ft)	117	101	244
95th Queue (ft)	133	211	514
Link Distance (ft)	117	77	356
Upstream Blk Time (%)	72	69	65
Queuing Penalty (veh)	416	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: West Putnam Avenue & Byram Road

Movement	NB	NB	NE	NE
Directions Served	T	R	LT	TR
Maximum Queue (ft)	306	105	271	216
Average Queue (ft)	286	25	223	25
95th Queue (ft)	306	98	356	123
Link Distance (ft)	291		270	270
Upstream Blk Time (%)	99		69	
Queuing Penalty (veh)	0		392	
Storage Bay Dist (ft)		80		
Storage Blk Time (%)	99	1		
Queuing Penalty (veh)	244	4		

Intersection: 8: West Putnam Avenue & Connector

Movement	NE
Directions Served	L
Maximum Queue (ft)	55
Average Queue (ft)	9
95th Queue (ft)	38
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	140
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: Bend

Movement	WB
Directions Served	T
Maximum Queue (ft)	195
Average Queue (ft)	25
95th Queue (ft)	132
Link Distance (ft)	105
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 3946

Summary of All Intervals

Start Time	7:00
End Time	8:05
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	508
Vehs Exited	430
Starting Vehs	56
Ending Vehs	134
Travel Distance (mi)	100
Travel Time (hr)	1028.8
Total Delay (hr)	1024.9
Total Stops	419
Fuel Used (gal)	237.0

Interval #0 Information Seeding

Start Time	7:00
End Time	7:05
Total Time (min)	5
Volumes adjusted by PHF, Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:05
End Time	8:05
Total Time (min)	60
Volumes adjusted by PHF, Growth Factors.	
Vehs Entered	508
Vehs Exited	430
Starting Vehs	56
Ending Vehs	134
Travel Distance (mi)	100
Travel Time (hr)	1028.8
Total Delay (hr)	1024.9
Total Stops	419
Fuel Used (gal)	237.0

1: HILLSIDE AVE./W. Putnam Avenue & Connector & Pemberwick Road Performance by movement

Movement	NBL2	SER2	SWT	SWR	All
Denied Delay (hr)	0.0	58.0	155.6	16.9	230.5
Denied Del/Veh (s)	0.0	1355.8	1239.4	1379.4	1260.9
Total Delay (hr)	0.0	7.9	17.5	0.1	25.6
Total Del/Veh (s)	21.1	1235.8	789.4	30.1	766.8
Avg Speed (mph)	1	0	0	4	0
Fuel Used (gal)	0.0	15.0	39.6	3.8	58.5
HC Emissions (g)	0	86	65	24	175
CO Emissions (g)	1	1718	2650	473	4842
NOx Emissions (g)	0	61	50	19	130

2: HILLSIDE AVE. & SITE ACCESS DR. Performance by movement

Movement	WBT	WBR	SBR	All
Denied Delay (hr)	7.2	0.0	0.0	7.2
Denied Del/Veh (s)	255.5	0.0	0.1	241.3
Total Delay (hr)	6.9	0.0	0.7	7.6
Total Del/Veh (s)	291.3	0.6	2687.8	301.7
Avg Speed (mph)	0	16	0	0
Fuel Used (gal)	3.2	0.0	0.2	3.4
HC Emissions (g)	23	0	0	23
CO Emissions (g)	443	9	8	460
NOx Emissions (g)	20	1	0	21

3: HILLSIDE AVE. Performance by movement

Movement	WBT	NWL	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0
Total Delay (hr)	1.0	4.9	5.8
Total Del/Veh (s)	44.6	1167.7	225.8
Avg Speed (mph)	2	0	0
Fuel Used (gal)	0.3	1.1	1.4
HC Emissions (g)	0	0	1
CO Emissions (g)	30	57	87
NOx Emissions (g)	2	1	3

4: BYRAM CIRCLE & HILLSIDE AVE. Performance by movement

Movement	WBL	WBT	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0
Total Delay (hr)	9.4	0.1	9.5
Total Del/Veh (s)	999.3	5.3	380.8
Avg Speed (mph)	0	15	0
Fuel Used (gal)	2.2	0.1	2.3
HC Emissions (g)	0	1	1
CO Emissions (g)	108	36	144
NOx Emissions (g)	1	3	4

5: PUTNAM AVE. & BYRAM CIRCLE Performance by movement

Movement	EBT	SBL	All
Denied Delay (hr)	288.6	0.0	288.6
Denied Del/Veh (s)	1229.5	0.0	1195.6
Total Delay (hr)	18.2	9.0	27.3
Total Del/Veh (s)	393.4	1118.6	500.7
Avg Speed (mph)	1	0	0
Fuel Used (gal)	70.0	2.0	72.0
HC Emissions (g)	206	0	206
CO Emissions (g)	5814	93	5906
NOx Emissions (g)	160	0	160

6: North Main Street & PUTNAM AVE. Performance by movement

Movement	EBL	EBT	EBR	NBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	4.7	0.0	0.0	4.4	9.2
Total Del/Veh (s)	125.2	0.0	0.7	105.3	101.7
Avg Speed (mph)	1	31	16	1	1
Fuel Used (gal)	1.2	0.0	0.0	1.2	2.4
HC Emissions (g)	31	0	0	1	32
CO Emissions (g)	432	0	6	126	564
NOx Emissions (g)	27	0	1	5	34

7: West Putnam Avenue & Byram Road Performance by movement

Movement	NBL	NBR	NEL	NET	NER	All
Denied Delay (hr)	90.6	208.1	0.7	3.5	2.8	305.7
Denied Del/Veh (s)	1646.6	1570.5	217.1	65.4	79.8	1092.7
Total Delay (hr)	5.8	5.9	5.9	5.7	0.1	23.4
Total Del/Veh (s)	1238.3	532.4	2367.0	112.5	1.7	232.0
Avg Speed (mph)	0	0	0	2	17	1
Fuel Used (gal)	22.1	48.7	1.5	2.7	0.8	75.8
HC Emissions (g)	71	156	0	6	2	235
CO Emissions (g)	1875	4125	76	414	106	6597
NOx Emissions (g)	51	110	0	23	9	193

8: West Putnam Avenue & Connector Performance by movement

Movement	NEL	NET	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0
Total Delay (hr)	0.0	0.1	0.1
Total Del/Veh (s)	2.5	1.0	1.1
Avg Speed (mph)	18	28	27
Fuel Used (gal)	0.0	0.7	0.7
HC Emissions (g)	0	9	9
CO Emissions (g)	6	439	445
NOx Emissions (g)	1	31	32

Total Network Performance

Denied Delay (hr)	906.9
Denied Del/Veh (s)	1223.2
Total Delay (hr)	118.0
Total Del/Veh (s)	753.5
Avg Speed (mph)	1
Fuel Used (gal)	237.0
HC Emissions (g)	750
CO Emissions (g)	21215
NOx Emissions (g)	670

Intersection: 1: HILLSIDE AVE./W. Putnam Avenue & Connector & Pemberwick Road

Movement	NB	SE	SW	SW
Directions Served	<L	>	T	T
Maximum Queue (ft)	29	201	284	260
Average Queue (ft)	3	164	229	235
95th Queue (ft)	16	239	306	333
Link Distance (ft)	0	186	245	245
Upstream Blk Time (%)	4	86	90	87
Queuing Penalty (veh)	4	0	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				79
Queuing Penalty (veh)				30

Intersection: 2: HILLSIDE AVE. & SITE ACCESS DR.

Movement	WB	WB	SB
Directions Served	T	TR	R
Maximum Queue (ft)	164	160	29
Average Queue (ft)	143	30	13
95th Queue (ft)	187	127	25
Link Distance (ft)	144	144	70
Upstream Blk Time (%)	94	12	
Queuing Penalty (veh)	337	43	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: HILLSIDE AVE.

Movement	WB	NW
Directions Served	T	L
Maximum Queue (ft)	31	136
Average Queue (ft)	24	122
95th Queue (ft)	32	126
Link Distance (ft)	24	122
Upstream Blk Time (%)	94	96
Queuing Penalty (veh)	330	249
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: BYRAM CIRCLE & HILLSIDE AVE.

Movement	WB
Directions Served	LT
Maximum Queue (ft)	239
Average Queue (ft)	230
95th Queue (ft)	242
Link Distance (ft)	230
Upstream Blk Time (%)	95
Queuing Penalty (veh)	455
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: PUTNAM AVE. & BYRAM CIRCLE

Movement	EB	EB	SB
Directions Served	T	T	L
Maximum Queue (ft)	395	428	244
Average Queue (ft)	363	365	212
95th Queue (ft)	381	393	223
Link Distance (ft)	365	365	130
Upstream Blk Time (%)	100	97	98
Queuing Penalty (veh)	0	0	315
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Main Street & PUTNAM AVE.

Movement	EB	NB	B14
Directions Served	L	T	T
Maximum Queue (ft)	136	149	371
Average Queue (ft)	120	96	220
95th Queue (ft)	130	212	503
Link Distance (ft)	117	77	356
Upstream Blk Time (%)	85	63	59
Queuing Penalty (veh)	494	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: West Putnam Avenue & Byram Road

Movement	NB	NB	NE	NE
Directions Served	L	R	LT	TR
Maximum Queue (ft)	303	105	275	265
Average Queue (ft)	282	7	239	32
95th Queue (ft)	290	50	358	168
Link Distance (ft)	288		265	265
Upstream Blk Time (%)	95		81	0
Queuing Penalty (veh)	0		536	1
Storage Bay Dist (ft)		80		
Storage Blk Time (%)	97	2		
Queuing Penalty (veh)	467	5		

Intersection: 8: West Putnam Avenue & Connector

Movement	NE
Directions Served	L
Maximum Queue (ft)	31
Average Queue (ft)	1
95th Queue (ft)	10
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	140
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 3267

Westchester County Streams Byram River Basin Flood Risk Management Study Attachment C – Microsimulation SimTraffic Analysis

Attachment C.3 Construction Scenario 1

Summary of All Intervals

Start Time	7:00
End Time	8:05
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	1615
Vehs Exited	1623
Starting Vehs	68
Ending Vehs	60
Travel Distance (mi)	360
Travel Time (hr)	969.4
Total Delay (hr)	954.4
Total Stops	2175
Fuel Used (gal)	233.8

Interval #0 Information Seeding

Start Time	7:00
End Time	7:05
Total Time (min)	5
Volumes adjusted by PHF, Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:05
End Time	8:05
Total Time (min)	60
Volumes adjusted by PHF, Growth Factors.	
Vehs Entered	1615
Vehs Exited	1623
Starting Vehs	68
Ending Vehs	60
Travel Distance (mi)	360
Travel Time (hr)	969.4
Total Delay (hr)	954.4
Total Stops	2175
Fuel Used (gal)	233.8

1: HILLSIDE AVE./W. Putnam Avenue & Pemberwick Road Performance by movement

Movement	SET	SER	NWL	NER	SWL	SWT	SWR	All
Denied Delay (hr)	19.8	0.5	0.0	0.0	111.9	3.4	10.1	145.7
Denied Del/Veh (s)	400.6	412.0	0.0	0.0	853.7	724.0	865.0	657.3
Total Delay (hr)	3.1	0.0	0.0	0.9	9.4	0.0	0.1	13.5
Total Del/Veh (s)	107.5	19.3	3.5	61.0	111.5	16.3	8.3	91.2
Avg Speed (mph)	1	2	9	2	1	7	10	1
Fuel Used (gal)	5.2	0.1	0.0	0.2	28.0	0.8	2.4	36.7
HC Emissions (g)	47	0	0	5	95	0	0	147
CO Emissions (g)	802	6	2	93	2494	49	126	3572
NOx Emissions (g)	35	0	0	6	79	1	2	122

4: PUTNAM AVE. Performance by movement

Movement	EBT	WBT	WBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Delay (hr)	2.1	0.0	0.0	2.1
Total Del/Veh (s)	14.6	0.3	0.2	10.1
Avg Speed (mph)	2	16	13	4
Fuel Used (gal)	0.7	0.5	0.0	1.2
HC Emissions (g)	3	7	0	10
CO Emissions (g)	84	268	4	356
NOx Emissions (g)	10	28	1	39

6: North Main Street & PUTNAM AVE. Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	3.2	0.3	0.1	0.1	0.0	0.0	3.8
Total Del/Veh (s)	25.6	19.9	2.1	0.9	1.3	0.8	11.7
Avg Speed (mph)	4	5	14	23	22	19	7
Fuel Used (gal)	1.3	0.2	0.1	0.4	0.2	0.2	2.4
HC Emissions (g)	6	1	1	5	1	3	17
CO Emissions (g)	193	27	30	127	72	116	566
NOx Emissions (g)	26	4	4	18	5	11	69

7: West Putnam Avenue & Byram Road Performance by movement

Movement	NBL	NBR	NET	NER	SWL	SWT	All
Denied Delay (hr)	98.4	186.1	0.0	0.0	0.0	0.0	284.5
Denied Del/Veh (s)	1406.0	1472.3	0.0	0.0	0.0	0.0	547.1
Total Delay (hr)	7.6	6.0	0.1	0.0	1.6	1.6	17.0
Total Del/Veh (s)	536.1	244.4	0.6	0.1	38.4	26.2	46.7
Avg Speed (mph)	0	1	23	13	4	5	2
Fuel Used (gal)	24.3	43.9	0.4	0.0	0.8	1.1	70.4
HC Emissions (g)	36	94	5	0	5	11	151
CO Emissions (g)	1580	3190	235	5	171	322	5503
NOx Emissions (g)	27	69	19	0	19	35	170

8: West Putnam Avenue Performance by movement

Movement	SEL	SER	NEL	NET	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.2	0.5	0.0	0.3	0.9
Total Del/Veh (s)	8.5	4.4	2.8	1.5	2.9
Avg Speed (mph)	5	7	19	26	17
Fuel Used (gal)	0.1	0.5	0.1	2.1	2.8
HC Emissions (g)	1	5	1	34	40
CO Emissions (g)	18	110	31	1490	1649
NOx Emissions (g)	3	19	3	112	138

11: PUTNAM AVE. Performance by movement

Movement	EBT	WBR	All
Denied Delay (hr)	203.7	0.0	203.7
Denied Del/Veh (s)	810.3	0.0	653.0
Total Delay (hr)	9.1	0.0	9.1
Total Del/Veh (s)	63.1	0.2	44.4
Avg Speed (mph)	2	15	3
Fuel Used (gal)	49.1	0.1	49.2
HC Emissions (g)	114	0	115
CO Emissions (g)	3733	8	3741
NOx Emissions (g)	97	1	98

12: Performance by movement

Movement	NET	All
Denied Delay (hr)	0.0	0.0
Denied Del/Veh (s)	0.0	0.0
Total Delay (hr)	0.1	0.1
Total Del/Veh (s)	0.5	0.5
Avg Speed (mph)	27	27
Fuel Used (gal)	1.6	1.6
HC Emissions (g)	18	18
CO Emissions (g)	663	663
NOx Emissions (g)	61	61

20: Hillside Avenue Performance by movement

Movement	NBL	All
Denied Delay (hr)	0.0	0.0
Denied Del/Veh (s)	0.0	0.0
Total Delay (hr)	0.2	0.2
Total Del/Veh (s)	3.1	3.1
Avg Speed (mph)	8	8
Fuel Used (gal)	0.3	0.3
HC Emissions (g)	2	2
CO Emissions (g)	56	56
NOx Emissions (g)	9	9

22: West Putnam Avenue/North Main Street Performance by movement

Movement	NET	SWT	SWR	All
Denied Delay (hr)	0.0	186.6	84.7	271.3
Denied Del/Veh (s)	0.0	1253.4	1355.3	628.5
Total Delay (hr)	0.4	0.1	0.0	0.5
Total Del/Veh (s)	2.0	1.0	0.4	1.7
Avg Speed (mph)	20	17	12	20
Fuel Used (gal)	2.4	42.5	19.2	64.1
HC Emissions (g)	29	176	40	244
CO Emissions (g)	1302	4103	1368	6774
NOx Emissions (g)	114	132	29	275

Total Network Performance

Denied Delay (hr)	905.3
Denied Del/Veh (s)	967.9
Total Delay (hr)	49.2
Total Del/Veh (s)	105.2
Avg Speed (mph)	6
Fuel Used (gal)	233.8
HC Emissions (g)	801
CO Emissions (g)	25268
NOx Emissions (g)	1177

Intersection: 1: HILLSIDE AVE./W. Putnam Avenue & Pemberwick Road

Movement	SE	NW	NE	SW	SW
Directions Served	TR	LT	R	LT	T
Maximum Queue (ft)	112	23	143	270	233
Average Queue (ft)	84	14	36	235	158
95th Queue (ft)	101	32	109	256	330
Link Distance (ft)	78	34	129		
Upstream Blk Time (%)	87	1	6		
Queuing Penalty (veh)	0	1	0		
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 4: PUTNAM AVE.

Movement	EB	B5
Directions Served	T	T
Maximum Queue (ft)	98	120
Average Queue (ft)	67	104
95th Queue (ft)	83	113
Link Distance (ft)	-12	38
Upstream Blk Time (%)		74
Queuing Penalty (veh)		639
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: North Main Street & PUTNAM AVE.

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	115	75	22
Average Queue (ft)	112	18	2
95th Queue (ft)	115	56	13
Link Distance (ft)	101	84	207
Upstream Blk Time (%)	42	0	
Queuing Penalty (veh)	358	0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: West Putnam Avenue & Byram Road

Movement	NB	NB	NE	SW
Directions Served	L	R	TR	LT
Maximum Queue (ft)	373	105	22	270
Average Queue (ft)	324	56	3	163
95th Queue (ft)	341	142	16	286
Link Distance (ft)	310		-2	255
Upstream Blk Time (%)	100		0	7
Queuing Penalty (veh)	0		0	44
Storage Bay Dist (ft)		80		
Storage Blk Time (%)	99	1		
Queuing Penalty (veh)	442	3		

Intersection: 8: West Putnam Avenue

Movement	SE	NE
Directions Served	LR	LT
Maximum Queue (ft)	63	30
Average Queue (ft)	47	1
95th Queue (ft)	57	10
Link Distance (ft)	34	255
Upstream Blk Time (%)	34	
Queuing Penalty (veh)	237	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: PUTNAM AVE.

Movement	EB
Directions Served	LT
Maximum Queue (ft)	290
Average Queue (ft)	257
95th Queue (ft)	273
Link Distance (ft)	238
Upstream Blk Time (%)	96
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 12:

Movement

Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: Hillside Avenue

Movement

NB

Directions Served	LT
Maximum Queue (ft)	55
Average Queue (ft)	39
95th Queue (ft)	57
Link Distance (ft)	80
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 22: West Putnam Avenue/North Main Street

Movement

Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 1723

Summary of All Intervals

Start Time	4:00
End Time	5:05
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	2311
Vehs Exited	2278
Starting Vehs	68
Ending Vehs	101
Travel Distance (mi)	414
Travel Time (hr)	955.7
Total Delay (hr)	936.3
Total Stops	2425
Fuel Used (gal)	233.3

Interval #0 Information Seeding

Start Time	4:00
End Time	4:05
Total Time (min)	5
Volumes adjusted by PHF, Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	4:05
End Time	5:05
Total Time (min)	60
Volumes adjusted by PHF, Growth Factors.	
Vehs Entered	2311
Vehs Exited	2278
Starting Vehs	68
Ending Vehs	101
Travel Distance (mi)	414
Travel Time (hr)	955.7
Total Delay (hr)	936.3
Total Stops	2425
Fuel Used (gal)	233.3

1: HILLSIDE AVE./W. Putnam Avenue & Pemberwick Road Performance by movement

Movement	SET	SER	NWL	NER	SWL	SWT	SWR	All
Denied Delay (hr)	36.3	2.1	0.0	0.0	325.7	9.4	20.4	394.0
Denied Del/Veh (s)	1502.8	1879.5	0.0	0.0	1226.6	1301.3	1360.6	1087.6
Total Delay (hr)	2.9	0.0	0.0	1.6	12.2	0.0	0.0	16.8
Total Del/Veh (s)	2604.9		3.7	41.3	121.8	12.9	5.4	105.9
Avg Speed (mph)	0		8	3	1	10	13	1
Fuel Used (gal)	8.7	0.5	0.0	0.5	77.3	2.2	4.7	94.0
HC Emissions (g)	34	0	0	13	254	0	8	309
CO Emissions (g)	803	23	2	230	6710	119	334	8220
NOx Emissions (g)	24	0	0	16	194	1	8	244

4: PUTNAM AVE. Performance by movement

Movement	EBT	WBT	WBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Delay (hr)	2.8	0.4	0.0	3.3
Total Del/Veh (s)	308.4	1.8	0.7	12.7
Avg Speed (mph)	0	12	12	5
Fuel Used (gal)	0.6	1.5	0.1	2.2
HC Emissions (g)	5	17	0	22
CO Emissions (g)	86	461	10	557
NOx Emissions (g)	4	70	2	75

6: North Main Street & PUTNAM AVE. Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.2	0.3
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	1.0	1.2	0.7
Total Delay (hr)	3.2	1.6	2.4	2.2	0.3	0.6	10.2
Total Del/Veh (s)	444.5	513.3	44.4	33.8	4.8	2.9	26.5
Avg Speed (mph)	0	0	2	2	13	13	3
Fuel Used (gal)	0.8	0.4	0.7	0.7	0.3	0.9	3.9
HC Emissions (g)	4	1	3	2	4	8	22
CO Emissions (g)	94	29	86	73	111	236	629
NOx Emissions (g)	5	2	7	8	13	27	63

7: West Putnam Avenue & Byram Road Performance by movement

Movement	NBL	NBR	NET	NER	SWL	SWT	All
Denied Delay (hr)	32.2	23.4	0.0	0.0	0.0	0.0	55.6
Denied Del/Veh (s)	326.5	323.5	0.0	0.0	0.0	0.0	130.6
Total Delay (hr)	8.7	3.8	0.1	0.0	0.1	0.2	12.8
Total Del/Veh (s)	103.1	63.0	0.5	0.1	4.7	1.6	32.0
Avg Speed (mph)	2	3	24	13	12	17	4
Fuel Used (gal)	9.9	6.6	0.3	0.0	0.3	1.4	18.5
HC Emissions (g)	21	36	5	0	6	23	91
CO Emissions (g)	779	792	263	3	175	826	2837
NOx Emissions (g)	29	39	16	0	20	80	185

8: West Putnam Avenue Performance by movement

Movement	SEL	SET	SER	NEL	NET	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.1	0.0	0.3	0.0	0.1	0.5
Total Del/Veh (s)	5.5	0.6	2.8	2.2	0.9	1.9
Avg Speed (mph)	6	11	8	17	24	16
Fuel Used (gal)	0.0	0.0	0.5	0.1	1.9	2.6
HC Emissions (g)	1	0	5	1	35	42
CO Emissions (g)	16	1	120	39	1454	1629
NOx Emissions (g)	3	0	21	4	112	139

11: PUTNAM AVE. Performance by movement

Movement	EBT	WBR	All
Denied Delay (hr)	399.2	0.0	399.2
Denied Del/Veh (s)	1856.7	0.0	882.8
Total Delay (hr)	9.0	1.0	10.1
Total Del/Veh (s)	814.4	4.4	40.6
Avg Speed (mph)	0	8	2
Fuel Used (gal)	93.1	0.7	93.8
HC Emissions (g)	205	4	209
CO Emissions (g)	6808	106	6914
NOx Emissions (g)	146	11	157

17: Performance by movement

Movement	NET	All
Denied Delay (hr)	0.0	0.0
Denied Del/Veh (s)	0.0	0.0
Total Delay (hr)	0.1	0.1
Total Del/Veh (s)	0.4	0.4
Avg Speed (mph)	28	28
Fuel Used (gal)	1.2	1.2
HC Emissions (g)	23	23
CO Emissions (g)	579	579
NOx Emissions (g)	66	66

20: Hillside Avenue Performance by movement

Movement	NBL	All
Denied Delay (hr)	0.0	0.0
Denied Del/Veh (s)	0.0	0.0
Total Delay (hr)	1.1	1.1
Total Del/Veh (s)	4.5	4.5
Avg Speed (mph)	7	7
Fuel Used (gal)	1.1	1.1
HC Emissions (g)	8	8
CO Emissions (g)	194	194
NOx Emissions (g)	29	29

22: West Putnam Avenue/North Main Street Performance by movement

Movement	NET	SWT	SWR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.3	0.0	0.0	0.1
Total Delay (hr)	0.3	0.1	0.0	0.4
Total Del/Veh (s)	2.5	0.6	0.4	1.4
Avg Speed (mph)	20	17	12	19
Fuel Used (gal)	1.2	0.4	0.1	1.7
HC Emissions (g)	15	6	1	22
CO Emissions (g)	716	192	16	924
NOx Emissions (g)	59	23	3	84

Total Network Performance

Denied Delay (hr)	864.9
Denied Del/Veh (s)	785.7
Total Delay (hr)	71.4
Total Del/Veh (s)	108.1
Avg Speed (mph)	5
Fuel Used (gal)	233.3
HC Emissions (g)	885
CO Emissions (g)	27464
NOx Emissions (g)	1433

Intersection: 1: HILLSIDE AVE./W. Putnam Avenue & Pemberwick Road

Movement	SE	NW	NE	B2	SW	SW
Directions Served	TR	LT	R	T	LT	T
Maximum Queue (ft)	112	34	226	66	343	295
Average Queue (ft)	95	15	65	8	299	201
95th Queue (ft)	116	35	193	42	316	418
Link Distance (ft)	78	34	129	51		
Upstream Blk Time (%)	100	1	15	11		
Queuing Penalty (veh)	0	1	0	0		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 4: PUTNAM AVE.

Movement	EB	B5	WB
Directions Served	T	T	TR
Maximum Queue (ft)	81	107	124
Average Queue (ft)	62	81	19
95th Queue (ft)	70	116	91
Link Distance (ft)	-12	38	101
Upstream Blk Time (%)		99	2
Queuing Penalty (veh)		747	18
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Main Street & PUTNAM AVE.

Movement	EB	NB	B14	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	115	167	408	154
Average Queue (ft)	102	132	360	52
95th Queue (ft)	109	155	477	119
Link Distance (ft)	101	59	356	226
Upstream Blk Time (%)	96	81	84	
Queuing Penalty (veh)	728	0	0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: West Putnam Avenue & Byram Road

Movement	NB	NB	NE	SW
Directions Served	L	R	TR	LT
Maximum Queue (ft)	362	105	22	74
Average Queue (ft)	330	101	1	34
95th Queue (ft)	348	132	7	73
Link Distance (ft)	310		-2	255
Upstream Blk Time (%)	96			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)		80		
Storage Blk Time (%)	92	2		
Queuing Penalty (veh)	245	8		

Intersection: 8: West Putnam Avenue

Movement	SE	NE
Directions Served	LR	LT
Maximum Queue (ft)	74	31
Average Queue (ft)	43	1
95th Queue (ft)	60	10
Link Distance (ft)	34	255
Upstream Blk Time (%)	25	
Queuing Penalty (veh)	288	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: PUTNAM AVE.

Movement	EB	WB	B5
Directions Served	LT	R	T
Maximum Queue (ft)	250	132	79
Average Queue (ft)	219	92	22
95th Queue (ft)	238	142	73
Link Distance (ft)	216	38	-12
Upstream Blk Time (%)	100	44	4
Queuing Penalty (veh)	0	480	42
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 17:

Movement

Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: Hillside Avenue

Movement

NB

Directions Served	LT
Maximum Queue (ft)	93
Average Queue (ft)	74
95th Queue (ft)	94
Link Distance (ft)	80
Upstream Blk Time (%)	2
Queuing Penalty (veh)	24
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 22: West Putnam Avenue/North Main Street

Movement

SW

Directions Served	TR
Maximum Queue (ft)	75
Average Queue (ft)	7
95th Queue (ft)	44
Link Distance (ft)	-2
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 2581

Westchester County Streams Byram River Basin Flood Risk Management Study Attachment C – Microsimulation SimTraffic Analysis

Attachment C.4 Construction Scenario 2

Summary of All Intervals

Start Time	7:00
End Time	8:05
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	4773
Vehs Exited	4754
Starting Vehs	40
Ending Vehs	59
Travel Distance (mi)	574
Travel Time (hr)	286.3
Total Delay (hr)	260.7
Total Stops	2501
Fuel Used (gal)	89.4

Interval #0 Information Seeding

Start Time	7:00
End Time	7:05
Total Time (min)	5
Volumes adjusted by PHF, Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:05
End Time	8:05
Total Time (min)	60
Volumes adjusted by PHF, Growth Factors.	
Vehs Entered	4773
Vehs Exited	4754
Starting Vehs	40
Ending Vehs	59
Travel Distance (mi)	574
Travel Time (hr)	286.3
Total Delay (hr)	260.7
Total Stops	2501
Fuel Used (gal)	89.4

1: HILLSIDE AVE./W. Putnam Avenue & Connector/Pemberwick Road Performance by movement

Movement	NBL	SBR	SWL	SWT	SWR	All
Denied Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.2
Denied Del/Veh (s)	2.8	0.1	0.3	0.1	3.3	0.8
Total Delay (hr)	0.2	0.2	0.3	0.3	0.0	1.0
Total Del/Veh (s)	5.4	7.4	5.7	3.2	0.1	4.5
Avg Speed (mph)	2	9	13	19	20	14
Fuel Used (gal)	0.1	0.1	0.3	0.6	0.0	1.2
HC Emissions (g)	1	1	1	7	1	10
CO Emissions (g)	13	20	71	222	18	344
NOx Emissions (g)	1	2	8	23	1	36

2: HILLSIDE AVE. & SITE ACCESS DR. Performance by movement

Movement	EBT	WBT	WBR	SBR	All
Denied Delay (hr)	0.0	0.5	0.0	0.1	0.5
Denied Del/Veh (s)	0.0	1.5	0.7	1.9	0.8
Total Delay (hr)	0.0	0.6	0.0	0.8	1.5
Total Del/Veh (s)	0.0	2.0	0.7	28.8	2.1
Avg Speed (mph)	29	17	14	2	14
Fuel Used (gal)	0.6	2.2	0.0	0.2	3.0
HC Emissions (g)	12	25	0	0	36
CO Emissions (g)	446	799	4	17	1266
NOx Emissions (g)	31	100	1	2	133

3: BYRAM CIRCLE & HILLSIDE AVE. Performance by movement

Movement	EBT	WBT	NWL	All
Denied Delay (hr)	0.0	0.0	1.7	1.7
Denied Del/Veh (s)	0.1	0.0	45.4	2.4
Total Delay (hr)	0.5	0.2	1.4	2.1
Total Del/Veh (s)	1.4	0.5	38.7	2.9
Avg Speed (mph)	22	22	2	16
Fuel Used (gal)	4.1	1.7	0.8	6.7
HC Emissions (g)	71	24	2	97
CO Emissions (g)	2310	1191	68	3570
NOx Emissions (g)	254	87	6	347

4: BYRAM CIRCLE & HILLSIDE AVE. Performance by movement

Movement	EBT	WBL	WBT	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.4	0.4
Denied Del/Veh (s)	0.0	0.0	0.0	4.2	0.9
Total Delay (hr)	0.2	0.4	0.2	4.3	5.1
Total Del/Veh (s)	1.1	11.2	2.2	47.8	11.7
Avg Speed (mph)	13	10	21	2	7
Fuel Used (gal)	1.7	0.3	1.0	1.6	4.6
HC Emissions (g)	23	1	15	10	48
CO Emissions (g)	685	79	567	250	1581
NOx Emissions (g)	92	7	48	26	173

5: PUTNAM AVE. & BYRAM CIRCLE Performance by movement

Movement	EBT	WBT	WBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.1	0.5	1.4	0.2	0.0	2.2
Total Del/Veh (s)	2.1	16.7	16.1	5.7	1.3	12.0
Avg Speed (mph)	18	6	5	10	14	6
Fuel Used (gal)	0.3	0.2	0.5	0.3	0.0	1.3
HC Emissions (g)	5	1	4	1	0	12
CO Emissions (g)	184	46	85	59	2	376
NOx Emissions (g)	18	4	7	8	0	38

7: Byram Road & Byram Circle & West Putnam Avenue Performance by movement

Movement	NBL	NBR	SWL	SWT	All
Denied Delay (hr)	72.1	129.2	0.0	0.0	201.3
Denied Del/Veh (s)	1002.3	991.8	0.0	0.0	549.5
Total Delay (hr)	7.4	7.0	0.1	0.0	14.5
Total Del/Veh (s)	230.1	119.9	0.9	0.6	56.9
Avg Speed (mph)	1	2	16	14	3
Fuel Used (gal)	18.3	31.4	1.6	0.2	51.5
HC Emissions (g)	57	151	22	3	232
CO Emissions (g)	1557	3301	710	92	5660
NOx Emissions (g)	45	116	84	11	256

8: West Putnam Avenue & Connector Performance by movement

Movement	SBL	SBR	NEL	NET	All
Denied Delay (hr)	6.4	4.3	0.0	0.0	10.8
Denied Del/Veh (s)	23.9	25.8	0.0	0.1	21.0
Total Delay (hr)	0.4	0.1	0.0	0.1	0.6
Total Del/Veh (s)	1.4	0.8	2.7	1.3	1.2
Avg Speed (mph)	5	6	14	18	11
Fuel Used (gal)	1.7	1.1	0.0	1.1	3.9
HC Emissions (g)	4	7	0	14	25
CO Emissions (g)	144	135	5	686	970
NOx Emissions (g)	8	7	0	54	70

13: PUTNAM AVE. Performance by movement

Movement	EBL	EBT	WBT	All
Denied Delay (hr)	8.6	1.3	0.0	9.8
Denied Del/Veh (s)	38.6	47.9	0.0	35.1
Total Delay (hr)	5.8	0.7	0.1	6.5
Total Del/Veh (s)	26.1	25.0	1.8	23.2
Avg Speed (mph)	5	5	18	5
Fuel Used (gal)	4.4	0.6	0.2	5.2
HC Emissions (g)	21	4	3	29
CO Emissions (g)	558	89	137	783
NOx Emissions (g)	38	7	12	57

20: Hillside Avenue Performance by movement

Movement	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	0.1	0.3	0.4
Denied Del/Veh (s)	0.0	2.2	1.6	1.2
Total Delay (hr)	0.0	0.2	1.3	1.5
Total Del/Veh (s)	0.5	7.8	6.0	4.7
Avg Speed (mph)	26	6	7	9
Fuel Used (gal)	0.4	0.2	1.1	1.7
HC Emissions (g)	5	0	10	15
CO Emissions (g)	164	15	223	402
NOx Emissions (g)	18	2	31	52

Total Network Performance

Denied Delay (hr)	225.2
Denied Del/Veh (s)	155.4
Total Delay (hr)	35.6
Total Del/Veh (s)	26.6
Avg Speed (mph)	9
Fuel Used (gal)	89.4
HC Emissions (g)	654
CO Emissions (g)	20854
NOx Emissions (g)	1659

Intersection: 1: HILLSIDE AVE./W. Putnam Avenue & Connector/Pemberwick Road

Movement	NB	SB	SW
Directions Served	LT	TR	LT
Maximum Queue (ft)	69	91	218
Average Queue (ft)	27	39	52
95th Queue (ft)	50	70	117
Link Distance (ft)	12	190	245
Upstream Blk Time (%)	20		
Queuing Penalty (veh)	3		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: HILLSIDE AVE. & SITE ACCESS DR.

Movement	WB	SB
Directions Served	TR	LR
Maximum Queue (ft)	55	93
Average Queue (ft)	5	57
95th Queue (ft)	26	93
Link Distance (ft)	157	78
Upstream Blk Time (%)		7
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: BYRAM CIRCLE & HILLSIDE AVE.

Movement	WB	NW
Directions Served	T	L
Maximum Queue (ft)	32	54
Average Queue (ft)	3	50
95th Queue (ft)	18	52
Link Distance (ft)	21	23
Upstream Blk Time (%)	0	91
Queuing Penalty (veh)	0	235
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: BYRAM CIRCLE & HILLSIDE AVE.

Movement	EB	WB	WB	NB
Directions Served	T	LT	T	R
Maximum Queue (ft)	71	163	125	166
Average Queue (ft)	17	64	4	137
95th Queue (ft)	50	109	41	194
Link Distance (ft)	104	247	247	128
Upstream Blk Time (%)				58
Queuing Penalty (veh)				186
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: PUTNAM AVE. & BYRAM CIRCLE

Movement	WB	B6	SB
Directions Served	TR	T	L
Maximum Queue (ft)	198	83	49
Average Queue (ft)	98	7	33
95th Queue (ft)	220	38	51
Link Distance (ft)	115	34	128
Upstream Blk Time (%)	26	2	
Queuing Penalty (veh)	0	0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Byram Road & Byram Circle & West Putnam Avenue

Movement	NB	NB	SW
Directions Served	L	R	L
Maximum Queue (ft)	368	105	18
Average Queue (ft)	333	98	1
95th Queue (ft)	345	141	6
Link Distance (ft)	316		236
Upstream Blk Time (%)	98		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)		80	
Storage Blk Time (%)	96	5	
Queuing Penalty (veh)	425	13	

Intersection: 8: West Putnam Avenue & Connector

Movement	SB	NE	NE
Directions Served	LR	L	T
Maximum Queue (ft)	81	31	53
Average Queue (ft)	55	1	6
95th Queue (ft)	68	10	31
Link Distance (ft)	12	236	236
Upstream Blk Time (%)	51		
Queuing Penalty (veh)	102		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 13: PUTNAM AVE.

Movement	EB
Directions Served	LT
Maximum Queue (ft)	288
Average Queue (ft)	253
95th Queue (ft)	327
Link Distance (ft)	236
Upstream Blk Time (%)	76
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: Hillside Avenue

Movement	NB
Directions Served	LTR
Maximum Queue (ft)	103
Average Queue (ft)	96
95th Queue (ft)	110
Link Distance (ft)	79
Upstream Blk Time (%)	18
Queuing Penalty (veh)	140
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 1106

Summary of All Intervals

Start Time	4:00
End Time	5:05
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	1724
Vehs Exited	1689
Starting Vehs	86
Ending Vehs	121
Travel Distance (mi)	361
Travel Time (hr)	1068.8
Total Delay (hr)	1052.3
Total Stops	2918
Fuel Used (gal)	256.8

Interval #0 Information Seeding

Start Time	4:00
End Time	4:05
Total Time (min)	5
Volumes adjusted by PHF, Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	4:05
End Time	5:05
Total Time (min)	60
Volumes adjusted by PHF, Growth Factors.	
Vehs Entered	1724
Vehs Exited	1689
Starting Vehs	86
Ending Vehs	121
Travel Distance (mi)	361
Travel Time (hr)	1068.8
Total Delay (hr)	1052.3
Total Stops	2918
Fuel Used (gal)	256.8

1: HILLSIDE AVE./W. Putnam Avenue & Connector/Pemberwick Road Performance by movement

Movement	NBL	NBT	SBT	SBR	NET	NER	SWL	SWT	SWR	All
Denied Delay (hr)	0.0	0.0	25.8	20.4	0.0	0.0	87.3	429.7	21.5	584.8
Denied Del/Veh (s)	0.0	0.0	1936.4	1752.3	0.0	0.0	1745.8	1848.2	1799.7	1207.1
Total Delay (hr)	0.0	0.0	6.0	3.0	0.0	5.1	7.0	6.0	0.0	27.1
Total Del/Veh (s)	3.1	3.3	3588.0	3591.2	16.4	31.5	3600.0	3600.0		156.6
Avg Speed (mph)	8	8	0	0	5	4	0	0		1
Fuel Used (gal)	0.0	0.0	7.3	5.4	0.0	1.9	21.5	99.4	4.9	140.4
HC Emissions (g)	0	0	0	0	0	6	61	129	63	259
CO Emissions (g)	0	0	344	253	1	243	1728	6193	967	9729
NOx Emissions (g)	0	0	0	0	0	27	42	90	44	204

2: HILLSIDE AVE. & SITE ACCESS DR. Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	8.9	10.0	18.9
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	388.0	403.0	92.5
Total Delay (hr)	0.0	0.7	0.0	0.0	1.6	1.5	3.9
Total Del/Veh (s)	1.6	4.9	0.9	0.0	98.5	84.7	20.4
Avg Speed (mph)	12	8	19	14	1	1	2
Fuel Used (gal)	0.0	0.6	0.1	0.0	2.4	2.7	5.8
HC Emissions (g)	0	5	1	0	9	0	15
CO Emissions (g)	4	124	42	0	224	131	525
NOx Emissions (g)	1	23	3	0	7	1	35

3: BYRAM CIRCLE & HILLSIDE AVE. Performance by movement

Movement	EBT	WBT	NWL	All
Denied Delay (hr)	38.5	0.0	0.0	38.5
Denied Del/Veh (s)	223.3	0.0	0.3	130.0
Total Delay (hr)	8.6	0.0	0.6	9.2
Total Del/Veh (s)	56.2	0.3	5.7	33.2
Avg Speed (mph)	3	12	7	4
Fuel Used (gal)	11.7	0.1	0.5	12.3
HC Emissions (g)	33	1	5	39
CO Emissions (g)	1048	34	125	1206
NOx Emissions (g)	53	5	21	78

4: BYRAM CIRCLE & HILLSIDE AVE. Performance by movement

Movement	EBT	WBL	WBT	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	5.3	5.3
Denied Del/Veh (s)	0.0	0.0	0.0	132.6	19.0
Total Delay (hr)	2.7	0.1	0.1	5.5	8.4
Total Del/Veh (s)	23.3	3.1	0.8	147.6	30.2
Avg Speed (mph)	3	16	21	1	4
Fuel Used (gal)	1.1	0.4	1.3	2.6	5.4
HC Emissions (g)	11	4	21	17	53
CO Emissions (g)	219	164	868	350	1600
NOx Emissions (g)	23	18	72	18	130

5: PUTNAM AVE. & BYRAM CIRCLE Performance by movement

Movement	EBT	WBT	WBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.1	3.0	3.7	0.1	0.0	6.9
Total Del/Veh (s)	2.2	91.8	103.8	5.9	0.3	51.9
Avg Speed (mph)	18	1	1	10	16	2
Fuel Used (gal)	0.3	0.8	1.0	0.2	0.0	2.3
HC Emissions (g)	10	2	1	1	1	15
CO Emissions (g)	277	76	67	41	33	494
NOx Emissions (g)	31	4	3	5	3	46

7: Byram Road & Byram Circle & West Putnam Avenue Performance by movement

Movement	NBL	NBR	SWL	SWT	All
Denied Delay (hr)	29.7	23.0	0.0	0.0	52.7
Denied Del/Veh (s)	292.2	299.5	0.0	0.0	220.7
Total Delay (hr)	8.8	3.8	0.0	0.0	12.6
Total Del/Veh (s)	94.3	55.6	0.4	0.2	56.7
Avg Speed (mph)	2	3	17	15	3
Fuel Used (gal)	9.4	6.6	0.6	0.1	16.6
HC Emissions (g)	28	19	6	0	53
CO Emissions (g)	856	584	288	23	1751
NOx Emissions (g)	38	26	27	2	93

8: West Putnam Avenue & Connector Performance by movement

Movement	SBL	SBT	SBR	NEL	NET	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.3	0.0	0.1	0.0	0.0	0.4
Total Del/Veh (s)	2.7	0.7	1.9	1.8	0.6	1.8
Avg Speed (mph)	5	8	6	15	19	11
Fuel Used (gal)	0.3	0.0	0.2	0.0	1.2	1.7
HC Emissions (g)	2	0	1	0	18	20
CO Emissions (g)	45	0	22	12	879	959
NOx Emissions (g)	7	0	4	1	62	74

13: PUTNAM AVE. Performance by movement

Movement	EBL	EBT	WBT	All
Denied Delay (hr)	66.5	17.3	0.0	83.9
Denied Del/Veh (s)	383.3	385.0	0.0	336.6
Total Delay (hr)	6.7	1.5	0.1	8.3
Total Del/Veh (s)	52.0	46.3	2.4	43.1
Avg Speed (mph)	3	3	16	3
Fuel Used (gal)	17.4	4.4	0.3	22.0
HC Emissions (g)	21	42	3	66
CO Emissions (g)	1130	727	137	1994
NOx Emissions (g)	29	35	14	78

20: Hillside Avenue Performance by movement

Movement	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	13.3	34.6	48.0
Denied Del/Veh (s)	0.0	262.6	257.9	180.2
Total Delay (hr)	0.1	0.6	1.9	2.5
Total Del/Veh (s)	1.1	13.2	16.2	10.5
Avg Speed (mph)	23	4	3	6
Fuel Used (gal)	0.3	3.3	8.7	12.3
HC Emissions (g)	4	8	16	28
CO Emissions (g)	85	257	625	968
NOx Emissions (g)	13	9	21	43

Total Network Performance

Denied Delay (hr)	956.1
Denied Del/Veh (s)	959.1
Total Delay (hr)	96.2
Total Del/Veh (s)	191.3
Avg Speed (mph)	3
Fuel Used (gal)	256.8
HC Emissions (g)	688
CO Emissions (g)	24399
NOx Emissions (g)	1069

Intersection: 1: HILLSIDE AVE./W. Putnam Avenue & Connector/Pemberwick Road

Movement	NB	SB	NE	SW	SW
Directions Served	LT	TR	LTR	LT	T
Maximum Queue (ft)	26	201	180	235	235
Average Queue (ft)	10	188	171	235	235
95th Queue (ft)	31	192	180	235	235
Link Distance (ft)	12	190	166	245	245
Upstream Blk Time (%)	1	98	24	100	100
Queuing Penalty (veh)	0	0	245	0	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 2: HILLSIDE AVE. & SITE ACCESS DR.

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	79	91
Average Queue (ft)	43	79
95th Queue (ft)	66	103
Link Distance (ft)	28	76
Upstream Blk Time (%)	27	87
Queuing Penalty (veh)	266	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: BYRAM CIRCLE & HILLSIDE AVE.

Movement	EB	WB	NW
Directions Served	T	T	L
Maximum Queue (ft)	262	31	65
Average Queue (ft)	250	3	45
95th Queue (ft)	257	18	63
Link Distance (ft)	247	28	23
Upstream Blk Time (%)	25	0	42
Queuing Penalty (veh)	226	1	145
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: BYRAM CIRCLE & HILLSIDE AVE.

Movement	EB	WB	NB
Directions Served	T	LT	R
Maximum Queue (ft)	121	72	163
Average Queue (ft)	114	22	143
95th Queue (ft)	130	53	159
Link Distance (ft)	104	247	128
Upstream Blk Time (%)	42		89
Queuing Penalty (veh)	255		237
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: PUTNAM AVE. & BYRAM CIRCLE

Movement	WB	B6	B14	SB
Directions Served	TR	T	T	L
Maximum Queue (ft)	220	143	408	46
Average Queue (ft)	174	92	321	24
95th Queue (ft)	204	137	513	37
Link Distance (ft)	115	34	356	128
Upstream Blk Time (%)	85	84	81	
Queuing Penalty (veh)	0	0	0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Byram Road & Byram Circle & West Putnam Avenue

Movement	NB	NB	SW
Directions Served	L	R	L
Maximum Queue (ft)	368	105	20
Average Queue (ft)	340	105	1
95th Queue (ft)	360	105	9
Link Distance (ft)	316		236
Upstream Blk Time (%)	99		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)		80	
Storage Blk Time (%)	95	2	
Queuing Penalty (veh)	255	9	

Intersection: 8: West Putnam Avenue & Connector

Movement	SB
Directions Served	LR
Maximum Queue (ft)	104
Average Queue (ft)	48
95th Queue (ft)	83
Link Distance (ft)	12
Upstream Blk Time (%)	43
Queuing Penalty (veh)	527
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: PUTNAM AVE.

Movement	EB
Directions Served	LT
Maximum Queue (ft)	276
Average Queue (ft)	252
95th Queue (ft)	300
Link Distance (ft)	236
Upstream Blk Time (%)	88
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: Hillside Avenue

Movement	WB	NB
Directions Served	LT	LTR
Maximum Queue (ft)	138	114
Average Queue (ft)	5	99
95th Queue (ft)	46	109
Link Distance (ft)	104	79
Upstream Blk Time (%)	1	57
Queuing Penalty (veh)	5	349
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 2518

Westchester County Streams Byram River Basin Flood Risk Management Study Attachment C – Microsimulation SimTraffic Analysis

Attachment C.5 Construction Scenario 3

Summary of All Intervals

Start Time	7:00
End Time	8:05
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	2271
Vehs Exited	2251
Starting Vehs	56
Ending Vehs	76
Travel Distance (mi)	480
Travel Time (hr)	280.0
Total Delay (hr)	260.3
Total Stops	2024
Fuel Used (gal)	79.8

Interval #0 Information Seeding

Start Time	7:00
End Time	7:05
Total Time (min)	5
Volumes adjusted by PHF, Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:05
End Time	8:05
Total Time (min)	60
Volumes adjusted by PHF, Growth Factors.	
Vehs Entered	2271
Vehs Exited	2251
Starting Vehs	56
Ending Vehs	76
Travel Distance (mi)	480
Travel Time (hr)	280.0
Total Delay (hr)	260.3
Total Stops	2024
Fuel Used (gal)	79.8

2: HILLSIDE AVE. & SITE ACCESS DR. Performance by movement

Movement	WBT	WBR	SBR	All
Denied Delay (hr)	0.8	0.0	0.0	0.9
Denied Del/Veh (s)	4.5	4.0	0.1	4.4
Total Delay (hr)	1.9	0.0	0.0	2.0
Total Del/Veh (s)	10.2	1.3	15.4	9.7
Avg Speed (mph)	16	22	3	16
Fuel Used (gal)	2.5	0.1	0.0	2.7
HC Emissions (g)	26	1	0	27
CO Emissions (g)	629	28	0	657
NOx Emissions (g)	71	3	0	74

3: HILLSIDE AVE. Performance by movement

Movement	WBT	NWL	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0
Total Delay (hr)	0.2	1.3	1.5
Total Del/Veh (s)	1.2	22.5	6.1
Avg Speed (mph)	20	4	9
Fuel Used (gal)	0.5	0.6	1.1
HC Emissions (g)	5	4	9
CO Emissions (g)	117	119	236
NOx Emissions (g)	18	17	35

4: BYRAM CIRCLE & HILLSIDE AVE. Performance by movement

Movement	WBL	WBT	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0
Total Delay (hr)	0.9	0.7	1.6
Total Del/Veh (s)	12.2	4.1	6.6
Avg Speed (mph)	9	17	13
Fuel Used (gal)	0.7	1.6	2.3
HC Emissions (g)	8	17	25
CO Emissions (g)	178	624	802
NOx Emissions (g)	22	68	90

5: PUTNAM AVE. & BYRAM CIRCLE Performance by movement

Movement	EBT	SBL	All
Denied Delay (hr)	128.3	0.0	128.3
Denied Del/Veh (s)	549.3	0.0	415.4
Total Delay (hr)	16.5	4.0	20.5
Total Del/Veh (s)	95.5	52.2	82.2
Avg Speed (mph)	2	2	2
Fuel Used (gal)	34.2	1.2	35.4
HC Emissions (g)	97	8	106
CO Emissions (g)	2993	199	3192
NOx Emissions (g)	112	16	128

6: North Main Street & PUTNAM AVE. Performance by movement

Movement	EBL	EBT	EBR	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	3.7	0.0	0.1	1.2	5.0
Total Del/Veh (s)	20.0	2.2	1.9	11.1	14.3
Avg Speed (mph)	5	15	14	5	5
Fuel Used (gal)	1.7	0.0	0.4	0.5	2.6
HC Emissions (g)	5	0	6	2	13
CO Emissions (g)	212	6	152	63	433
NOx Emissions (g)	28	1	23	6	58

7: West Putnam Avenue & Byram Road Performance by movement

Movement	NWT	NWR	NEL	NET	NER	All
Denied Delay (hr)	27.0	56.9	0.0	0.0	0.0	83.9
Denied Del/Veh (s)	413.4	415.3	0.2	0.0	0.1	165.6
Total Delay (hr)	5.3	9.1	0.3	0.9	0.3	15.9
Total Del/Veh (s)	109.0	96.2	34.8	5.0	2.5	35.4
Avg Speed (mph)	2	2	5	16	15	5
Fuel Used (gal)	7.7	15.7	0.1	2.6	1.3	27.4
HC Emissions (g)	25	53	1	18	16	112
CO Emissions (g)	696	1447	33	737	471	3385
NOx Emissions (g)	27	56	4	95	62	245

Total Network Performance

Denied Delay (hr)	213.1
Denied Del/Veh (s)	280.9
Total Delay (hr)	47.2
Total Del/Veh (s)	73.0
Avg Speed (mph)	7
Fuel Used (gal)	79.8
HC Emissions (g)	416
CO Emissions (g)	13615
NOx Emissions (g)	1044

Intersection: 2: HILLSIDE AVE. & SITE ACCESS DR.

Movement	WB	SB
Directions Served	TR	R
Maximum Queue (ft)	532	30
Average Queue (ft)	63	3
95th Queue (ft)	323	17
Link Distance (ft)	517	80
Upstream Blk Time (%)	5	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: HILLSIDE AVE.

Movement	WB	NW
Directions Served	T	L
Maximum Queue (ft)	31	121
Average Queue (ft)	7	73
95th Queue (ft)	27	122
Link Distance (ft)	24	110
Upstream Blk Time (%)	9	12
Queuing Penalty (veh)	60	31
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: BYRAM CIRCLE & HILLSIDE AVE.

Movement	WB	WB
Directions Served	L	T
Maximum Queue (ft)	64	242
Average Queue (ft)	20	68
95th Queue (ft)	66	241
Link Distance (ft)		229
Upstream Blk Time (%)		8
Queuing Penalty (veh)		79
Storage Bay Dist (ft)	50	
Storage Blk Time (%)	16	0
Queuing Penalty (veh)	85	1

Intersection: 5: PUTNAM AVE. & BYRAM CIRCLE

Movement	EB	EB	SB
Directions Served	T	T	L
Maximum Queue (ft)	417	409	256
Average Queue (ft)	383	383	144
95th Queue (ft)	396	396	257
Link Distance (ft)	365	365	141
Upstream Blk Time (%)	98	87	37
Queuing Penalty (veh)	0	0	119
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Main Street & PUTNAM AVE.

Movement	EB	NB	B14
Directions Served	L	R	T
Maximum Queue (ft)	130	164	72
Average Queue (ft)	119	94	4
95th Queue (ft)	125	148	28
Link Distance (ft)	117	74	356
Upstream Blk Time (%)	20	23	
Queuing Penalty (veh)	116	0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: West Putnam Avenue & Byram Road

Movement	NW	NW	NE	NE
Directions Served	T	R	L	TR
Maximum Queue (ft)	400	105	71	319
Average Queue (ft)	376	94	9	15
95th Queue (ft)	422	146	39	113
Link Distance (ft)	361			300
Upstream Blk Time (%)	91			0
Queuing Penalty (veh)	0			6
Storage Bay Dist (ft)		80	50	
Storage Blk Time (%)	42	64	5	0
Queuing Penalty (veh)	203	139	67	0

Network Summary

Network wide Queuing Penalty: 905

Summary of All Intervals

Start Time	4:00
End Time	5:05
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	966
Vehs Exited	892
Starting Vehs	55
Ending Vehs	129
Travel Distance (mi)	213
Travel Time (hr)	820.0
Total Delay (hr)	811.6
Total Stops	1038
Fuel Used (gal)	193.6

Interval #0 Information Seeding

Start Time	4:00
End Time	4:05
Total Time (min)	5
Volumes adjusted by PHF, Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	4:05
End Time	5:05
Total Time (min)	60
Volumes adjusted by PHF, Growth Factors.	
Vehs Entered	966
Vehs Exited	892
Starting Vehs	55
Ending Vehs	129
Travel Distance (mi)	213
Travel Time (hr)	820.0
Total Delay (hr)	811.6
Total Stops	1038
Fuel Used (gal)	193.6

2: HILLSIDE AVE. & SITE ACCESS DR. Performance by movement

Movement	WBT	WBR	SBR	All
Denied Delay (hr)	212.1	4.2	30.3	246.6
Denied Del/Veh (s)	693.5	1010.2	1268.3	738.6
Total Delay (hr)	16.3	0.0	3.9	20.2
Total Del/Veh (s)	139.9	0.7	741.3	164.8
Avg Speed (mph)	2	25	0	2
Fuel Used (gal)	53.2	1.0	7.8	62.0
HC Emissions (g)	169	0	14	183
CO Emissions (g)	4608	48	532	5188
NOx Emissions (g)	145	0	10	156

3: HILLSIDE AVE. Performance by movement

Movement	WBT	NBL	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0
Total Delay (hr)	0.9	4.5	5.4
Total Del/Veh (s)	7.5	272.2	41.0
Avg Speed (mph)	7	0	2
Fuel Used (gal)	0.5	1.1	1.6
HC Emissions (g)	2	0	2
CO Emissions (g)	60	63	123
NOx Emissions (g)	10	3	12

4: BYRAM CIRCLE & HILLSIDE AVE. Performance by movement

Movement	WBL	WBT	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0
Total Delay (hr)	3.0	4.4	7.4
Total Del/Veh (s)	78.4	47.4	56.5
Avg Speed (mph)	2	3	3
Fuel Used (gal)	0.9	1.8	2.7
HC Emissions (g)	1	8	10
CO Emissions (g)	71	348	419
NOx Emissions (g)	7	36	43

5: PUTNAM AVE. & BYRAM CIRCLE Performance by movement

Movement	EBT	SBL	All
Denied Delay (hr)	142.6	6.2	148.7
Denied Del/Veh (s)	735.4	144.9	629.3
Total Delay (hr)	15.0	8.6	23.7
Total Del/Veh (s)	203.9	214.7	207.7
Avg Speed (mph)	1	1	1
Fuel Used (gal)	36.1	3.5	39.7
HC Emissions (g)	184	1	185
CO Emissions (g)	3977	191	4168
NOx Emissions (g)	146	4	150

6: North Main Street & PUTNAM AVE. Performance by movement

Movement	EBL	EBT	EBR	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	5.2	0.0	0.1	5.2	10.5
Total Del/Veh (s)	86.3	4.4	2.1	110.2	68.0
Avg Speed (mph)	1	10	13	1	1
Fuel Used (gal)	1.5	0.0	0.3	1.3	3.1
HC Emissions (g)	2	0	2	1	5
CO Emissions (g)	112	8	72	87	279
NOx Emissions (g)	10	1	11	4	26

7: West Putnam Avenue & Byram Road Performance by movement

Movement	NBT	NBR	NEL	NET	NER	All
Denied Delay (hr)	128.8	103.7	0.0	4.5	1.1	238.1
Denied Del/Veh (s)	1481.0	1458.9	0.2	65.1	29.3	877.3
Total Delay (hr)	8.9	5.7	4.9	3.5	0.7	23.7
Total Del/Veh (s)	711.4	551.3	653.1	54.6	20.5	181.4
Avg Speed (mph)	0	0	0	3	6	1
Fuel Used (gal)	31.6	25.0	1.2	2.6	0.8	61.1
HC Emissions (g)	51	24	0	23	3	103
CO Emissions (g)	2096	1470	71	538	132	4308
NOx Emissions (g)	37	20	3	49	15	124

Total Network Performance

Denied Delay (hr)	710.4
Denied Del/Veh (s)	862.2
Total Delay (hr)	101.2
Total Del/Veh (s)	356.9
Avg Speed (mph)	2
Fuel Used (gal)	193.6
HC Emissions (g)	563
CO Emissions (g)	17810
NOx Emissions (g)	694

Intersection: 2: HILLSIDE AVE. & SITE ACCESS DR.

Movement	WB	SB
Directions Served	TR	R
Maximum Queue (ft)	598	96
Average Queue (ft)	434	84
95th Queue (ft)	800	95
Link Distance (ft)	560	80
Upstream Blk Time (%)	66	98
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: HILLSIDE AVE.

Movement	WB	NB
Directions Served	T	L
Maximum Queue (ft)	32	120
Average Queue (ft)	26	108
95th Queue (ft)	32	118
Link Distance (ft)	24	102
Upstream Blk Time (%)	70	88
Queuing Penalty (veh)	825	362
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: BYRAM CIRCLE & HILLSIDE AVE.

Movement	WB	WB
Directions Served	L	T
Maximum Queue (ft)	64	239
Average Queue (ft)	42	177
95th Queue (ft)	74	338
Link Distance (ft)		230
Upstream Blk Time (%)		68
Queuing Penalty (veh)		1078
Storage Bay Dist (ft)	50	
Storage Blk Time (%)	72	0
Queuing Penalty (veh)	753	0

Intersection: 5: PUTNAM AVE. & BYRAM CIRCLE

Movement	EB	EB	SB
Directions Served	T	T	L
Maximum Queue (ft)	380	380	220
Average Queue (ft)	320	283	206
95th Queue (ft)	464	499	233
Link Distance (ft)	365	365	141
Upstream Blk Time (%)	67	64	89
Queuing Penalty (veh)	0	0	388
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Main Street & PUTNAM AVE.

Movement	EB	NB	B14
Directions Served	L	R	T
Maximum Queue (ft)	127	165	371
Average Queue (ft)	118	133	238
95th Queue (ft)	122	165	501
Link Distance (ft)	117	74	356
Upstream Blk Time (%)	73	78	60
Queuing Penalty (veh)	420	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: West Putnam Avenue & Byram Road

Movement	NB	NB	NE	NE
Directions Served	T	R	L	TR
Maximum Queue (ft)	346	105	61	270
Average Queue (ft)	313	25	50	181
95th Queue (ft)	330	98	83	371
Link Distance (ft)	307			260
Upstream Blk Time (%)	99			65
Queuing Penalty (veh)	0			735
Storage Bay Dist (ft)		80	50	
Storage Blk Time (%)	98	1	72	
Queuing Penalty (veh)	242	4	764	

Network Summary

Network wide Queuing Penalty: 5572

Westchester County Streams Byram River Basin Flood Risk Management Study Attachment C – Microsimulation SimTraffic Analysis

Attachment C.6 Construction Scenario 4

Summary of All Intervals

Start Time	7:00
End Time	8:05
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	1725
Vehs Exited	1702
Starting Vehs	58
Ending Vehs	81
Travel Distance (mi)	353
Travel Time (hr)	692.7
Total Delay (hr)	677.2
Total Stops	1749
Fuel Used (gal)	170.3

Interval #0 Information Seeding

Start Time	7:00
End Time	7:05
Total Time (min)	5
Volumes adjusted by PHF, Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:05
End Time	8:05
Total Time (min)	60
Volumes adjusted by PHF, Growth Factors.	
Vehs Entered	1725
Vehs Exited	1702
Starting Vehs	58
Ending Vehs	81
Travel Distance (mi)	353
Travel Time (hr)	692.7
Total Delay (hr)	677.2
Total Stops	1749
Fuel Used (gal)	170.3

1: HILLSIDE AVE./W. Putnam Avenue & Connector/Pemberwick Road Performance by movement

Movement	SER	NWL	SWT	SWR	All
Denied Delay (hr)	54.9	33.5	97.0	10.3	195.7
Denied Del/Veh (s)	1029.7	1023.0	1126.0	903.5	1065.9
Total Delay (hr)	7.8	0.8	4.9	0.0	13.5
Total Del/Veh (s)	261.7	36.6	180.8	2.3	160.3
Avg Speed (mph)	0	0	1	12	1
Fuel Used (gal)	14.4	7.9	23.4	2.4	48.0
HC Emissions (g)	32	0	53	0	86
CO Emissions (g)	1083	373	1742	117	3315
NOx Emissions (g)	28	1	41	1	70

2: SITE ACCESS DR. & HILLSIDE AVE. Performance by movement

Movement	SBR	SWR	SWR2	All
Denied Delay (hr)	0.0	6.7	1.2	7.9
Denied Del/Veh (s)	0.1	87.0	277.8	96.4
Total Delay (hr)	1.0	4.7	0.1	5.8
Total Del/Veh (s)	1185.0	63.9	16.9	73.5
Avg Speed (mph)	0	2	5	1
Fuel Used (gal)	0.2	3.0	0.3	3.5
HC Emissions (g)	0	6	0	7
CO Emissions (g)	11	248	16	275
NOx Emissions (g)	0	17	1	18

3: HILLSIDE AVE. Performance by movement

Movement	WBT	NBL	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0
Total Delay (hr)	0.6	2.3	2.9
Total Del/Veh (s)	8.3	125.7	32.1
Avg Speed (mph)	5	1	2
Fuel Used (gal)	0.5	0.6	1.2
HC Emissions (g)	4	2	6
CO Emissions (g)	104	67	170
NOx Emissions (g)	15	6	22

4: BYRAM CIRCLE & HILLSIDE AVE. Performance by movement

Movement	WBL	WBT	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0
Total Delay (hr)	3.6	2.9	6.5
Total Del/Veh (s)	136.2	45.0	71.3
Avg Speed (mph)	1	4	2
Fuel Used (gal)	1.1	1.5	2.6
HC Emissions (g)	3	13	16
CO Emissions (g)	153	594	746
NOx Emissions (g)	12	46	58

5: PUTNAM AVE. & BYRAM CIRCLE Performance by movement

Movement	EBT	SBL	SBT	All
Denied Delay (hr)	169.1	0.0	0.0	169.1
Denied Del/Veh (s)	708.0	0.0	0.0	638.2
Total Delay (hr)	17.2	6.5	0.0	23.8
Total Del/Veh (s)	117.8	250.8	69.8	137.8
Avg Speed (mph)	2	1	1	2
Fuel Used (gal)	43.6	1.6	0.0	45.2
HC Emissions (g)	100	23	0	123
CO Emissions (g)	3456	359	0	3816
NOx Emissions (g)	112	20	0	132

6: North Main Street & PUTNAM AVE. Performance by movement

Movement	EBL	EBT	EBR	NBR	SWL	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	4.0	0.0	0.1	2.6	0.0	6.7
Total Del/Veh (s)	28.2	2.1	4.9	21.4	0.3	20.2
Avg Speed (mph)	3	16	10	3	25	5
Fuel Used (gal)	1.6	0.1	0.1	0.9	0.2	2.9
HC Emissions (g)	4	2	1	3	2	12
CO Emissions (g)	183	80	30	111	80	484
NOx Emissions (g)	25	8	4	10	6	53

7: West Putnam Avenue & Byram Road Performance by movement

Movement	NBT	NBR	NET	NER	SWT	All
Denied Delay (hr)	74.6	154.2	0.0	0.0	0.0	228.8
Denied Del/Veh (s)	1243.6	1137.5	0.1	0.0	0.2	443.9
Total Delay (hr)	5.2	8.7	0.7	0.2	0.0	14.8
Total Del/Veh (s)	256.9	156.9	4.0	2.0	0.1	37.3
Avg Speed (mph)	1	1	16	15	29	4
Fuel Used (gal)	18.3	37.5	2.3	1.1	0.3	59.4
HC Emissions (g)	68	90	22	8	3	191
CO Emissions (g)	1669	2871	809	332	81	5762
NOx Emissions (g)	51	73	97	40	9	271

Total Network Performance

Denied Delay (hr)	601.6
Denied Del/Veh (s)	748.4
Total Delay (hr)	75.5
Total Del/Veh (s)	152.5
Avg Speed (mph)	4
Fuel Used (gal)	170.3
HC Emissions (g)	534
CO Emissions (g)	18288
NOx Emissions (g)	952

Intersection: 1: HILLSIDE AVE./W. Putnam Avenue & Connector/Pemberwick Road

Movement	SE	NW	SW	SW
Directions Served	R	LT	T	R
Maximum Queue (ft)	193	47	207	144
Average Queue (ft)	174	20	135	19
95th Queue (ft)	226	34	207	100
Link Distance (ft)	178	17	144	
Upstream Blk Time (%)	85	84	82	0
Queuing Penalty (veh)	0	0	0	0
Storage Bay Dist (ft)				100
Storage Blk Time (%)			85	
Queuing Penalty (veh)			32	

Intersection: 2: SITE ACCESS DR. & HILLSIDE AVE.

Movement	SB	SW
Directions Served	R	R>
Maximum Queue (ft)	69	144
Average Queue (ft)	18	130
95th Queue (ft)	47	142
Link Distance (ft)	76	119
Upstream Blk Time (%)	0	74
Queuing Penalty (veh)	0	447
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: HILLSIDE AVE.

Movement	WB	NB
Directions Served	T	L
Maximum Queue (ft)	50	96
Average Queue (ft)	25	60
95th Queue (ft)	41	112
Link Distance (ft)	24	82
Upstream Blk Time (%)	57	54
Queuing Penalty (veh)	329	116
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: BYRAM CIRCLE & HILLSIDE AVE.

Movement	WB	WB
Directions Served	L	T
Maximum Queue (ft)	64	245
Average Queue (ft)	40	146
95th Queue (ft)	88	330
Link Distance (ft)		230
Upstream Blk Time (%)		57
Queuing Penalty (veh)		449
Storage Bay Dist (ft)	50	
Storage Blk Time (%)	61	0
Queuing Penalty (veh)	318	0

Intersection: 5: PUTNAM AVE. & BYRAM CIRCLE

Movement	EB	EB	SB
Directions Served	T	T	L
Maximum Queue (ft)	404	399	220
Average Queue (ft)	381	382	175
95th Queue (ft)	388	391	260
Link Distance (ft)	365	365	141
Upstream Blk Time (%)	100	92	68
Queuing Penalty (veh)	0	0	173
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Main Street & PUTNAM AVE.

Movement	EB	EB	NB	B14
Directions Served	L	R	R	T
Maximum Queue (ft)	136	69	184	257
Average Queue (ft)	129	19	110	54
95th Queue (ft)	140	45	173	175
Link Distance (ft)	121	121	64	356
Upstream Blk Time (%)	33		54	
Queuing Penalty (veh)	180		0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: West Putnam Avenue & Byram Road

Movement	NB	NB
Directions Served	T	R
Maximum Queue (ft)	372	105
Average Queue (ft)	324	52
95th Queue (ft)	348	139
Link Distance (ft)	309	
Upstream Blk Time (%)	98	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		80
Storage Blk Time (%)	67	39
Queuing Penalty (veh)	321	83

Network Summary

Network wide Queuing Penalty: 2450

Summary of All Intervals

Start Time	4:00
End Time	5:05
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	2240
Vehs Exited	2197
Starting Vehs	49
Ending Vehs	92
Travel Distance (mi)	438
Travel Time (hr)	534.0
Total Delay (hr)	515.0
Total Stops	2513
Fuel Used (gal)	137.7

Interval #0 Information Seeding

Start Time	4:00
End Time	4:05
Total Time (min)	5
Volumes adjusted by PHF, Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	4:05
End Time	5:05
Total Time (min)	60
Volumes adjusted by PHF, Growth Factors.	
Vehs Entered	2240
Vehs Exited	2197
Starting Vehs	49
Ending Vehs	92
Travel Distance (mi)	438
Travel Time (hr)	534.0
Total Delay (hr)	515.0
Total Stops	2513
Fuel Used (gal)	137.7

1: HILLSIDE AVE./W. Putnam Avenue & Connector/Pemberwick Road Performance by movement

Movement	SER	NWL	SWT	SWR	All
Denied Delay (hr)	37.3	85.6	121.4	6.6	250.9
Denied Del/Veh (s)	1542.5	1400.9	632.6	662.2	873.7
Total Delay (hr)	7.9	1.0	5.4	0.0	14.3
Total Del/Veh (s)	1775.7	100.7	39.8	5.1	91.5
Avg Speed (mph)	0	0	2	9	1
Fuel Used (gal)	10.1	19.6	29.4	1.6	60.6
HC Emissions (g)	114	60	62	0	236
CO Emissions (g)	1820	1634	2171	83	5708
NOx Emissions (g)	80	42	56	1	180

2: SITE ACCESS DR. & HILLSIDE AVE. Performance by movement

Movement	SBR	SWR	SWR2	All
Denied Delay (hr)	42.7	22.4	1.0	66.1
Denied Del/Veh (s)	1830.2	145.6	286.5	366.1
Total Delay (hr)	4.0	3.8	0.1	7.8
Total Del/Veh (s)	3600.0	25.9	18.6	52.3
Avg Speed (mph)	0	4	5	2
Fuel Used (gal)	10.4	6.8	0.3	17.5
HC Emissions (g)	34	8	0	42
CO Emissions (g)	886	493	15	1394
NOx Emissions (g)	24	35	1	60

3: HILLSIDE AVE. Performance by movement

Movement	WBT	NWL	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0
Total Delay (hr)	0.2	0.5	0.6
Total Del/Veh (s)	1.1	7.2	3.0
Avg Speed (mph)	9	9	9
Fuel Used (gal)	0.9	0.5	1.4
HC Emissions (g)	7	6	14
CO Emissions (g)	213	170	383
NOx Emissions (g)	32	26	58

4: BYRAM CIRCLE & HILLSIDE AVE. Performance by movement

Movement	WBL	WBT	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0
Total Delay (hr)	0.4	0.5	0.8
Total Del/Veh (s)	7.9	2.8	3.9
Avg Speed (mph)	11	18	16
Fuel Used (gal)	0.5	2.2	2.7
HC Emissions (g)	6	29	36
CO Emissions (g)	225	1381	1606
NOx Emissions (g)	24	107	131

5: PUTNAM AVE. & BYRAM CIRCLE Performance by movement

Movement	EBT	SBL	All
Denied Delay (hr)	60.8	0.1	60.8
Denied Del/Veh (s)	329.9	1.3	262.2
Total Delay (hr)	17.2	1.9	19.1
Total Del/Veh (s)	114.0	39.3	95.9
Avg Speed (mph)	2	3	2
Fuel Used (gal)	18.9	0.7	19.6
HC Emissions (g)	52	6	58
CO Emissions (g)	1752	126	1878
NOx Emissions (g)	86	11	96

6: North Main Street & PUTNAM AVE. Performance by movement

Movement	EBL	EBT	EBR	NBR	SWL	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	4.0	0.1	0.2	3.3	0.0	7.7
Total Del/Veh (s)	30.5	2.5	6.1	26.1	0.5	20.3
Avg Speed (mph)	3	14	9	3	24	5
Fuel Used (gal)	1.5	0.2	0.3	1.1	0.4	3.5
HC Emissions (g)	5	4	3	4	3	20
CO Emissions (g)	202	131	90	143	126	692
NOx Emissions (g)	27	15	12	13	9	76

7: West Putnam Avenue & Byram Road Performance by movement

Movement	NWT	NWR	NET	NER	SWT	All
Denied Delay (hr)	39.1	31.2	0.0	0.0	0.0	70.3
Denied Del/Veh (s)	437.3	443.5	0.0	0.1	0.2	145.1
Total Delay (hr)	8.7	4.3	0.7	0.2	0.0	13.9
Total Del/Veh (s)	128.8	86.2	3.6	2.0	0.6	31.3
Avg Speed (mph)	2	2	17	15	25	5
Fuel Used (gal)	11.4	8.4	2.7	1.1	0.4	24.0
HC Emissions (g)	16	29	34	12	5	96
CO Emissions (g)	786	778	1253	410	288	3516
NOx Emissions (g)	24	30	138	50	18	260

Total Network Performance

Denied Delay (hr)	448.2
Denied Del/Veh (s)	516.7
Total Delay (hr)	66.8
Total Del/Veh (s)	105.1
Avg Speed (mph)	5
Fuel Used (gal)	137.7
HC Emissions (g)	613
CO Emissions (g)	19734
NOx Emissions (g)	1228

Intersection: 1: HILLSIDE AVE./W. Putnam Avenue & Connector/Pemberwick Road

Movement	SE	NW	SW	SW
Directions Served	R	LT	T	R
Maximum Queue (ft)	241	47	196	144
Average Queue (ft)	185	28	155	81
95th Queue (ft)	214	42	197	199
Link Distance (ft)	178	17	144	
Upstream Blk Time (%)	98	98	90	1
Queuing Penalty (veh)	0	0	0	0
Storage Bay Dist (ft)				100
Storage Blk Time (%)			93	
Queuing Penalty (veh)			38	

Intersection: 2: SITE ACCESS DR. & HILLSIDE AVE.

Movement	SB	SW
Directions Served	R	R>
Maximum Queue (ft)	78	144
Average Queue (ft)	78	132
95th Queue (ft)	78	143
Link Distance (ft)	78	114
Upstream Blk Time (%)	100	46
Queuing Penalty (veh)	0	444
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: HILLSIDE AVE.

Movement	WB	NW
Directions Served	T	L
Maximum Queue (ft)	31	97
Average Queue (ft)	25	44
95th Queue (ft)	44	80
Link Distance (ft)	30	97
Upstream Blk Time (%)	7	3
Queuing Penalty (veh)	78	9
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: BYRAM CIRCLE & HILLSIDE AVE.

Movement	WB	WB
Directions Served	L	T
Maximum Queue (ft)	62	228
Average Queue (ft)	6	22
95th Queue (ft)	36	131
Link Distance (ft)		228
Upstream Blk Time (%)		5
Queuing Penalty (veh)		72
Storage Bay Dist (ft)	50	
Storage Blk Time (%)	7	
Queuing Penalty (veh)	73	

Intersection: 5: PUTNAM AVE. & BYRAM CIRCLE

Movement	EB	EB	SB
Directions Served	T	T	L
Maximum Queue (ft)	404	399	220
Average Queue (ft)	382	374	90
95th Queue (ft)	396	425	184
Link Distance (ft)	365	365	141
Upstream Blk Time (%)	94	77	11
Queuing Penalty (veh)	0	0	34
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Main Street & PUTNAM AVE.

Movement	EB	EB	NB	B14
Directions Served	L	R	R	T
Maximum Queue (ft)	136	111	156	288
Average Queue (ft)	128	42	122	94
95th Queue (ft)	139	78	167	253
Link Distance (ft)	121	121	64	356
Upstream Blk Time (%)	36	0	68	
Queuing Penalty (veh)	181	0	0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: West Putnam Avenue & Byram Road

Movement	NW	NW
Directions Served	T	R
Maximum Queue (ft)	399	105
Average Queue (ft)	336	105
95th Queue (ft)	447	107
Link Distance (ft)	336	
Upstream Blk Time (%)	86	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		80
Storage Blk Time (%)	88	6
Queuing Penalty (veh)	218	18

Network Summary

Network wide Queuing Penalty: 1166

Westchester County Streams Byram River Basin Flood Risk Management Study Attachment C – Microsimulation SimTraffic Analysis

Attachment C.7 Construction Scenario 5

Summary of All Intervals

Start Time	7:00
End Time	8:05
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	2747
Vehs Exited	2736
Starting Vehs	37
Ending Vehs	48
Travel Distance (mi)	598
Travel Time (hr)	108.2
Total Delay (hr)	80.8
Total Stops	3074
Fuel Used (gal)	45.6

Interval #0 Information Seeding

Start Time	7:00
End Time	7:05
Total Time (min)	5
Volumes adjusted by PHF, Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:05
End Time	8:05
Total Time (min)	60
Volumes adjusted by PHF, Growth Factors.	
Vehs Entered	2747
Vehs Exited	2736
Starting Vehs	37
Ending Vehs	48
Travel Distance (mi)	598
Travel Time (hr)	108.2
Total Delay (hr)	80.8
Total Stops	3074
Fuel Used (gal)	45.6

1: Connector/Pemberwick Road & HILLSIDE AVE. & W. Putnam Avenue Performance by movement

Movement	EBL	EBT	SER	NWL	SWR	SWR2	All
Denied Delay (hr)	0.0	0.0	0.0	62.9	0.1	0.0	62.9
Denied Del/Veh (s)	0.0	0.0	0.3	1917.5	0.5	0.8	191.9
Total Delay (hr)	0.0	0.0	1.1	0.0	0.1	0.0	1.3
Total Del/Veh (s)	0.5	0.4	23.4		1.0	1.2	4.2
Avg Speed (mph)	21	26	4		13	13	11
Fuel Used (gal)	0.2	0.0	0.4	14.2	0.3	0.0	15.2
HC Emissions (g)	1	0	1	59	3	0	63
CO Emissions (g)	24	3	56	1358	73	5	1518
NOx Emissions (g)	2	0	6	41	8	0	57

2: HILLSIDE AVE. & SITE ACCESS DR. Performance by movement

Movement	EBT	WBT	WBR	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.0
Total Delay (hr)	0.0	0.1	0.0	0.0	0.1
Total Del/Veh (s)	0.1	0.6	0.4	6.8	0.5
Avg Speed (mph)	27	13	11	5	14
Fuel Used (gal)	0.1	1.9	0.1	0.0	2.1
HC Emissions (g)	1	24	0	0	25
CO Emissions (g)	19	933	13	0	965
NOx Emissions (g)	2	96	2	0	100

3: HILLSIDE AVE. Performance by movement

Movement	EBT	WBT	NBL	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.1	1.1	1.2
Total Del/Veh (s)	0.3	0.3	13.4	3.3
Avg Speed (mph)	28	25	6	16
Fuel Used (gal)	0.8	0.6	0.7	2.1
HC Emissions (g)	8	10	4	22
CO Emissions (g)	211	434	135	780
NOx Emissions (g)	22	34	21	77

4: BYRAM CIRCLE & HILLSIDE AVE. Performance by movement

Movement	EBT	WBL	WBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.7	0.1	0.8
Total Del/Veh (s)	0.2	7.4	0.5	2.1
Avg Speed (mph)	28	12	25	19
Fuel Used (gal)	0.4	0.7	1.4	2.5
HC Emissions (g)	4	6	15	26
CO Emissions (g)	130	198	626	954
NOx Emissions (g)	13	24	55	92

5: PUTNAM AVE. & BYRAM CIRCLE Performance by movement

Movement	EBT	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Delay (hr)	0.9	0.7	0.0	1.5
Total Del/Veh (s)	7.1	7.8	8.6	7.4
Avg Speed (mph)	13	9	7	12
Fuel Used (gal)	2.0	0.6	0.0	2.7
HC Emissions (g)	23	6	0	29
CO Emissions (g)	898	154	3	1055
NOx Emissions (g)	86	22	0	108

6: North Main Street & PUTNAM AVE. Performance by movement

Movement	EBL	EBT	EBR	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Delay (hr)	1.6	0.0	0.1	1.3	2.9
Total Del/Veh (s)	11.4	1.7	1.6	10.1	8.9
Avg Speed (mph)	7	16	14	6	7
Fuel Used (gal)	1.1	0.0	0.4	0.6	2.1
HC Emissions (g)	7	0	8	2	18
CO Emissions (g)	211	1	202	76	490
NOx Emissions (g)	32	0	28	8	68

7: West Putnam Avenue & Byram Road Performance by movement

Movement	NBT	NBR	NEL	NET	NER	All
Denied Delay (hr)	0.4	1.0	0.0	0.0	0.0	1.4
Denied Del/Veh (s)	5.2	7.1	0.0	0.0	0.0	2.9
Total Delay (hr)	2.6	3.2	0.1	0.5	0.3	6.7
Total Del/Veh (s)	35.6	23.6	7.6	4.5	2.3	14.3
Avg Speed (mph)	5	7	12	16	15	9
Fuel Used (gal)	1.2	2.1	0.1	1.3	1.6	6.3
HC Emissions (g)	4	13	1	14	21	53
CO Emissions (g)	165	391	33	493	598	1679
NOx Emissions (g)	17	42	4	61	80	204

9: PUTNAM AVE. Performance by movement

Movement	EBT	EBR	WBT	All
Denied Delay (hr)	0.1	0.1	0.0	0.3
Denied Del/Veh (s)	1.1	1.2	0.0	0.7
Total Delay (hr)	0.3	0.1	0.0	0.5
Total Del/Veh (s)	2.9	1.2	0.2	1.3
Avg Speed (mph)	13	12	29	19
Fuel Used (gal)	0.4	0.3	0.7	1.5
HC Emissions (g)	3	2	5	10
CO Emissions (g)	141	50	89	280
NOx Emissions (g)	12	6	16	34

Total Network Performance

Denied Delay (hr)	64.6
Denied Del/Veh (s)	81.0
Total Delay (hr)	16.1
Total Del/Veh (s)	20.9
Avg Speed (mph)	14
Fuel Used (gal)	45.6
HC Emissions (g)	410
CO Emissions (g)	14226
NOx Emissions (g)	1298

Intersection: 1: Connector/Pemberwick Road & HILLSIDE AVE. & W. Putnam Avenue

Movement	SE	SW
Directions Served	R	R>
Maximum Queue (ft)	212	48
Average Queue (ft)	75	7
95th Queue (ft)	163	32
Link Distance (ft)	197	118
Upstream Blk Time (%)	1	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: HILLSIDE AVE. & SITE ACCESS DR.

Movement	WB	SB
Directions Served	TR	LR
Maximum Queue (ft)	30	30
Average Queue (ft)	3	2
95th Queue (ft)	17	14
Link Distance (ft)	122	81
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: HILLSIDE AVE.

Movement	EB	WB	NB
Directions Served	T	T	L
Maximum Queue (ft)	22	50	98
Average Queue (ft)	1	2	79
95th Queue (ft)	7	16	113
Link Distance (ft)	238	16	90
Upstream Blk Time (%)		0	8
Queuing Penalty (veh)		0	22
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: BYRAM CIRCLE & HILLSIDE AVE.

Movement	WB
Directions Served	L
Maximum Queue (ft)	158
Average Queue (ft)	73
95th Queue (ft)	134
Link Distance (ft)	238
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: PUTNAM AVE. & BYRAM CIRCLE

Movement	EB	EB	SB
Directions Served	T	T	L
Maximum Queue (ft)	78	103	164
Average Queue (ft)	51	40	73
95th Queue (ft)	73	65	118
Link Distance (ft)	400	400	122
Upstream Blk Time (%)			1
Queuing Penalty (veh)			4
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Main Street & PUTNAM AVE.

Movement	EB	NB	B14
Directions Served	L	R	T
Maximum Queue (ft)	119	164	91
Average Queue (ft)	92	92	8
95th Queue (ft)	133	154	42
Link Distance (ft)	117	73	356
Upstream Blk Time (%)	3	23	
Queuing Penalty (veh)	11	0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: West Putnam Avenue & Byram Road

Movement	NB	NB	NE	NE
Directions Served	T	R	L	TR
Maximum Queue (ft)	372	105	43	28
Average Queue (ft)	235	99	10	1
95th Queue (ft)	441	118	31	9
Link Distance (ft)	356			284
Upstream Blk Time (%)	16			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)		80	50	
Storage Blk Time (%)	24	26	0	
Queuing Penalty (veh)	117	55	1	

Intersection: 9: PUTNAM AVE.

Movement	EB
Directions Served	TR
Maximum Queue (ft)	111
Average Queue (ft)	6
95th Queue (ft)	42
Link Distance (ft)	96
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 209

Summary of All Intervals

Start Time	4:00
End Time	5:05
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	3244
Vehs Exited	3226
Starting Vehs	36
Ending Vehs	54
Travel Distance (mi)	690
Travel Time (hr)	134.6
Total Delay (hr)	103.9
Total Stops	2993
Fuel Used (gal)	54.6

Interval #0 Information Seeding

Start Time	4:00
End Time	4:05
Total Time (min)	5
Volumes adjusted by PHF, Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	4:05
End Time	5:05
Total Time (min)	60
Volumes adjusted by PHF, Growth Factors.	
Vehs Entered	3244
Vehs Exited	3226
Starting Vehs	36
Ending Vehs	54
Travel Distance (mi)	690
Travel Time (hr)	134.6
Total Delay (hr)	103.9
Total Stops	2993
Fuel Used (gal)	54.6

1: Connector/Pemberwick Road & HILLSIDE AVE. & W. Putnam Avenue Performance by movement

Movement	EBL	SER	NWL	SWR	SWR2	All
Denied Delay (hr)	0.0	0.5	71.7	0.4	0.0	72.7
Denied Del/Veh (s)	0.2	20.1	2000.6	1.8	1.8	184.0
Total Delay (hr)	0.0	4.7	0.0	0.7	0.0	5.5
Total Del/Veh (s)	0.3	187.6		3.0	2.8	15.2
Avg Speed (mph)	16	1		10	10	4
Fuel Used (gal)	0.2	1.3	16.0	0.9	0.0	18.5
HC Emissions (g)	3	14	90	5	1	113
CO Emissions (g)	89	248	1807	137	20	2302
NOx Emissions (g)	11	15	63	16	2	107

2: HILLSIDE AVE. & SITE ACCESS DR. Performance by movement

Movement	EBT	WBT	WBR	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.0	0.1	0.0	1.8	0.1
Total Delay (hr)	0.0	0.4	0.0	0.6	1.0
Total Del/Veh (s)	0.0	1.5	1.5	26.4	2.6
Avg Speed (mph)	29	11	10	2	10
Fuel Used (gal)	0.1	2.6	0.0	0.2	3.0
HC Emissions (g)	1	28	0	2	31
CO Emissions (g)	60	974	6	30	1069
NOx Emissions (g)	4	117	1	2	124

3: HILLSIDE AVE. Performance by movement

Movement	EBT	WBT	NWL	NWT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.2	1.3	0.1	1.7
Total Del/Veh (s)	0.3	0.8	17.6	4.1	3.5
Avg Speed (mph)	28	19	5	10	14
Fuel Used (gal)	0.7	1.3	0.7	0.2	2.9
HC Emissions (g)	6	16	5	1	28
CO Emissions (g)	203	653	126	68	1050
NOx Emissions (g)	19	66	18	7	109

4: BYRAM CIRCLE & HILLSIDE AVE. Performance by movement

Movement	EBT	WBL	WBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.7	0.2	0.9
Total Del/Veh (s)	0.4	6.1	0.7	2.0
Avg Speed (mph)	27	14	26	21
Fuel Used (gal)	0.3	0.9	2.5	3.8
HC Emissions (g)	3	9	37	49
CO Emissions (g)	120	289	1162	1572
NOx Emissions (g)	10	34	129	173

5: PUTNAM AVE. & BYRAM CIRCLE Performance by movement

Movement	EBT	SBL	All
Denied Delay (hr)	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.1	0.0
Total Delay (hr)	0.7	0.9	1.6
Total Del/Veh (s)	7.5	7.1	7.2
Avg Speed (mph)	13	9	11
Fuel Used (gal)	1.6	0.8	2.5
HC Emissions (g)	20	6	26
CO Emissions (g)	747	163	910
NOx Emissions (g)	72	22	94

6: North Main Street & PUTNAM AVE. Performance by movement

Movement	EBL	EBR	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Delay (hr)	1.4	0.2	1.5	3.0
Total Del/Veh (s)	11.9	1.7	11.2	8.7
Avg Speed (mph)	7	13	5	7
Fuel Used (gal)	0.9	0.6	0.6	2.2
HC Emissions (g)	8	7	2	16
CO Emissions (g)	206	188	73	466
NOx Emissions (g)	32	28	7	67

7: West Putnam Avenue & Byram Road Performance by movement

Movement	NWT	NWR	NEL	NET	NER	All
Denied Delay (hr)	1.1	1.1	0.0	0.0	0.0	2.2
Denied Del/Veh (s)	14.5	17.1	0.1	0.1	0.1	5.5
Total Delay (hr)	7.9	4.2	0.3	0.6	0.3	13.3
Total Del/Veh (s)	102.4	64.7	8.6	4.7	2.4	32.0
Avg Speed (mph)	2	3	12	16	15	6
Fuel Used (gal)	2.6	1.8	0.5	1.8	1.3	8.0
HC Emissions (g)	4	4	3	22	12	45
CO Emissions (g)	247	199	124	743	423	1736
NOx Emissions (g)	17	17	17	87	52	189

9: PUTNAM AVE. Performance by movement

Movement	EBT	EBR	WBT	All
Denied Delay (hr)	0.1	0.1	0.0	0.2
Denied Del/Veh (s)	0.8	0.9	0.0	0.3
Total Delay (hr)	0.2	0.1	0.1	0.4
Total Del/Veh (s)	2.3	0.9	0.4	0.9
Avg Speed (mph)	15	13	28	23
Fuel Used (gal)	0.4	0.2	1.5	2.1
HC Emissions (g)	4	2	16	22
CO Emissions (g)	197	44	271	512
NOx Emissions (g)	15	5	48	68

Total Network Performance

Denied Delay (hr)	75.2
Denied Del/Veh (s)	80.3
Total Delay (hr)	28.7
Total Del/Veh (s)	31.5
Avg Speed (mph)	12
Fuel Used (gal)	54.6
HC Emissions (g)	484
CO Emissions (g)	15730
NOx Emissions (g)	1456

Intersection: 1: Connector/Pemberwick Road & HILLSIDE AVE. & W. Putnam Avenue

Movement	SE	SW
Directions Served	R	R>
Maximum Queue (ft)	256	156
Average Queue (ft)	153	66
95th Queue (ft)	275	152
Link Distance (ft)	192	118
Upstream Blk Time (%)	29	5
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: HILLSIDE AVE. & SITE ACCESS DR.

Movement	WB	SB
Directions Served	TR	LR
Maximum Queue (ft)	125	116
Average Queue (ft)	55	48
95th Queue (ft)	126	91
Link Distance (ft)	106	83
Upstream Blk Time (%)	1	5
Queuing Penalty (veh)	10	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: HILLSIDE AVE.

Movement	WB	NW
Directions Served	T	L
Maximum Queue (ft)	51	117
Average Queue (ft)	25	91
95th Queue (ft)	51	123
Link Distance (ft)	19	95
Upstream Blk Time (%)	4	14
Queuing Penalty (veh)	52	59
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: BYRAM CIRCLE & HILLSIDE AVE.

Movement	EB	WB
Directions Served	T	L
Maximum Queue (ft)	31	116
Average Queue (ft)	2	70
95th Queue (ft)	13	109
Link Distance (ft)	87	254
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: PUTNAM AVE. & BYRAM CIRCLE

Movement	EB	EB	SB
Directions Served	T	T	L
Maximum Queue (ft)	131	68	186
Average Queue (ft)	48	41	80
95th Queue (ft)	83	61	127
Link Distance (ft)	400	400	122
Upstream Blk Time (%)			1
Queuing Penalty (veh)			6
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Main Street & PUTNAM AVE.

Movement	EB	NB	B14
Directions Served	L	R	T
Maximum Queue (ft)	117	165	154
Average Queue (ft)	85	99	17
95th Queue (ft)	125	159	80
Link Distance (ft)	117	74	356
Upstream Blk Time (%)	3	27	
Queuing Penalty (veh)	11	0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: West Putnam Avenue & Byram Road

Movement	NW	NW	NE	NE
Directions Served	T	R	L	TR
Maximum Queue (ft)	440	105	72	150
Average Queue (ft)	364	103	23	10
95th Queue (ft)	514	121	55	63
Link Distance (ft)	388			316
Upstream Blk Time (%)	47			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)		80	50	
Storage Blk Time (%)	78	9	5	0
Queuing Penalty (veh)	193	27	38	0

Intersection: 9: PUTNAM AVE.

Movement	EB
Directions Served	TR
Maximum Queue (ft)	31
Average Queue (ft)	2
95th Queue (ft)	15
Link Distance (ft)	96
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 397