



February 7, 2022

Ref: 20848.00

Mr. Morgan S. Ruthman
The Spinney Group
One Jupiter Drive
Delmar, NY 12054

Re: Traffic Impact Evaluation, Quackenderry Commons, Town of North Greenbush, NY

Dear Mr. Ruthman:

VHB Engineering, Surveying, Landscape Architecture and Geology, PC (VHB) has conducted a traffic impact evaluation to assess the potential traffic impacts associated with the construction of apartments within the Quackenderry Commons mixed use Planned Development District (PDD) located on Bloomingrove Drive in the Town of North Greenbush, New York. The current proposal includes the construction of 237 apartment units and 25,900 SF of commercial space within the PDD. The proposed Conceptual Layout Plan, prepared by Lansing Engineering, is included as Attachment A.

This letter includes a comparison of the site generated trips for the current development plan as compared to the trip generation identified in a November 2008 letter prepared by Creighton Manning Engineering, LLP (CME) and an evaluation of the existing and future traffic operations at the NY Route 43/Washington Avenue intersection. As detailed herein, the proposed project is expected to have a minor impact on local traffic operations.

Site Location and Proposed Development

The 24.53±-acre project site, as shown in Figure 1, is bound by NY Route 43 to the west, Washington Avenue to the north and Bloomingrove Drive to the east, in the Town of North Greenbush, New York. Consistent with the initial PDD plans, access to the site is proposed via two full movement access driveways on Bloomingrove Drive. The northerly full movement access drive will form a fourth leg at the unsignalized intersection with Bloomingrove Drive and the access road currently providing access to the CVS Pharmacy and Berkshire Bank. The southerly full movement access drive will form a fourth leg with the access road and the CVS and Berkshire Bank driveway. The project is anticipated to be fully constructed in 2025.

Quackenderry Commons PDD

Creighton Manning Engineering, LLP (CME) prepared an addendum to the August 15, 2008, Traffic Impact Study (TIS) that had been prepared for the Tech Valley Plaza project which included traffic generated from the proposed Quackenderry Commons development. The November 2008 addendum updated the trip generation associated with the proposed development for the Quackenderry Commons project and included an evaluation of the proposed site access with Bloomingrove Drive and the NY Route 43/Washington Avenue and US Route 4/Bloomingrove Drive/Agway Drive intersections. Since 2008, the pharmacy and bank have been constructed.

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The November 2008 Tech Valley Plaza addendum with the updated trip generation associated with the (approved) Quackenderry Commons project identified several mitigation measures resulting from the Quackenderry Commons PDD and the Tech Valley Plaza project. The improvements are summarized below:

- Construction of exclusive eastbound and westbound left-turn lanes at the NY Route 43/Washington Avenue intersection. This mitigation measure was previously identified in the *Generic Environmental Impact Statement (GEIS) for the Route 4/Route 43 Corridor Study*.
- Installation of a traffic signal at the US Route 4/Bloomington Drive/Agway Drive intersection along with widening on both US Route 4, Bloomington Drive, and Agway Drive intersection approaches.
- Realignment of Bloomington Drive to create a four-way intersection with the site access roads and maximize the spacing to the US Route 4/Bloomington Drive/Agway Drive intersection. The recommendations included widening Bloomington Drive to provide a left-turn/through and right-turn lane.

The above noted mitigation related to US Route 4 and Bloomington Drive has been completed and paid for as part of an agreement between the Town of North Greenbush and three development corporations, including the owners of Quackenderry Commons. The \$1.8 million dollars of improvement, in which Quackenderry Commons is contributing more than 50% of the costs, have provided substantial mitigation to the area of US Route 4 between Thompson Court and NY Route 43 and mitigate impacts beyond those identified by the traffic associated by Quackenderry Commons. The mitigation to include the construction of eastbound and westbound left-turn lanes at the NY Route 43/Washington Avenue intersection has not been completed.

The current proposal replaces the prior 98,000 SF of retail space and 5,811 SF restaurant land uses with 237 apartments and 25,900 SF of retail space. Below is a comparison of the November 2008 trip generation and the current proposal. It is noted that due to the level of retail/commercial space in the original PDD, the prior analyses focused on the PM and Saturday peak hours. The AM peak hour was included in the evaluation since the weekday AM and PM commuter peak hours will represent worst case travel associated with the site's residential land use.

Trip Generation Comparison

To estimate the site-generated traffic anticipated at the project site, the Institute of Transportation Engineers' (ITE) publication *Trip Generation Manual, 11th Edition*¹ was utilized. The number of vehicle trips generated by the proposed project at full buildout was estimated based on ITE land use codes (LUC) 221 – Multifamily Residential (Mid-Rise) and 822 – Strip Retail. The trip generation estimate for the proposed project is summarized in Table 1.

It can be expected that some of the trips to the site for the retail land use will originate from traffic that is already on the adjacent roadway network. These trips, known as pass-by or diverted link trips, contribute to the site driveway volumes, but do not add traffic volumes on the adjacent roadway network. The pass-by trip percentages applied to the applicable commercial land uses included at the site are based on data published by ITE in the *Trip Generation Manual, 11th Edition*¹. Based on ITE, pass-by credits of 30% for the AM and Saturday peak hours, and 40% for the PM peak hour were applied to the retail land use.

¹ Trip Generation Manual, 11th Edition, Institute of Transportation Engineers, Washington D.C., September 2021



Due to the mixed-use nature of the proposed project, it is expected that some vehicle trips at the site will be multi-use or "internal" meaning that trips to more than one land use on the site are generated internally and do not add an additional trip to the adjacent roadway network. For example, a resident may stop at the retail shops. Based on the proposed land uses within the site, the resulting internal trip credit is 2% entering and 1% exiting during the weekday AM peak hour. During the PM and Saturday peak hours, the internal trip credit is 22% entering and 25% exiting. The trip generation for the site is summarized in Table 1.

The proposed project is expected to generate 134 new vehicle trips during the weekday morning peak hour (48 entering and 86 exiting), 146 new vehicle trips during the weekday evening peak hour (83 entering and 63 exiting), and 161 new vehicle trips during the Saturday midday peak hour (85 entering and 76 exiting). The magnitude of site generated trips results in less than the NYSDOT and ITE trip thresholds of the generation of 100 vehicle trips on a single intersection approach for determining the need for detailed off-site intersection analysis.

Table 1 Trip Generation Summary for Current Proposal

Weekday Time Period	Movement	Residential ^a	Retail ^b	Pass-By ^c	Internal Capture ^d	Total
Morning Peak Hr	Enter	21	37	-9	-1	48
	Exit	<u>72</u>	<u>24</u>	<u>-9</u>	<u>-1</u>	<u>86</u>
	Total	93	61	-18	-2	134
Evening Peak Hr	Enter	57	85	-28	-31	83
	Exit	<u>36</u>	<u>86</u>	<u>-28</u>	<u>-31</u>	<u>63</u>
	Total	93	171	-56	-62	146
Saturday Peak Hr	Enter	48	87	-21	-29	85
	Exit	<u>47</u>	<u>83</u>	<u>-20</u>	<u>-34</u>	<u>76</u>
	Total	95	170	-41	-63	161

a Trip generation estimate based on ITE LUC 221 – Multifamily Residential (Mid-Rise) for 237 units.

b Trip generation estimate based on ITE LUC 822 – Strip Retail for 25,900 SF.

c Pass-by credit of 30% AM, 40% PM, and 30% Saturday applied to LUC 822 – Strip Retail.

d Internal Capture applied based upon NCHRP Report 684.

The site generated trips for the proposed project are significantly less than the previously Town approved Quackenderry Commons project. A comparison of the trip generation associated with the proposed project and the trip generation from the previously approved Quackenderry Commons project (excluding the already built pharmacy and bank) is shown in Table 2. Note the comparison was completed for the PM and Saturday peak hours only, consistent with the prior record. The proposed project will generate 167 less total trips during the weekday PM peak hour (73 entering and 94 exiting) and 247 less total trips during the Saturday peak hour (135 entering and 112 exiting) than the approved Quackenderry Commons (November 2008). The proposed project results in 131 less new vehicle trips during the weekday PM peak hour (55 entering and 76 exiting) and 171 less new vehicle trips during the Saturday peak hour (95 entering and 76 exiting) to the surrounding roadway network. Likewise, there are



significantly less entering and exiting trips at the proposed site accesses with the proposed project and the approved Quackenderry Commons. The proposed project results in 229 less vehicle trips during the weekday PM peak hour (104 entering and 125 exiting) and 310 less vehicle trips during the Saturday peak hour (164 entering and 146 exiting) at the site accesses than the approved Quackenderry Commons project. Given that the proposed project results in significantly less trips at the proposed site access than the approved Quackenderry Commons, the proposed access, that is consistent with the prior planned access configuration, will adequately service the site.

Table 2 Trip Generation Comparison Proposed vs. Approved (2008) Development

Weekday Time Period	Movement	Total Trips	Pass-By Trips	Internal Trips	Total New Trips
<i>2022 Proposed^a</i>					
Evening Peak Hr	Enter	142	-28	-9	83
	<u>Exit</u>	<u>122</u>	<u>-28</u>	<u>-22</u>	<u>63</u>
	Total	264	-56	-31	146
Saturday Peak Hr	Enter	135	-21	-10	85
	<u>Exit</u>	<u>130</u>	<u>-20</u>	<u>-22</u>	<u>76</u>
	Total	265	-41	-32	161
<i>2008 Approved^b</i>					
Evening Peak Hr	Enter	215	-77	NA	138
	<u>Exit</u>	<u>216</u>	<u>-77</u>	<u>NA</u>	<u>139</u>
	Total	431	-154	NA	277
Saturday Peak Hr	Enter	270	-90	NA	180
	<u>Exit</u>	<u>242</u>	<u>-90</u>	<u>NA</u>	<u>152</u>
	Total	512	-180	NA	332
<i>Difference</i>					
Evening Peak Hr	Enter	-73	-49	9	-55
	<u>Exit</u>	<u>-94</u>	<u>-49</u>	<u>22</u>	<u>-76</u>
	Total	-167	-98	31	-131
Saturday Peak Hr	Enter	-135	-69	10	-95
	<u>Exit</u>	<u>-112</u>	<u>-70</u>	<u>22</u>	<u>-76</u>
	Total	-247	-139	32	-171

a Trip generation estimate based on ITE LUC 822 – Strip Retail for 25,900 SF and LUC 221 – Multifamily Residential (Mid-Rise) for 237 units
 b Trip generation shown in the November 2008 CME study (excluding the already built pharmacy and bank)
 NA Data not applicable



As noted, significant improvements were constructed on US Route 4 and Bloomingrove Drive that were in part paid for by the owners of Quackenderry Commons. This mitigation provided a public benefit to the general traveling public, beyond the impacts associated with trips associated with the site. The current development plan, with less vehicle trips than previously anticipated and approved will serve to further increase the public benefit of the already constructed improvements on US Route 4 and Bloomingrove Drive.

The current proposal consisting primarily of residential units, will result in a shift in the distribution of trips towards Washington Avenue and NY Route 43 to access Interstate 90 by commuters as compared to the prior site development plan that consisting of more retail/commercial land uses. Based on this shift in travel patterns, an evaluation of the Washington Avenue/NY Route 43 intersection was conducted. Based on the current development proposal, the detailed analysis focused on the weekday AM and PM peak hours to coincide with commuter travel periods.

Existing Conditions

The following section provides a description of the existing study area roadway and intersection characteristics.

NY Route 43

NY Route 43 is classified as an urban principal arterial and generally provides north-south travel. Near the project site, NY Route 43 provides two 12-foot wide travel lanes in each direction. There are 10- to 12-foot wide paved shoulders on both sides of the roadway. NY Route 43 has a posted speed limit of 45-mph near the project site. There are no sidewalks on NY Route 43 in the vicinity of the project, so pedestrians use the shoulders and bicyclists use the shoulders and/or share the roadway with motorized vehicles.

Washington Avenue

Washington Avenue provides east-west travel and is classified as an urban minor arterial west of NY Route 43 and classified as a local roadway east of NY Route 43. Near the project site, Washington Avenue is a two-lane roadway with 10- to 11-foot-wide travel lanes. There are paved shoulders that are 3-foot wide on both sides. Land use on Washington Avenue near the project site is primarily residential and commercial.

NY Route 43/Washington Avenue

The NY Route 43/Washington Avenue intersection is a four-leg intersection operating under traffic signal control. The NY Route 43 northbound and southbound approaches each provide a left-turn lane, a through lane and a shared through/right-turn lane. The Washington Avenue eastbound and westbound approaches provide a single lane for shared left/through/right-turn movements. There are sidewalks on the north side of Washington Avenue. There is a marked crosswalk with accompanying push buttons, indicators, and countdown timers to accommodate pedestrian movements on the north leg of this intersection.



Traffic Volumes

Peak hour turning movement counts (TMCs) were conducted at the NY Route 43/Washington Avenue intersection on Tuesday, December 14, 2021, during the weekday morning peak period from 7:00 to 9:00 AM and the weekday evening peak period from 4:00 to 6:00 PM. Based on the collected data, the weekday morning peak hour occurred from 7:45 to 8:45 AM and the weekday evening peak hour occurred from 4:30 to 5:30 PM.

A review of the peak period traffic volumes collected at the NY Route 43/Washington Avenue intersection as compared to the daily traffic volume data collected by NYSDOT, indicated that the current turning movement count data is slightly lower than the NYSDOT data during both peak periods. Therefore, a COVID-19 adjustment factor of 1.03 for the AM peak hour and 1.01 for the PM peak hour was applied to the 2021 peak hour traffic volume data. The traffic volume count data for the weekday morning and evening peak periods are provided in Attachment B. The 2021 Existing AM and PM peak hour traffic volumes are illustrated on Figure 2.

Future Conditions

To determine the impacts of the site-generated traffic volumes near the site, future traffic conditions were evaluated. The project is expected to be fully built and occupied in 2025.

Traffic growth on area roadways is a function of the expected land development, environmental activity, and changes in demographics. A frequently used procedure is to identify estimated traffic generated by planned developments that would be expected to affect the project study area roadways. An alternative procedure is to estimate an annual percentage increase and apply that increase to study area traffic volumes. For this evaluation, both procedures were used. The following summarizes this traffic forecasting process.

Historic Growth

Regression analyses performed using data published by the NYSDOT shows that traffic growth in the study area ranges from -0.28% to 0.11% per year. To provide a conservative evaluation of the potential growth in the study area, a growth rate of 0.5% for four years was used for this project.

Site Specific Growth

The Town of North Greenbush identified the following projects occurring within the project area:

- Proposed 24-unit apartment, Valley View Boulevard, Stonegate
- Proposed 24-unit apartment, Valley View Boulevard, Partridge Hill
- Proposed 40,000 SF fitness center proposed at NY Route 43/US Route 4 intersection
- Approved 22,000 SF grocery store at NY Route 43/US Route 4 intersection
- Pad site restaurant at NY Route 43/US Route 4 intersection

Given the small size and type of development for Stonegate and Partridge Hill, the trips associated with each of the 24-unit apartments are considered within the conservatively high background growth rate that was applied to the volumes; therefore, no site-specific trips associated with these developments have been added beyond the background growth rate.



The Institute of Transportation Engineers' (ITE) publication *Trip Generation Manual, 11th Edition*² was used to develop the estimated number of trips associated with the fitness center, the grocery store, and the restaurant. Land Use Codes (LUC) 492 Health/Fitness Club, LUC 850 Supermarket, and LUC 934 Fast Food Restaurant with Drive-Through Window. According to the ITE Trip generation Handbook, 3rd Edition, the Supermarket has an average pass-by rate of 20% for the weekday AM and 25% for the weekday PM and the Fast-Food Restaurant with Drive-Through Window has a pass-by rate of 50% for the weekday AM and 56% for the weekday PM peak hours. These pass-by rates were utilized. The trips were then distributed to the NY Route 43/Washington Avenue intersection.

No-Build Traffic Volumes

The 2025 No-Build traffic volumes were generated with consideration of the general and site-specific growth described above. The resulting 2025 No-Build peak hour traffic volumes are provided on Figure 2 and represent future traffic volumes in the study area prior to development of the proposed project.

Trip Distribution

The directional distribution of traffic approaching and departing the site is a function of several variables including population densities, existing travel patterns, and the efficiency of the roadways leading to and from the site. Based on a review of the existing travel patterns and population centers in the area it is estimated that 50% of the site generated traffic will travel to and from US Route 4 and 50% will travel to and from the intersection of NY Route 43/Washington Avenue. The primary trip assignments for the project are illustrated on Figure 2.

Build Traffic Volumes

The project-related traffic volumes shown in Table 1 were assigned to the study area roadway network based on the trip distribution. These assigned volumes were then added to the 2025 No-Build peak hour traffic volumes to develop the 2025 Build peak hour traffic volumes. The 2025 Build traffic volumes are summarized on Figure 2.

Traffic Operations Analysis

To assess quality of flow, intersection capacity analyses were conducted with respect to 2021 Existing, 2025 No-Build, and 2025 Build traffic volume conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them. Roadway operating conditions are classified by calculated levels of service (LOS).

The evaluation criteria used to analyze the study area intersections is based on the procedures set forth in the latest version of the Highway Capacity Manual (HCM)³. LOS is a measure that considers many factors including roadway geometry, speed, and travel delay. Levels of service range from A to F, with LOS A representing short vehicle delays and LOS F representing longer vehicle delays. The LOS definitions are included in Attachment C.

² Trip Generation Manual, 11th Edition, Institute of Transportation Engineers, Washington D.C., September 2021.

³ Highway Capacity Manual, 6th Edition, Transportation Research Board, Washington D.C., 2016



Intersection Capacity Analysis

Levels of service analyses (LOS) were conducted for the 2021 Existing, 2025 No-Build, and 2025 Build conditions for the NY Route 43/Washington Avenue intersection. Table 3 summarizes the capacity analysis results for the study area intersection. The capacity analyses worksheets are included in Attachment D.

The analyses shows that the signalized NY Route 43/Washington Avenue intersection will operate at the same overall LOS D during the Build condition as in the No-Build condition during the AM peak hour and the same overall LOS C during the Build condition as in the No-Build condition during the PM peak hour. While there will be some increases in delay during the AM peak hour, all intersection movements are shown to operate with the same levels of service in the Build condition as the No-Build condition. Although overall levels of service remain the same, there are two movements during the PM peak hour that experience increases in delay resulting in a drop in LOS between the No-Build and Build condition. The proposed project increases the traffic volume at the intersection by approximately 2% during both the weekday AM and PM peak hours. Given the minimal additional traffic contributed to the intersection by this project, the overall intersection is shown to operate at overall acceptable LOS (LOS D and LOS C conditions during the AM and PM peak hours, respectively), and there is no change in the overall intersection LOS between the No-Build and Build conditions, no mitigation is proposed resulting from this project.

While no mitigation is proposed as part of this project, the capacity analysis was reviewed since the westbound shared left-turn/through/right-turn lane operates at LOS F during the Existing AM peak hour. This LOS F currently exists and occurs regardless of the proposed project. Therefore, measures to improve Existing conditions were reviewed. Specifically, the Existing volumes for the eastbound and westbound approaches show that the left turning volumes each exceed 110 vehicles during the AM and PM peak hours, with the westbound left turning volume at approximately 200 vehicles during the AM peak hour. The Highway Capacity Manual indicates that an exclusive left-turn lane is often provided when the left-turn volume ranges between 100 and 300 vehicles per hour. Therefore, an exclusive left turn lane could be considered for the eastbound and westbound approaches. The volumes for the eastbound and westbound approaches also suggest that if a westbound left turn lane were to be constructed at the intersection, the westbound left turn lane should operate under protected-permitted phasing. These measures could be considered to address existing conditions that are not the result of this project.



Table 3 Intersection Levels of Service Summary

Location/Movement	2021 Existing		2025 No-Build		2025 Build	
	LOS ^a	Delay ^b	LOS	Delay	LOS	Delay
NY Route 43/Washington Avenue						
<i>AM Peak Hour</i>						
Wash. Ave EB LTR	D	43	D	47	D	48
Wash. Ave WB LTR	F	143	F	132	F	202
NY Route 43 NB L	B	18	C	21	C	22
T	B	15	B	17	B	17
TR	B	15	B	17	B	17
NY Route 43 SB L	B	12	B	14	B	14
T	C	24	C	28	C	28
TR	C	24	C	28	C	29
Overall	C	34	D	36	D	44
<i>PM Peak Hour</i>						
Wash. Ave EB LTR	D	43	D	44	D	49
Wash. Ave WB LTR	D	49	D	50	E	73
NY Route 43 NB L	B	13	B	14	B	14
T	C	26	C	28	C	29
TR	C	29	C	34	D	35
NY Route 43 SB L	B	20	C	21	C	22
T	B	18	B	19	B	19
TR	B	18	B	19	B	19
Overall	C	28	C	29	C	33

a Level of service

b Average total delay in seconds per vehicle (rounded to nearest whole number)

As noted above these left turn lanes could be considered to address the existing LOS F for the westbound approach during the AM peak hour, since this condition occurs without and is not the result of the proposed project.



Conclusions

VHB has conducted a traffic evaluation to assess the potential traffic impacts associated with the construction of the Quackenderry Commons. Consistent with prior studies for the site, access to the site is proposed via two full movement access driveways on Bloomingrove Drive. The project is anticipated to be fully constructed in 2025.

- The proposed project results in 131 less new (primary) trips during the weekday PM peak hour (55 entering and 76 exiting) and 171 less new (primary) trips during the Saturday peak hour (95 entering and 76 exiting) than the traffic volumes anticipated with the approved Quackenderry Commons PDD resulting in less impact to the overall roadway network.
- The proposed project results in significantly less trips (229 during the weekday PM and 310 Saturday peak hour trips) entering and exiting the proposed site access than the approved Quackenderry Commons; therefore, the proposed access will adequately service the site as proposed.
- Significant improvements were constructed on US Route 4 and Bloomingrove Drive that were in part paid for by the owners of Quackenderry Commons. This mitigation provided a public benefit to the general traveling public, beyond the impacts associated with trips associated with the site. The current development plan, with less vehicle trips than previously anticipated and approved will serve to further increase the public benefit of the already constructed improvements on US Route 4 and Bloomingrove Drive.
- The proposed project is estimated to generate 134 new vehicle trips during the weekday morning peak hour (48 entering and 86 exiting), 146 new vehicle trips during the weekday evening peak hour (83 entering and 63 exiting), and 161 new vehicle trips during the Saturday midday peak hour (85 entering and 76 exiting).
- The analysis shows that with construction of the proposed project, the signalized NY Route 43/Washington Avenue intersection will experience increases in delay but will maintain overall level of service D and LOS C conditions during the AM and PM peak hours, respectively. No off-site mitigation is recommended at this intersection resulting from this project.

Please call with any questions regarding the above evaluation.

Sincerely,

VHB Engineering, Surveying, Landscape Architecture and Geology, P.C.

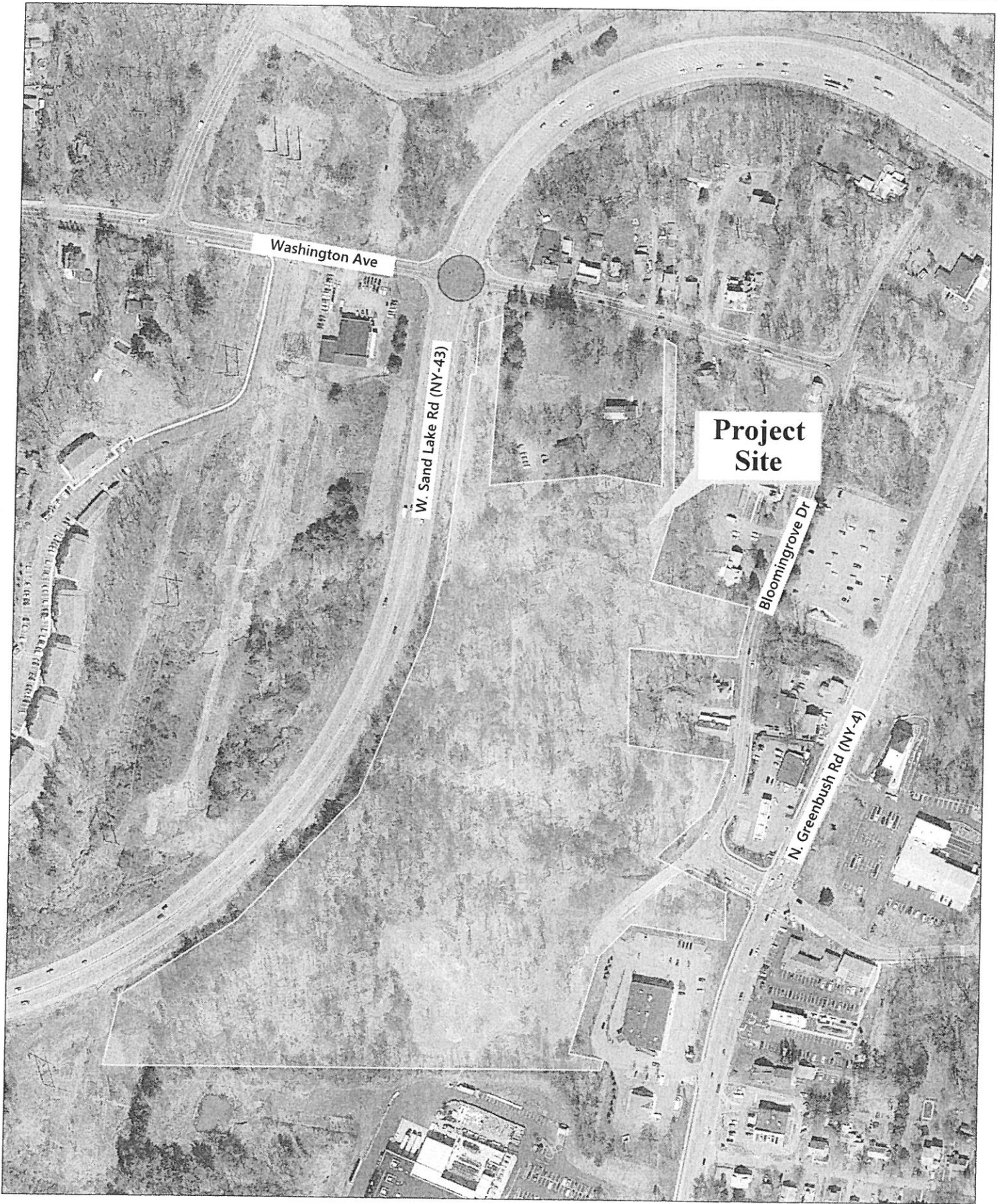
Handwritten signature of Christine Lilholt in black ink.

Christine Lilholt, PE, PTOE
Project Manager

Handwritten signature of John Donnan in black ink.

John Donnan, IE
Project Engineer

Attachments:



Legend



Study Intersection



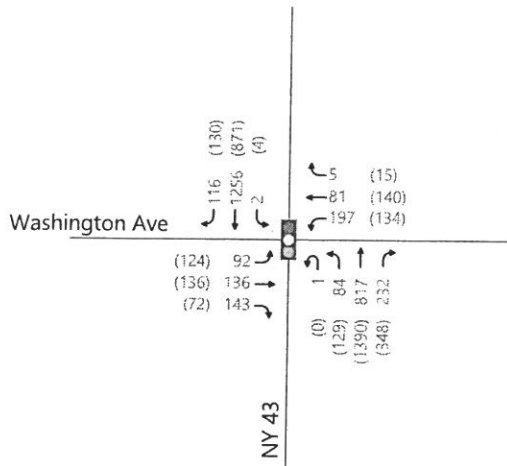
Not to Scale



Project Location Map
Quackenderry Commons
Bloominggrove Drive
North Greenbush, New York

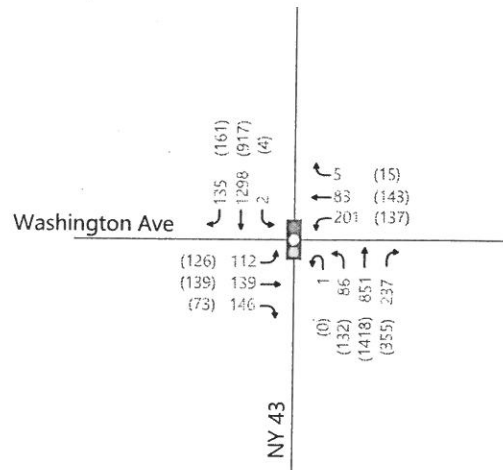
Figure 1

2021 Existing



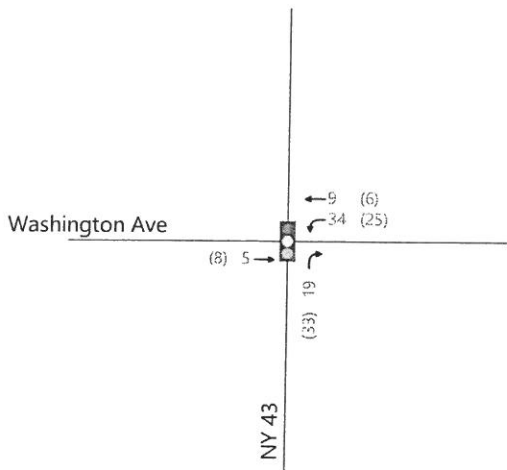
Key: AM Peak (PM Peak)

2025 No-Build



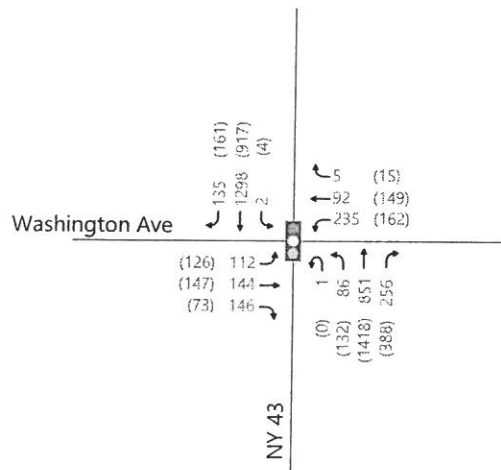
Key: AM Peak (PM Peak)

Trip Assignment



Key: AM Peak (PM Peak)

2025 Build



Key: AM Peak (PM Peak)



Attachments

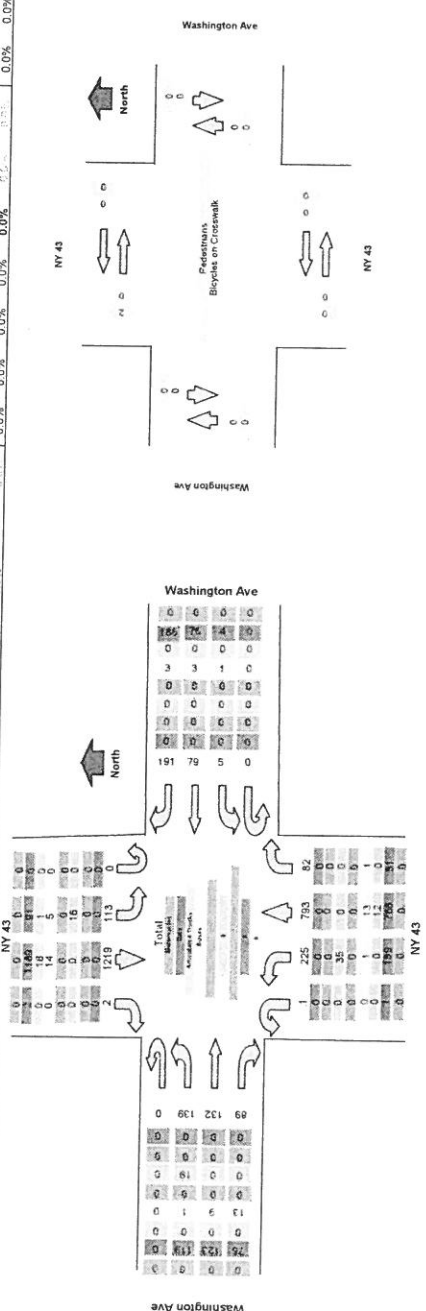
- A. Proposed Site Plan
- B. Turning Movement Count Data
- C. LOS Definitions
- D. Capacity Analysis Worksheets

Attachment A – Proposed Site Plan

Attachment B – Turning Movement Count Data

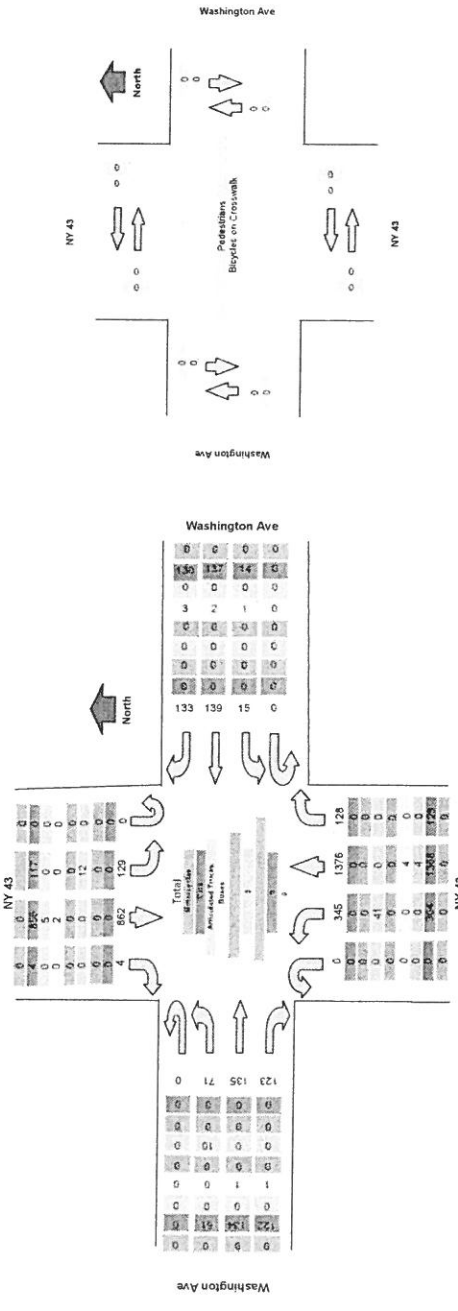
Turning Movement Peak Hour Data (AM)
7:45:00 AM

Leg	NY 43 Southbound				Washington Ave Westbound				NY 43 Northbound				Washington Ave Eastbound				Total		
	Left	Thru	Right	U-Turn/APP Total	Left	Thru	Right	U-Turn/APP Total	Left	Thru	Right	U-Turn/APP Total	Left	Thru	Right	U-Turn/APP Total			
7:45:00 AM	302	37	0	369	0	72	0	72	0	22	225	55	0	32	41	0	92	835	
8:00:00 AM	307	36	0	343	0	65	0	65	0	27	195	60	0	20	30	34	0	84	765
8:15:00 AM	300	21	0	321	0	41	0	41	0	24	217	55	0	29	33	34	0	106	786
8:30:00 AM	280	10	0	290	0	85	0	85	0	9	156	55	1	21	21	0	78	664	
Grand Total	1219	113	0	1332	0	273	0	273	0	82	793	225	1	69	132	139	0	3070	
% Approach	0.1%	91.4%	8.5%	0.0%	0.0%	69.5%	28.7%	1.8%	0.0%	7.4%	72.0%	20.4%	0.1%	24.7%	36.7%	38.6%	0.0%	0.0%	
% Left	0.500	0.818	0.784	0.000	0.004	0.621	0.265	0.004	0.000	0.729	0.681	0.658	0.911	0.757	0.767	0.848	0.000	0.849	
% Right	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
% U-Turn/APP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
% Trucks	100.0%	97.5%	80.5%	0.0%	98.4%	88.8%	96.2%	80.0%	97.5%	98.8%	96.8%	84.0%	100.0%	94.4%	85.4%	93.2%	85.6%	88.3%	
% Buses	0.0%	1.3%	0.8%	0.0%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
% RTOR	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
% RTOR Cars	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
% RTOR Anticipated Trucks	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
% RTOR Bus	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
% Pedestrians	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
% Bicycles on Crosswalk	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	



Turning Movement Peak Hour Data (PM)
4:30:00 PM

Leg	NY 43 Southbound				Washington Ave Westbound				NY 43 Northbound				Washington Ave Eastbound				Total	
	Left	Thru	Right	U-Turn/Approach Total	Left	Thru	Right	U-Turn/Approach Total	Left	Thru	Right	U-Turn/Approach Total	Left	Thru	Right	U-Turn/Approach Total		
Start Time	1	232	32	0	265	40	33	0	75	23	354	76	0	37	28	0	94	880
4:45:00 PM	1	233	30	0	234	42	40	3	85	34	334	94	0	31	29	0	86	867
5:00:00 PM	1	212	35	0	227	26	29	4	59	38	355	92	0	34	28	15	77	862
5:15:00 PM	1	193	37	0	220	25	37	6	69	33	333	80	0	34	28	15	71	852
Grand Total	4	862	128	0	995	128	1376	345	1849	128	1376	345	0	123	135	71	329	3460
% Approach	0.4%	86.6%	13.0%	0.0%	0.0%	46.3%	48.4%	5.3%	0.0%	5.9%	74.4%	18.7%	0.0%	37.4%	41.0%	21.6%	0.0%	0.0%
% PHF	0.1%	24.9%	3.7%	0.0%	28.8%	3.8%	4.0%	0.4%	0.0%	3.8%	38.8%	10.0%	0.0%	3.6%	3.9%	2.1%	0.0%	9.5%
% Motorcycles	1.00%	0.92%	0.92%	0.00%	0.92%	0.79%	0.86%	0.62%	0.00%	0.84%	0.84%	0.84%	0.00%	0.84%	0.83%	0.63%	0.00%	0.87%
% Trucks	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% Buses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% RTOR Motorcycles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% RTOR Cars	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% RTOR Trucks	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% RTOR Buses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% Pedestrians	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% Bicycles on Crosswalk	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%



Attachment C – LOS Definitions

Level of Service Definitions

Signal Controlled Intersections

The evaluation criteria used to analyze signalized intersections is based on the procedures set forth in the latest version of the *Highway Capacity Manual (HCM)*¹.

The level of service (LOS) of a signalized intersection can be characterized for the entire intersection, each intersection approach, and each lane group. Control delay alone is used to characterize LOS for the entire intersection or an approach. Control delay and volume-to-capacity ratio are used to characterize LOS for a lane group. Delay quantifies the increase in travel time due to traffic signal control. It is also a measure of driver discomfort and fuel consumption. The volume-to-capacity ratio quantifies the degree to which a phase's capacity is utilized by a lane group.

The levels of service range between level of service A (relatively congestion-free) and level of service F (congested).

Level of service A – This level is typically assigned when the volume-to-capacity ratio is low and either progression is exceptionally favorable or the cycle length is very short. If LOS A is the result of favorable progression, most vehicles arrive during the green indication and travel through the intersection without stopping.

Level of service B – This level is typically assigned when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.

Level of service C – This level is typically assigned when progression is favorable or the cycle length is moderate. Individual *cycle failures* (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.

Level of service D – This level is typically assigned when the volume-to-capacity ratio is high and either progression is ineffective, or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.

Level of service E - This level is typically assigned when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.

¹ Highway Capacity Manual, 6th Edition, Transportation Research Board, Washington D.C., 2016.

Level of Service F - This level is typically assigned when the volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

A lane group can incur a delay less than 80 s/veh when the volume-to-capacity ratio exceeds 1.0. This condition typically occurs when the cycle length is short, the signal progression is favorable, or both. As a result, both the delay and volume-to-capacity ratio are considered when lane group LOS is established. A ratio of 1.0 or more indicates cycle capacity is fully utilized and represents failure from a capacity perspective (just as delay in excess of 80 s/veh represents failure from a delay perspective).

The following lists the LOS thresholds established for motorized vehicle mode at a signalized intersection.

CONTROL DELAY (s/veh)	LOS by Volume-to-Capacity Ratio ^a	
	≤1.0	≥1.0
≤10	A	F
>10-20	B	F
>20-35	C	F
>35-55	D	F
>55-80	E	F
>80	F	F

^aFor approach-based and intersection wide assessments, LOS is defined solely by control delay.

Attachment D – Capacity Analysis Worksheets

1: NY Route 43 & Washington Avenue
 HCM 6th Signalized Intersection Summary

2021 Existing
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	92	136	143	197	81	5	1	84	817	232	2	1256
Future Volume (veh/h)	92	136	143	197	81	5	1	84	817	232	2	1256
Initial Q (Qb), veh	0	0	0	0	0	0		0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00		1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1678	1796	1885	1870	1841	1604		1885	1856	1885	1900	1856
Adj Flow Rate, veh/h	100	148	134	214	88	5		91	888	214	2	1365
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	15	7	1	2	4	20		1	3	1	0	3
Cap, veh/h	143	179	150	204	59	3		223	1609	388	270	1748
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26		0.05	0.57	0.57	0.00	0.53
Sat Flow, veh/h	373	680	569	547	225	13		1795	2818	679	1810	3308
Grp Volume(v), veh/h	382	0	0	307	0	0		91	555	547	2	725
Grp Sat Flow(s),veh/h/ln	1622	0	0	785	0	0		1795	1763	1733	1810	1763
Q Serve(g_s), s	0.0	0.0	0.0	3.7	0.0	0.0		2.2	20.0	20.0	0.1	33.4
Cycle Q Clear(g_c), s	23.0	0.0	0.0	26.7	0.0	0.0		2.2	20.0	20.0	0.1	33.4
Prop In Lane	0.26		0.35	0.70		0.02		1.00		0.39	1.00	
Lane Grp Cap(c), veh/h	472	0	0	267	0	0		223	1007	990	270	931
V/C Ratio(X)	0.81	0.00	0.00	1.15	0.00	0.00		0.41	0.55	0.55	0.01	0.78
Avail Cap(c_a), veh/h	596	0	0	267	0	0		672	1042	1025	800	1042
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00		1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.9	0.0	0.0	41.2	0.0	0.0		17.3	13.6	13.6	12.4	19.2
Incr Delay (d2), s/veh	6.6	0.0	0.0	101.7	0.0	0.0		0.4	1.1	1.1	0.0	4.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	14.9	0.0	0.0	22.0	0.0	0.0		1.4	11.6	11.5	0.0	19.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.5	0.0	0.0	142.9	0.0	0.0		17.7	14.7	14.7	12.4	23.5
LnGrp LOS	D	A	A	F	A	A		B	B	B	B	C
Approach Vol, veh/h		382			307				1193			1476
Approach Delay, s/veh		42.5			142.9				14.9			23.6
Approach LOS		D			F				B			C
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.6	60.1		31.7	5.3	64.5		31.7				
Change Period (Y+Rc), s	5.0	6.5		5.0	5.0	6.5		5.0				
Max Green Setting (Gmax), s	30.0	60.0		20.0	30.0	60.0		35.0				
Max Q Clear Time (g_c+I1), s	4.2	35.8		28.7	2.1	22.0		25.0				
Green Ext Time (p_c), s	0.1	17.8		0.0	0.0	17.0		1.7				

Intersection Summary

HCM 6th Ctrl Delay	33.6
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.
 User approved ignoring U-Turning movement.

1: NY Route 43 & Washington Avenue
 HCM 6th Signalized Intersection Summary

2021 Existing
 AM Peak Hour

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	116
Future Volume (veh/h)	116
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1826
Adj Flow Rate, veh/h	109
Peak Hour Factor	0.92
Percent Heavy Veh, %	5
Cap, veh/h	139
Arrive On Green	0.53
Sat Flow, veh/h	263
Grp Volume(v), veh/h	749
Grp Sat Flow(s),veh/h/ln	1808
Q Serve(g_s), s	33.8
Cycle Q Clear(g_c), s	33.8
Prop In Lane	0.15
Lane Grp Cap(c), veh/h	955
V/C Ratio(X)	0.78
Avail Cap(c_a), veh/h	1069
HCM Platoon Ratio	1.00
Upstream Filter(l)	1.00
Uniform Delay (d), s/veh	19.3
Incr Delay (d2), s/veh	4.4
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(95%),veh/ln	19.7
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	23.7
LnGrp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

1: NY Route 43 & Washington Avenue
 HCM 6th Signalized Intersection Summary

2025 No-Build
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	112	139	146	201	83	5	1	86	851	237	2	1298
Future Volume (veh/h)	112	139	146	201	83	5	1	86	851	237	2	1298
Initial Q (Qb), veh	0	0	0	0	0	0		0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00		1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No				No			No
Adj Sat Flow, veh/h/ln	1678	1796	1885	1870	1841	1604		1885	1856	1885	1900	1856
Adj Flow Rate, veh/h	122	151	138	218	90	5		93	925	220	2	1411
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	15	7	1	2	4	20		1	3	1	0	3
Cap, veh/h	165	175	150	212	64	4		198	1594	379	247	1708
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28		0.04	0.56	0.56	0.00	0.52
Sat Flow, veh/h	436	626	537	554	229	13		1795	2826	671	1810	3265
Grp Volume(v), veh/h	411	0	0	313	0	0		93	577	568	2	758
Grp Sat Flow(s),veh/h/ln	1598	0	0	796	0	0		1795	1763	1735	1810	1763
Q Serve(g_s), s	0.0	0.0	0.0	3.4	0.0	0.0		2.5	22.8	22.9	0.1	38.8
Cycle Q Clear(g_c), s	26.8	0.0	0.0	30.2	0.0	0.0		2.5	22.8	22.9	0.1	38.8
Prop In Lane	0.30		0.34	0.70		0.02		1.00		0.39	1.00	
Lane Grp Cap(c), veh/h	491	0	0	280	0	0		198	994	978	247	922
V/C Ratio(X)	0.84	0.00	0.00	1.12	0.00	0.00		0.47	0.58	0.58	0.01	0.82
Avail Cap(c_a), veh/h	559	0	0	280	0	0		620	994	978	746	982
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	0.00	1.00	0.00	0.00		1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.5	0.0	0.0	42.5	0.0	0.0		20.7	15.2	15.2	13.7	21.5
Incr Delay (d2), s/veh	9.7	0.0	0.0	89.6	0.0	0.0		0.6	1.4	1.4	0.0	6.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	17.2	0.0	0.0	22.1	0.0	0.0		1.9	13.3	13.1	0.0	22.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.2	0.0	0.0	132.2	0.0	0.0		21.4	16.6	16.6	13.7	27.8
LnGrp LOS	D	A	A	F	A	A		C	B	B	B	C
Approach Vol, veh/h		411			313				1238			1543
Approach Delay, s/veh		47.2			132.2				17.0			28.0
Approach LOS		D			F				B			C
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.7	62.8		35.2	5.3	67.2		35.2				
Change Period (Y+Rc), s	5.0	6.5		5.0	5.0	6.5		5.0				
Max Green Setting (Gmax), s	30.0	60.0		20.0	30.0	60.0		35.0				
Max Q Clear Time (g_c+I1), s	4.5	41.5		32.2	2.1	24.9		28.8				
Green Ext Time (p_c), s	0.1	14.9		0.0	0.0	17.2		1.4				

Intersection Summary

HCM 6th Ctrl Delay 35.7
 HCM 6th LOS D

Notes

User approved pedestrian interval to be less than phase max green.
 User approved ignoring U-Turning movement.

1: NY Route 43 & Washington Avenue
 HCM 6th Signalized Intersection Summary

2025 No-Build
 AM Peak Hour



Movement	SBR
<hr/>	
Lane Configurations	
Traffic Volume (veh/h)	135
Future Volume (veh/h)	135
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1826
Adj Flow Rate, veh/h	130
Peak Hour Factor	0.92
Percent Heavy Veh, %	5
Cap, veh/h	157
Arrive On Green	0.52
Sat Flow, veh/h	299
<hr/>	
Grp Volume(v), veh/h	783
Grp Sat Flow(s),veh/h/ln	1802
Q Serve(g_s), s	39.5
Cycle Q Clear(g_c), s	39.5
Prop In Lane	0.17
Lane Grp Cap(c), veh/h	942
V/C Ratio(X)	0.83
Avail Cap(c_a), veh/h	1004
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	21.7
Incr Delay (d2), s/veh	6.6
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(95%),veh/ln	23.2
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	28.2
LnGrp LOS	C
<hr/>	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
<hr/>	
Timer - Assigned Phs	
<hr/>	

1: NY Route 43 & Washington Avenue
 HCM 6th Signalized Intersection Summary

2025 Build
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	112	144	146	235	92	5	1	86	851	256	2	1298
Future Volume (veh/h)	112	144	146	235	92	5	1	86	851	256	2	1298
Initial Q (Qb), veh	0	0	0	0	0	0		0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00		1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1678	1796	1885	1870	1841	1604		1885	1856	1885	1900	1856
Adj Flow Rate, veh/h	122	157	138	255	100	5		93	925	240	2	1411
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	15	7	1	2	4	20		1	3	1	0	3
Cap, veh/h	165	182	150	213	61	3		197	1560	404	240	1704
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28		0.04	0.56	0.56	0.00	0.52
Sat Flow, veh/h	433	645	533	552	217	11		1795	2771	718	1810	3265
Grp Volume(v), veh/h	417	0	0	360	0	0		93	588	577	2	758
Grp Sat Flow(s),veh/h/ln	1610	0	0	780	0	0		1795	1763	1726	1810	1763
Q Serve(g_s), s	0.0	0.0	0.0	3.4	0.0	0.0		2.5	23.6	23.7	0.1	39.0
Cycle Q Clear(g_c), s	27.1	0.0	0.0	30.4	0.0	0.0		2.5	23.6	23.7	0.1	39.0
Prop In Lane	0.29		0.33	0.71		0.01		1.00		0.42	1.00	
Lane Grp Cap(c), veh/h	497	0	0	277	0	0		197	992	971	240	920
V/C Ratio(X)	0.84	0.00	0.00	1.30	0.00	0.00		0.47	0.59	0.59	0.01	0.82
Avail Cap(c_a), veh/h	560	0	0	277	0	0		618	992	971	737	979
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	0.00	1.00	0.00	0.00		1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.5	0.0	0.0	42.7	0.0	0.0		20.9	15.5	15.5	14.0	21.7
Incr Delay (d2), s/veh	10.0	0.0	0.0	159.5	0.0	0.0		0.7	1.5	1.5	0.0	6.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	17.5	0.0	0.0	30.9	0.0	0.0		1.9	13.7	13.5	0.0	22.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.5	0.0	0.0	202.2	0.0	0.0		21.5	17.0	17.0	14.0	28.1
LnGrp LOS	D	A	A	F	A	A		C	B	B	B	C
Approach Vol, veh/h		417			360				1258			1543
Approach Delay, s/veh		47.5			202.2				17.3			28.3
Approach LOS		D			F				B			C
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.7	62.9		35.4	5.3	67.3		35.4				
Change Period (Y+Rc), s	5.0	6.5		5.0	5.0	6.5		5.0				
Max Green Setting (Gmax), s	30.0	60.0		20.0	30.0	60.0		35.0				
Max Q Clear Time (g_c+1), s	4.5	41.7		32.4	2.1	25.7		29.1				
Green Ext Time (p_c), s	0.1	14.7		0.0	0.0	17.4		1.4				

Intersection Summary

HCM 6th Ctrl Delay	44.2
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.
 User approved ignoring U-Turning movement.



















1: NY Route 43 & Washington Avenue
 HCM 6th Signalized Intersection Summary

2025 Build
 AM Peak Hour

Movement	SBR
<hr/>	
Lane Configurations	
Traffic Volume (veh/h)	135
Future Volume (veh/h)	135
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1826
Adj Flow Rate, veh/h	130
Peak Hour Factor	0.92
Percent Heavy Veh, %	5
Cap, veh/h	156
Arrive On Green	0.52
Sat Flow, veh/h	299
<hr/>	
Grp Volume(v), veh/h	783
Grp Sat Flow(s),veh/h/ln	1802
Q Serve(g_s), s	39.7
Cycle Q Clear(g_c), s	39.7
Prop In Lane	0.17
Lane Grp Cap(c), veh/h	940
V/C Ratio(X)	0.83
Avail Cap(c_a), veh/h	1001
HCM Platoon Ratio	1.00
Upstream Filter(l)	1.00
Uniform Delay (d), s/veh	21.8
Incr Delay (d2), s/veh	6.7
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(95%),veh/ln	23.4
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	28.5
LnGrp LOS	C
<hr/>	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
<hr/>	
Timer - Assigned Phs	
<hr/>	

1: NY Route 43 & Washington Avenue
 HCM 6th Signalized Intersection Summary

2021 Existing
 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	124	136	72	134	140	15	129	1390	348	4	871	130
Future Volume (veh/h)	124	136	72	134	140	15	129	1390	348	4	871	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1693	1870	1885	1796	1900	1885	1900	1900	1885	1900
Adj Flow Rate, veh/h	128	140	64	138	144	15	133	1433	317	4	898	122
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	1	14	2	1	7	0	1	0	0	1	0
Cap, veh/h	177	168	71	188	170	16	349	1660	359	116	1647	224
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.05	0.57	0.57	0.01	0.52	0.52
Sat Flow, veh/h	479	627	264	509	633	61	1810	2929	633	1810	3168	430
Grp Volume(v), veh/h	332	0	0	297	0	0	133	863	887	4	508	512
Grp Sat Flow(s),veh/h/ln	1370	0	0	1203	0	0	1810	1791	1771	1810	1791	1808
Q Serve(g_s), s	0.0	0.0	0.0	1.0	0.0	0.0	3.4	41.7	45.0	0.1	19.7	19.7
Cycle Q Clear(g_c), s	24.5	0.0	0.0	25.5	0.0	0.0	3.4	41.7	45.0	0.1	19.7	19.7
Prop In Lane	0.39		0.19	0.46		0.05	1.00		0.36	1.00		0.24
Lane Grp Cap(c), veh/h	416	0	0	374	0	0	349	1015	1004	116	931	940
V/C Ratio(X)	0.80	0.00	0.00	0.79	0.00	0.00	0.38	0.85	0.88	0.03	0.55	0.55
Avail Cap(c_a), veh/h	522	0	0	374	0	0	779	1037	1026	630	1037	1047
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.3	0.0	0.0	36.7	0.0	0.0	12.3	18.7	19.5	19.6	16.7	16.7
Incr Delay (d2), s/veh	6.8	0.0	0.0	11.8	0.0	0.0	0.3	7.4	9.8	0.0	1.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.6	0.0	0.0	13.1	0.0	0.0	2.2	23.7	25.7	0.1	12.1	12.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.1	0.0	0.0	48.5	0.0	0.0	12.6	26.2	29.3	19.7	17.7	17.7
LnGrp LOS	D	A	A	D	A	A	B	C	C	B	B	B
Approach Vol, veh/h		332			297			1883			1024	
Approach Delay, s/veh		43.1			48.5			26.7			17.7	
Approach LOS		D			D			C			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.4	60.4		32.8	5.5	65.2		32.8				
Change Period (Y+Rc), s	5.0	6.5		5.0	5.0	6.5		5.0				
Max Green Setting (Gmax), s	30.0	60.0		20.0	30.0	60.0		35.0				
Max Q Clear Time (g_c+I1), s	5.4	21.7		27.5	2.1	47.0		26.5				
Green Ext Time (p_c), s	0.2	15.2		0.0	0.0	11.7		1.3				

Intersection Summary

HCM 6th Ctrl Delay 27.5
 HCM 6th LOS C

Notes

User approved pedestrian interval to be less than phase max green.
 User approved ignoring U-Turning movement.

1: NY Route 43 & Washington Avenue
 HCM 6th Signalized Intersection Summary

2025 No-Build
 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	126	139	73	137	143	15	132	1418	355	4	917	161
Future Volume (veh/h)	126	139	73	137	143	15	132	1418	355	4	917	161
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1693	1870	1885	1796	1900	1885	1900	1900	1885	1900
Adj Flow Rate, veh/h	130	143	65	141	147	15	136	1462	324	4	945	154
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	1	14	2	1	7	0	1	0	0	1	0
Cap, veh/h	178	170	72	189	170	16	323	1655	357	107	1594	260
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.05	0.56	0.56	0.01	0.52	0.52
Sat Flow, veh/h	478	625	263	508	625	59	1810	2930	633	1810	3083	502
Grp Volume(v), veh/h	338	0	0	303	0	0	136	879	907	4	549	550
Grp Sat Flow(s),veh/h/ln	1366	0	0	1193	0	0	1810	1791	1771	1810	1791	1795
Q Serve(g_s), s	0.0	0.0	0.0	1.3	0.0	0.0	3.5	43.9	47.9	0.1	22.4	22.4
Cycle Q Clear(g_c), s	25.3	0.0	0.0	26.6	0.0	0.0	3.5	43.9	47.9	0.1	22.4	22.4
Prop In Lane	0.38		0.19	0.47		0.05	1.00		0.36	1.00		0.28
Lane Grp Cap(c), veh/h	420	0	0	375	0	0	323	1011	1000	107	926	928
V/C Ratio(X)	0.80	0.00	0.00	0.81	0.00	0.00	0.42	0.87	0.91	0.04	0.59	0.59
Avail Cap(c_a), veh/h	513	0	0	375	0	0	745	1025	1014	616	1025	1027
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.6	0.0	0.0	37.1	0.0	0.0	13.4	19.5	20.4	20.9	17.6	17.6
Incr Delay (d2), s/veh	7.6	0.0	0.0	12.8	0.0	0.0	0.3	8.7	12.1	0.1	1.4	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	14.1	0.0	0.0	13.6	0.0	0.0	2.3	25.1	27.7	0.1	13.5	13.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.2	0.0	0.0	49.9	0.0	0.0	13.7	28.2	32.4	21.0	19.0	19.0
LnGrp LOS	D	A	A	D	A	A	B	C	C	C	B	B
Approach Vol, veh/h		338			303			1922			1103	
Approach Delay, s/veh		44.2			49.9			29.2			19.0	
Approach LOS		D			D			C			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.5	60.7		33.6	5.5	65.7		33.6				
Change Period (Y+Rc), s	5.0	6.5		5.0	5.0	6.5		5.0				
Max Green Setting (Gmax), s	30.0	60.0		20.0	30.0	60.0		35.0				
Max Q Clear Time (g_c+l1), s	5.5	24.4		28.6	2.1	49.9		27.3				
Green Ext Time (p_c), s	0.2	16.3		0.0	0.0	9.3		1.3				

Intersection Summary




















HCM 6th Ctrl Delay	29.2
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.
 User approved ignoring U-Turning movement.

1: NY Route 43 & Washington Avenue
 HCM 6th Signalized Intersection Summary

2025 Build
 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	126	147	73	162	149	15	132	1418	388	4	917	161
Future Volume (veh/h)	126	147	73	162	149	15	132	1418	388	4	917	161
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1693	1870	1885	1796	1900	1885	1900	1900	1885	1900
Adj Flow Rate, veh/h	130	152	65	167	154	15	136	1462	358	4	945	154
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	1	14	2	1	7	0	1	0	0	1	0
Cap, veh/h	177	179	71	196	147	14	324	1628	386	101	1602	261
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.05	0.57	0.57	0.01	0.52	0.52
Sat Flow, veh/h	480	659	263	536	543	50	1810	2872	682	1810	3083	502
Grp Volume(v), veh/h	347	0	0	336	0	0	136	894	926	4	549	550
Grp Sat Flow(s),veh/h/ln	1402	0	0	1129	0	0	1810	1791	1762	1810	1791	1795
Q Serve(g_s), s	0.0	0.0	0.0	3.3	0.0	0.0	3.5	45.4	50.3	0.1	22.3	22.3
Cycle Q Clear(g_c), s	25.1	0.0	0.0	28.4	0.0	0.0	3.5	45.4	50.3	0.1	22.3	22.3
Prop In Lane	0.37		0.19	0.50		0.04	1.00		0.39	1.00		0.28
Lane Grp Cap(c), veh/h	427	0	0	357	0	0	324	1015	999	101	930	932
V/C Ratio(X)	0.81	0.00	0.00	0.94	0.00	0.00	0.42	0.88	0.93	0.04	0.59	0.59
Avail Cap(c_a), veh/h	522	0	0	357	0	0	745	1023	1007	608	1023	1026
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.8	0.0	0.0	39.8	0.0	0.0	13.3	19.7	20.7	21.8	17.5	17.5
Incr Delay (d2), s/veh	8.0	0.0	0.0	33.1	0.0	0.0	0.3	9.6	14.4	0.1	1.4	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	14.4	0.0	0.0	17.7	0.0	0.0	2.3	26.0	29.3	0.1	13.4	13.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.8	0.0	0.0	72.9	0.0	0.0	13.6	29.3	35.2	21.9	18.9	18.9
LnGrp LOS	D	A	A	E	A	A	B	C	D	C	B	B
Approach Vol, veh/h		347			336			1956			1103	
Approach Delay, s/veh		44.8			72.9			31.0			18.9	
Approach LOS		D			E			C			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.5	61.0		33.4	5.6	66.0		33.4				
Change Period (Y+Rc), s	5.0	6.5		5.0	5.0	6.5		5.0				
Max Green Setting (Gmax), s	30.0	60.0		20.0	30.0	60.0		35.0				
Max Q Clear Time (g_c+I1), s	5.5	24.3		30.4	2.1	52.3		27.1				
Green Ext Time (p_c), s	0.2	16.3		0.0	0.0	7.2		1.3				

Intersection Summary

HCM 6th Ctrl Delay	32.5
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.
 User approved ignoring U-Turning movement.



20848.00 Spinney Quackenderry NG - ITE Parking Estimates

ITE LUC	Value	Ind. Var	Parking Required	
			Avg.	85th
221	386	Beds	290	336
820	30,805	SF	60	113
			350	449

ITE LUC	Value	Ind. Var	Parking Required	
			Avg.	85th
221	253	Units	331	372
820	30,805	SF	60	113
			391	485

ITE LUC	Value	Ind. Var	Parking Required	
			Avg.	85th
221	386	Beds	290	336
820	25,900	SF	51	95
			341	431

ITE LUC	Value	Ind. Var	Parking Required	
			Avg.	85th
221	237	Units	310	348
820	25,900	SF	51	95
			361	443