

Hamlet of Chappaqua, Town of New Castle, NY
**Streetscape & Infrastructure
Improvement Project**

**Quaker Road & South Greeley Avenue
Triangle – One-Way Circulation**

and

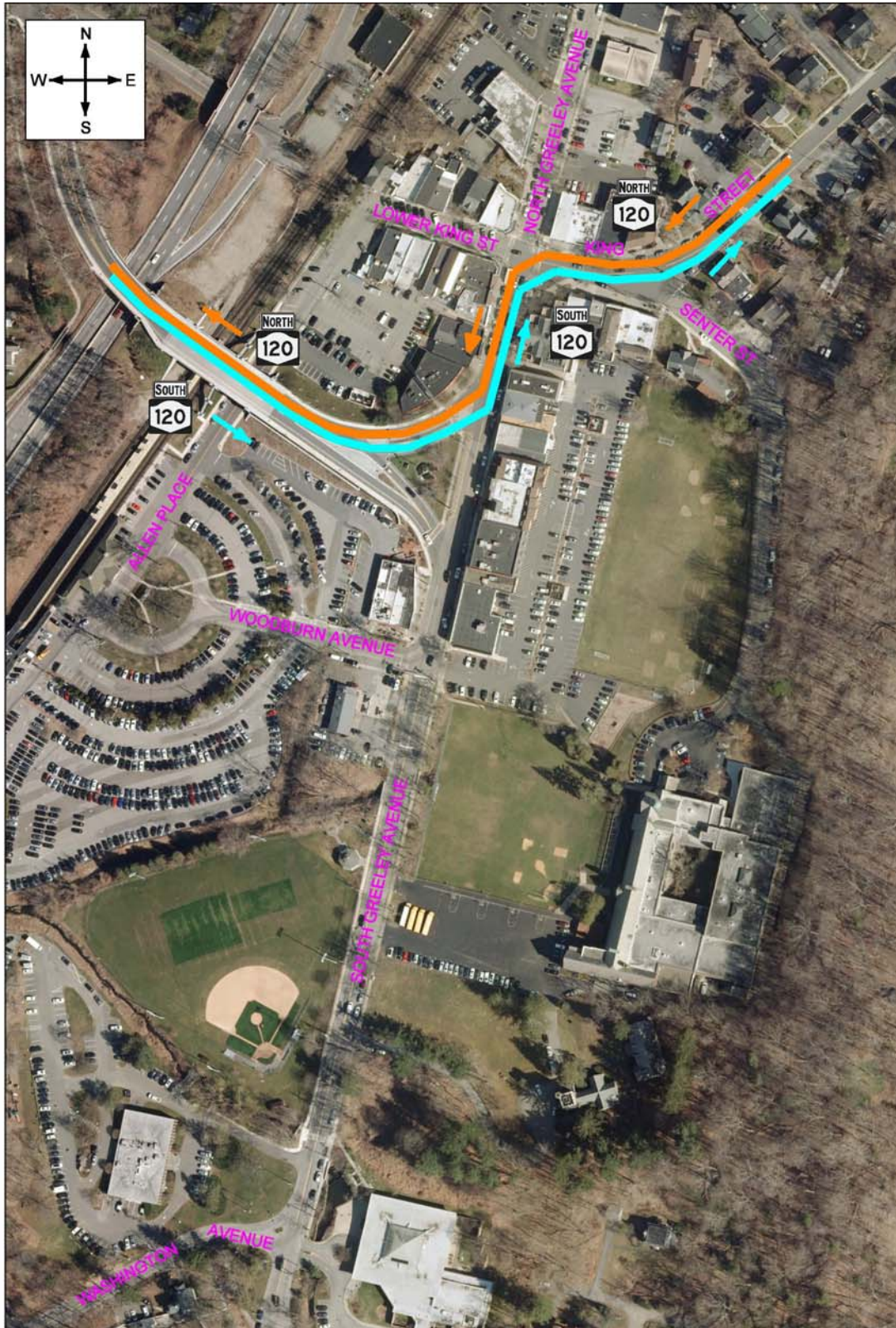
Lower King Street Two-Way Feasibility

Technical Memorandum

Prepared by:



November 10, 2015



HAMLET OF CHAPPAQUA
KEY STUDY CORRIDOR

Introduction

This memorandum documents the traffic analyses conducted for the reconfiguration of South Greeley Avenue at Quaker Avenue and the feasibility of converting Lower King Street to a two-way roadway. It also briefly discusses the feasibility of reversing Lower King Street to a one-way eastbound roadway. The proposed reconfigurations are part of the corridor-wide design initiative to enhance pedestrian safety and walkability of the downtown area while making improvements to the flow of traffic during peak commuting hours. Because the potential conversion of Lower King Street to two-way traffic affects the study of implementing one-way circulation at Quaker and South Greeley Avenues, both studies were consolidated into one technical memorandum.

For comparison, this memo presents the baseline existing and proposed conditions. Baseline existing conditions represent today's roadway network configuration and traffic volumes. The baseline proposed condition explores the Town's previously approved concept at the Greeley and King intersection with present day volumes and anticipated future volumes (further discussed in the next section).

Three alternatives were reviewed, all of which build upon the baseline proposed condition taking into consideration the conversion of the unconventional Y-intersection of South Greeley Avenue with Quaker Avenue into a "triangular roundabout" configuration. *Alternative A* includes only the "triangular roundabout" configuration while maintaining one-way eastbound traffic on Lower King Street. *Alternative B* includes the conversion of Lower King Street to two-way with installation of a signal at Greeley Avenue / King Street. *Alternative C* also includes two-way Lower King Street, but with an all-way stop condition at the Greeley Avenue / King Street intersection.

All information presented in this document can be readily supplemented and/or revised based upon input from the Town, NYSDOT, Westchester County and other relevant entities. The alternatives analyzed do not represent the only possible scenarios. They are being provided for review and consideration by the Town Technical Staff and Town Board for inclusion in the overall Streetscape and Infrastructure Improvement Project.

For purposes of simplification, the intersection of North Greeley Avenue, South Greeley Avenue, (Upper) King Street and Lower King Street may be referred to as "Greeley Avenue / King Street" or "Greeley / King" throughout the memo.

Planning and Design Assumptions

The following are assumptions used in the development of the traffic models for the three alternatives:

- As is consistent with the Town's previously approved design concept at Greeley / King, the northbound approach has been analyzed with two lanes – a through/left and a dedicated right turn bay – for the baseline proposed condition and all alternatives.

- A growth rate of 0.5% for the first five years and 0.3% for the remaining years was assumed for future ETC+30 volumes (estimated time of completion plus 30 years). These growth rates can easily be modified in the traffic models to account for additional future growth as a result of the Town's future demand analysis.
- Existing data was inputted into Synchro v8, a macro modeling software. Thus, delay and level of service (LOS) output for existing conditions is from Synchro v8. Because of the unique configuration of the proposed improvements at Quaker Road and South Greeley Avenue it was necessary to use VISSIM v7, a micro simulation program for the traffic analysis. Delay and LOS output from the proposed conditions is from VISSIM v7.
- For both software packages, Highway Capacity Manual (HCM) 2010 methodology is used to determine delay and LOS.
- Approximately 9 parking spaces would need to be eliminated on Lower King Street to facilitate conversion into a two-way operation (16 existing diagonal spaces reduced to 7 curbside parallel spaces).
- Retention of a one-way westbound Lower King Street would allow all but one diagonal parking space to shift from the north to the south side of the street. However, this would allow Upper King Street to better align with Lower King Street, improving safety conditions for both vehicles and pedestrians.
- In order to establish a baseline analysis, a cycle length of 60 seconds was utilized for a potential proposed signal at the Greeley Avenue / King Street intersection.

Baseline Existing Condition

In order to study various proposed traffic scenarios and operational configurations in the downtown Hamlet area, it was first necessary to gather and analyze information on the existing traffic conditions. In October 2013 (supplemented in June 2014), WSP performed existing manual intersection turning movement traffic counts at the following key intersections within the Hamlet within the study area of this memorandum:

- King Street / Lower King Street / North & South Greeley Avenue (Greeley / King)
- Quaker Road and South Greeley Avenue
- Woodburn Avenue and South Greeley Avenue

While counts were also taken at several additional intersections within the overall project limits, this memorandum focuses primarily on the effects of proposed improvements on the intersections listed.

For comparison to the alternatives examined in this memorandum, existing levels of service are shown in Table 1.

Table 1: LOS Summary – Existing Conditions

Intersection ¹	Approach	Distance of Streets and Storage Bays (ft) ²	Lane Group ³	AM Peak Hour		PM Peak Hour	
				Delay (sec.)	LOS ⁴	Delay (sec.)	LOS ⁴
South Greeley Avenue (N-S) @ Woodburn Avenue [TWO-WAY STOP CONTROL]	EB	150	LTR	224.4	F	119.9	F
	WB	300	LTR	20.5	C	15.7	C
	NB	860	LTR	1.0	A	0.4	A
	SB	100	LTR	0.5	A	1.4	A
	Intersection			36.4	E	32.1	D
South Greeley Avenue (N-S) @ Quaker Avenue EB (North Leg) [TWO-WAY STOP CONTROL]	NB	160	T	0.0	A	0.0	A
	SB	150	TR	0.0	A	0.0	A
	EB	500	L	79.6	F	61.5	F
South Greeley Avenue (N-S) @ Quaker Avenue EB (South Leg) [TWO-WAY STOP CONTROL]	NB	90	LT	24.5	C	100.6	F
	SB	170	T	0.0	A	0.0	A
	EB	500	R	18.1	C	10.0	A
South Greeley Avenue (N-S) @ King Street [TWO-WAY STOP CONTROL]	WB	140	LTR				
	NB	150	LTR				
	SB	190	LTR	15.1	C	38.8	E
	Intersection			1.8	A	7.4	A

Notes:

1. EB – Eastbound, WB – Westbound, NB – Northbound, SB – Southbound.
2. Street length measurements based on distance to adjacent intersection or off-ramp.
3. L – Left, T – Through, R – Right, DefL – DeFacto Left Turn.
4. Shaded queue lengths exceed available distance to the nearest intersection or end of full-width storage bay. Shaded LOS indicates congested movement.

Baseline Proposed Condition

The northbound approach of South Greeley Avenue at Lower King Street is currently a one-lane approach with a channelized right turn lane. A yield sign, essentially allowing a free-flow movement with minimal interruption, controls the channelized right turn lane. All alternatives explored in this memorandum include the conversion of the northbound approach to a two-lane approach striped as one left-through lane and one right-turn only lane. These changes would occur in addition to the elimination of the channelized geometry and yield sign. The existing space facilitating the present day channelized right turn lane would be converted to open space for pedestrian use, while also improving safety conditions by eliminating the need to cross the channelized right turn lane and shortening the crossing distance for pedestrians across the westbound approach of Lower King Street.

The Baseline Proposed option explores the above geometric alterations while also considering the conversion of the present day two-way stop control condition at the intersection of South Greeley Avenue and Lower King Street to an all-way stop control. For comparison to the existing conditions and the alternatives examined in this memorandum, Baseline Proposed levels of service are shown in Table 2.

Table 2: LOS Summary – Baseline Proposed

Intersection	Approach ¹	Distance of Streets and Storage Bays (ft) ²	Lane Group ³	AM Peak Hour						PM Peak Hour					
				Existing Volumes			ETC+30 Volumes			Existing Volumes			ETC+30 Volumes		
				Max Queue (ft)	Delay (sec.)	LOS	Queue (ft)	Delay (sec.)	LOS	Max Queue (ft)	Delay (sec.)	LOS	Max Queue (ft)	Delay (sec.)	LOS
South Greeley Avenue @ Woodburn Avenue [TWO-WAY STOP CONTROL]	EB	150	LTR	121	12.5	B	127	12.9	B	140	14.8	B	199	19.8	C
	WB	300	LTR	59	9.0	A	63	8.9	A	68	9.8	A	82	12.6	B
	NB	860	LTR	47	1.3	A	55	1.2	A	55	2.2	A	232	12.5	B
	SB	90	LTR	28	0.3	A	38	0.3	A	37	0.5	A	64	0.7	A
	Intersection					2.9	A		3.1	A		5.3	A		10.4
South Greeley Avenue @ Quaker Avenue South Leg [TWO-WAY STOP CONTROL]	EB	500	R	284	21.0	C	284	22.4	C	109	7.6	A	118	7.6	A
	NB	90	LT	82	1.3	A	60	1.4	A	151	3.1	A	161	6.8	A
	SB	170	T	0	0.5	A	0	0.5	A	0	0.3	A	29	0.7	A
	Intersection					11.6	B		11.9	B		3.4	A		6.0
South Greeley Avenue @ Quaker Avenue North Leg [TWO-WAY STOP CONTROL]	EB	500	L	251	21.1	C	251	26.4	D	242	19.7	C	252	23.2	C
	NB	170	T	0	2.7	A	0	4.4	A	0	2.7	A	0	3.6	A
	SB	170	TR	7	0.2	A	6	0.2	A	17	0.2	A	11	0.1	A
	Intersection					15.3	C		19.2	C		12.6	B		15.0
South Greeley Avenue @ King Street [ALL-WAY STOP CONTROL]	WB	140	LTR	193	25.9	D	194	31.4	D	200	31.2	D	195	33.8	D
	NB	150	LT	227	15.0	B	242	17.4	C	195	13.5	B	236	15.2	C
		100	R	224	20.8	C	238	24.3	C	192	14.4	B	233	16.6	C
	SB	190	LTR	74	7.7	A	56	7.8	A	94	9.8	A	105	10.7	B
	Intersection					21.7	C		25.8	D		20.4	C		22.2

Notes:

1. EB – Eastbound, WB – Westbound, NB – Northbound, SB – Southbound.
2. Street length measurements based on distance to adjacent intersection or off-ramp.
3. L – Left, T – Through, R – Right, DefL – DeFacto Left Turn.
4. Shaded queue lengths exceed available distance to the nearest intersection or end of full-width storage bay. Shaded LOS indicates congested movement.

One Way Circulation – “Triangular Roundabout” Concept

Quaker Avenue is a two-lane roadway within the vicinity of downtown Chappaqua. The road carries traffic over Metro North Railroad and the Saw Mill River Parkway. West of South Greeley Avenue, the roadway splits into two segments that both provide a connection to South Greeley Avenue, forming a triangular median. Both segments are two-way in their existing configuration and consist of one lane in each direction. Left turns are restricted from the south leg of Quaker Avenue onto South Greeley Avenue. Street parking is prohibited along Quaker Avenue and is only permitted on the east side of South Greeley Avenue. The existing Quaker Avenue intersection configuration is shown in Figure 1.

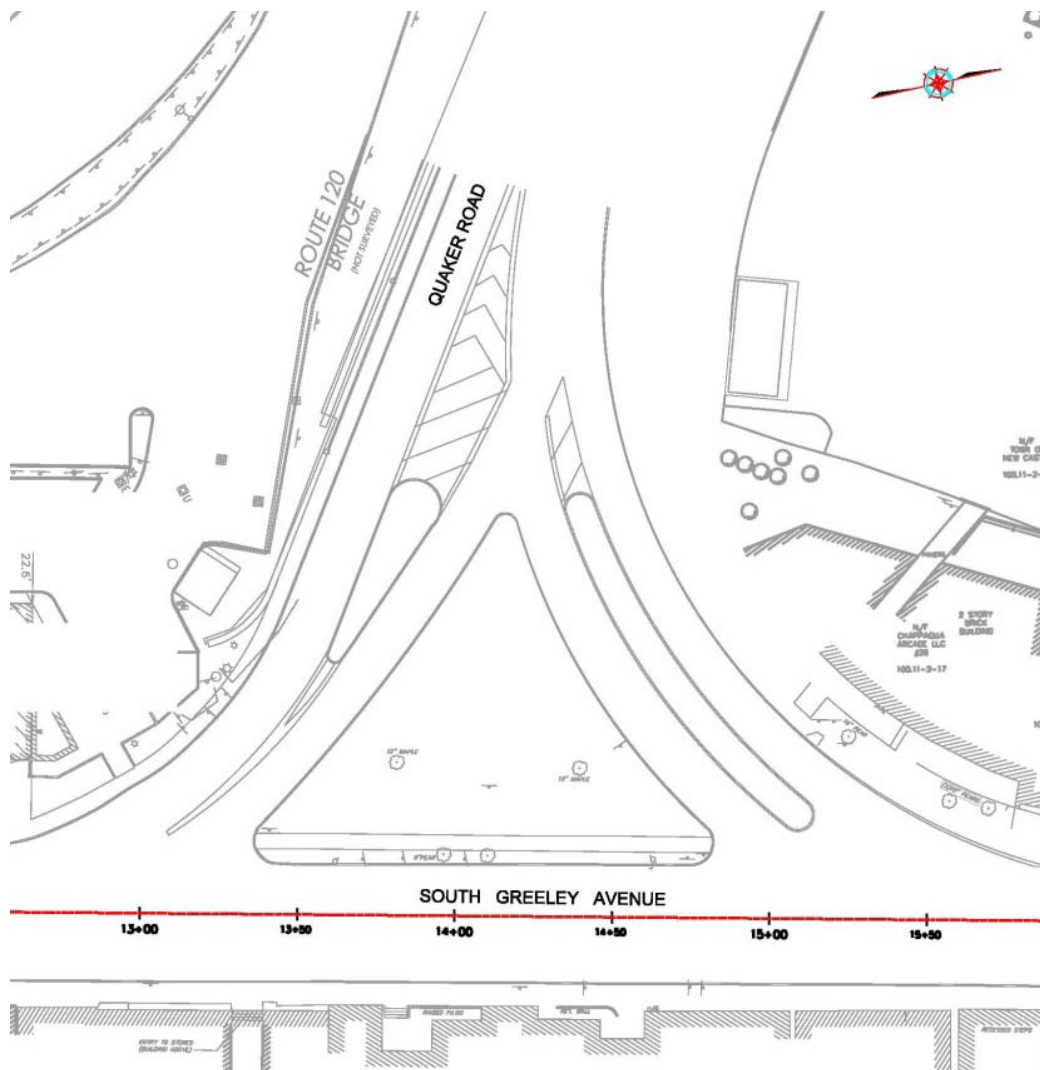


Figure 1 – Existing Intersection Configuration of South Greeley Avenue and Quaker Avenue

The “Triangular Roundabout” concept involves eliminating one direction for each leg of the Quaker Avenue triangle. This would result in the south leg converting to an eastbound-only operation and the north leg converting to a westbound-only operation. Although each leg would retain two lanes, the north leg would merge down to one lane prior to the overpass section of roadway. The south leg would be striped to include one left turn-only lane and one right turn-only lane. Conversion of this intersection to one-way circulation would favorably eliminate two conflict points and improve safety conditions at the apex of triangle, where westbound traffic on the south leg must wait for a gap in eastbound traffic and westbound traffic on the north leg. South Greeley Avenue would remain in its current configuration; however, in order to accommodate a WB-62 truck turning radius from eastbound Quaker Avenue to northbound South Greeley Avenue, approximately six (6) standard length (22’) parking spaces will need to be removed. Figure 2 illustrates the proposed concept.

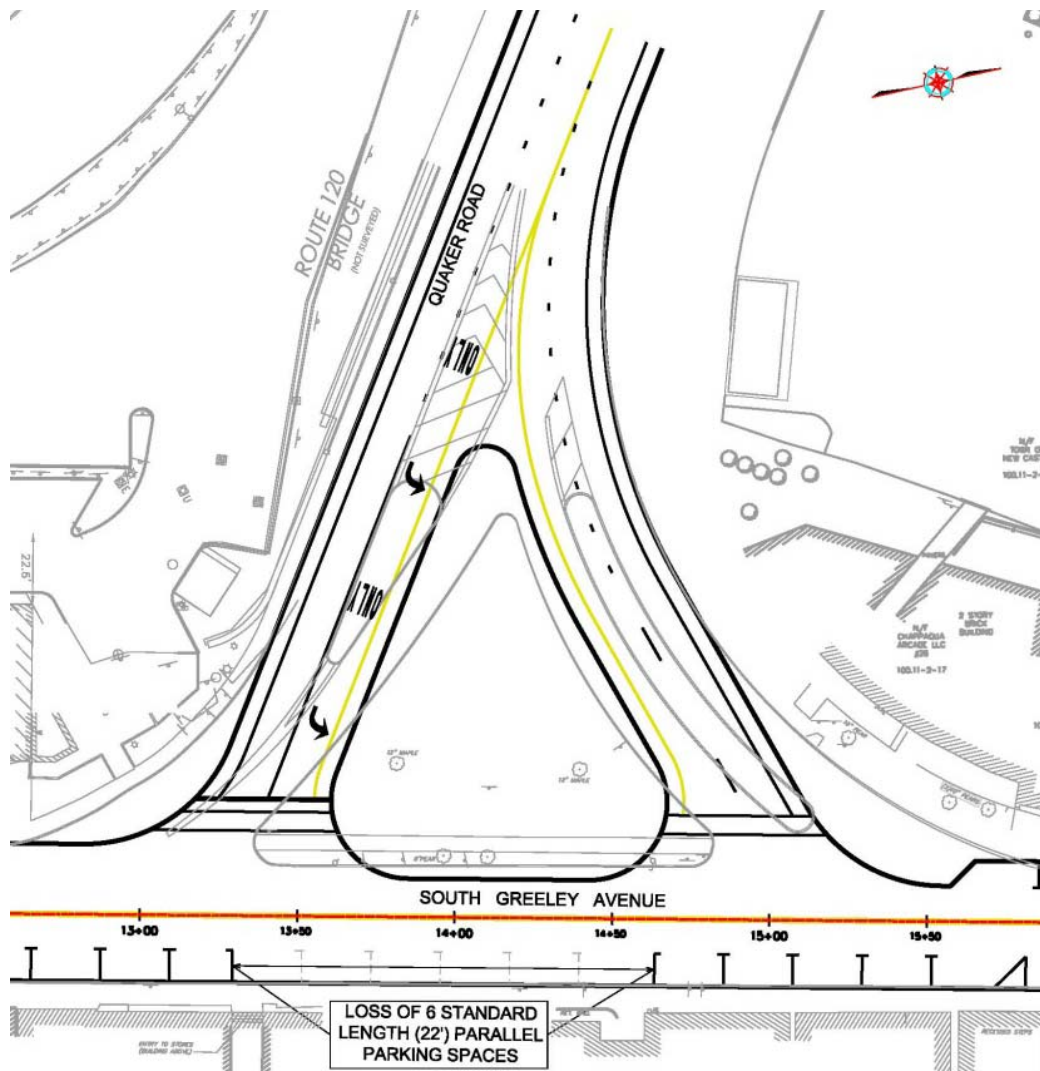


Figure 2 – Triangular Roundabout Concept for South Greeley Avenue and Quaker Avenue

Feasibility of a Two-Way Lower King Street

In the development of *Alternatives B and C*, two-way operation on Lower King Street was modeled in conjunction with the “triangular roundabout”. In order to adequately handle the additional traffic is expected to divert to the Greeley / King intersection via Lower King Street, enhancements would be required. For *Alternative B*, a new traffic signal was analyzed. In *Alternative C*, all-way stop control was modeled in lieu of the existing two-way stop control.

Both of these alternatives would require the elimination of approximately 9 diagonal parking spaces along Lower King Street to accommodate the creation of a new eastbound lane. The remaining available space would be converted to 7 parallel parking spaces. Figure 3 shows a depiction of Lower King Street in a two-way configuration with parallel parking along with the changes described.

Origin-Destination Survey

WSP conducted an Origin-Destination (O-D) survey on July 9, 2015. It was determined that the study would be most beneficial during the PM peak period as this represents the time of day when the most amount of traffic is leaving the train station plaza from Woodburn Avenue and passing through the Quaker Avenue / South Greeley Avenue intersection. A map of the study locations is shown in Figure 4.

License plate numbers were recorded at four locations including the point of origin, Location 1: the eastbound left turn movement of Woodburn Avenue at South Greeley Avenue. License plate numbers were matched to those recorded at three possible destination points. Location 2 was at the apex of the Quaker Avenue / South Greeley Avenue triangle. Location 3 was at the existing channelized right turn lane at Greeley Avenue / King Street and Location 4 was located on North Greeley Avenue, just north of King Street. Any vehicles that were not recorded as passing through Locations 2 through 4 were therefore assumed to make a left turn onto Lower King Street. A turning movement count (TMC) was also conducted at the intersection of South Greeley Avenue and Woodburn Avenue to confirm that the total volumes coincided with the O-D information collected.

Based on the results of the O-D study, it was determined that the majority of vehicles (51%) exiting the train station area at Woodburn Avenue turn left onto Quaker Road and exit the downtown Hamlet. The percentage of vehicles at each possible destination is presented in Figure 5. These results were used to calibrate the VISSIM analysis and accurately model the forecasted traffic movements at the intersection of Greeley Avenue / King Street, should Lower King Street become a two-way roadway.

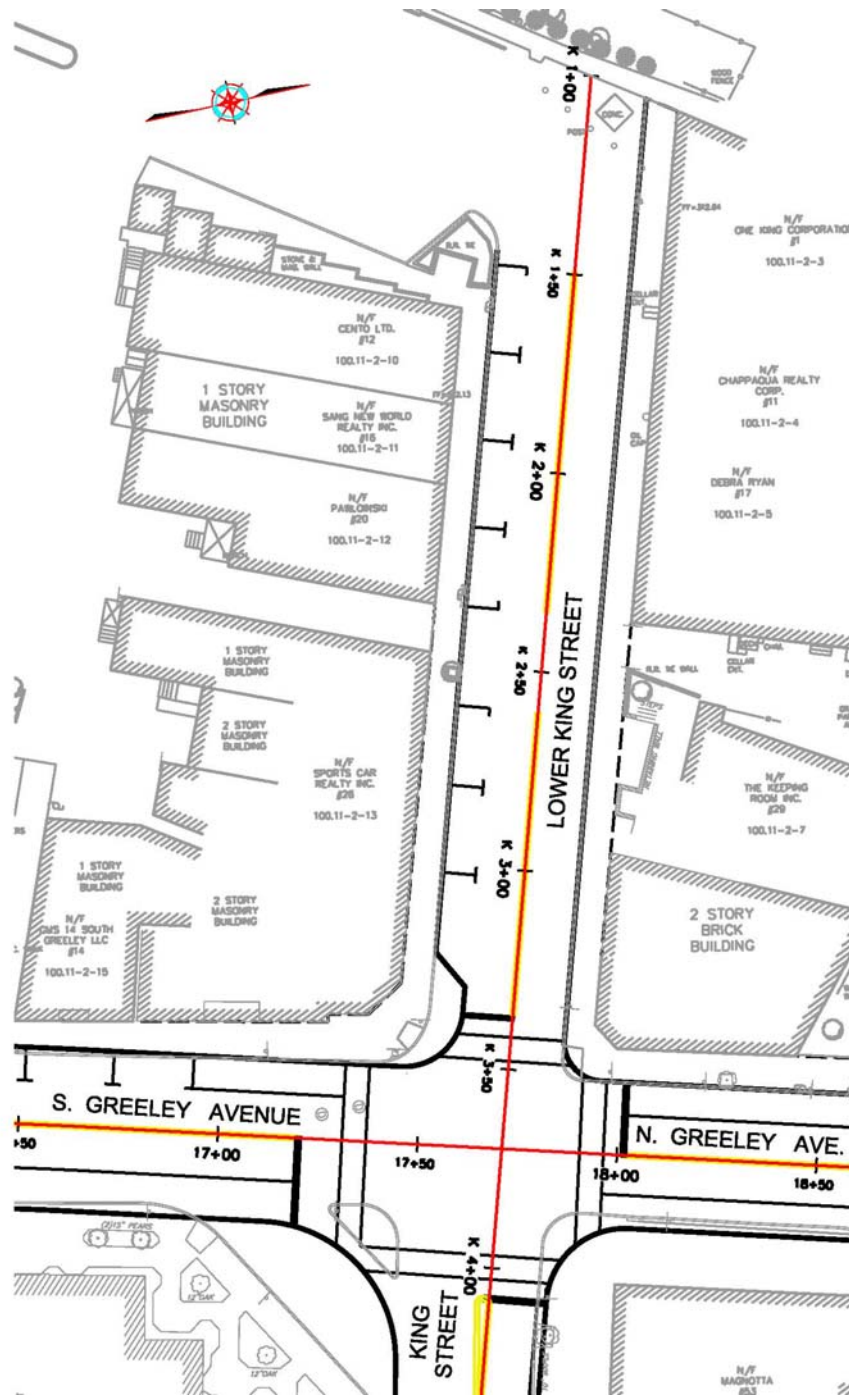


Figure 3 – Two-Way Concept for Lower King Street

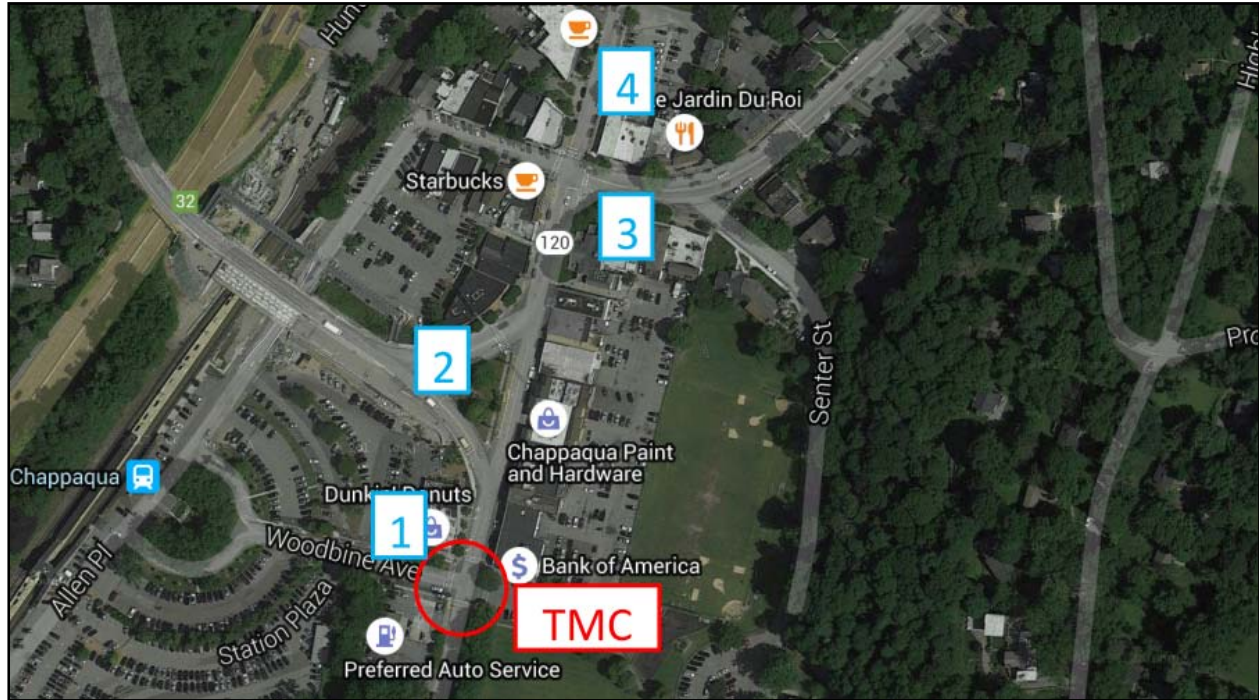


Figure 4 – Origin-Destination Study Locations (excerpt from Google Maps)

It should be noted that the intersection of Washington Avenue and Allen Place was not included in the O-D survey. Based on the original turning movement counts, the left turn volume out of Allen Place onto Washington Avenue during the overall afternoon peak period of 5:00PM to 6:00PM was determined to be 61 vehicles. During that same afternoon peak at the Washington Avenue / South Greeley Avenue intersection, the total number of vehicles turning in either direction was 143, with a dominant movement of 122 left turns (85% of 143) into the Hamlet. Using this distribution, it is anticipated that 52 (85% of 61) vehicles exiting Allen Place also make a left turn from Washington Avenue onto South Greeley Avenue. Thus, on a given day, a relatively high percentage of the traffic that turns left out of Allen Place re-enters the Hamlet.



Figure 5 – Origin-Destination Study Results (excerpt from Google Maps)

Feasibility of Reversing Lower King Street to One-Way Eastbound

Following the feasibility analysis of a Two-Way Lower King Street, WSP briefly investigated the potential to reverse its one-way direction from westbound to eastbound. This alternative was quickly dismissed for several reasons:

- Lack of the westbound direction on Lower King Street forces all vehicular traffic wishing to access the train station to turn left and travel south to Woodburn Avenue – which would become the sole point of ingress to the train station.
- Similarly, in order to access parking on Lower King Street in close proximity to local businesses, vehicles would need to navigate to Woodburn Avenue and through the train station parking lot to reach Lower King Street. This could result in undue additional volume passing through the lot. This may also cause unrest with local merchants and the citizens of New Castle.
- While the condition was not modeled in traffic analysis software, higher left turn volumes from WB King Street onto South Greeley Avenue would likely hinder pedestrian safety and cause higher vehicular congestion in the heart of the Hamlet (Woodburn Avenue to King Street).
- A fourth leg would be required the Greeley / King intersection where it does not presently exist. While operationally feasible, a traffic signal is recommended for optimum safety and operational conditions. This would require NYSDOT review and concurrence.

Alternatives Analysis

Operational analyses for the existing conditions and the three potential alternatives were conducted using VISSIM software. Each traffic model includes the intersections of South Greeley Avenue with Woodburn Avenue, Quaker Avenue, and King Street. Two time periods were analyzed to capture the bulk of the AM & PM peak weekday commuting traffic, representing the worst-case scenario for this area. The weekday AM and PM peak hours were determined to be 7:00am to 8:00am and 5:00pm to 6:00pm, respectively. LOS results were compiled using Highway Capacity Manual (HCM) methodology.

Alternative A

Under this alternative, the intersection of South Greeley Avenue and Quaker Avenue would be reconfigured using the “triangular roundabout” concept discussed earlier. Lower King Street would remain a one-way street in the westbound direction but include the changes to the northbound approach as described in the “baseline proposed” section.

Existing Volumes

According to the VISSIM results, under *Alternative A*, all movements within the analyzed network are expected to operate at LOS C or better during both the AM and PM peak hours with the exception of

the eastbound left turn movement of the South Greeley Avenue and Quaker Avenue intersection. At this location, the eastbound left turn movement is expected to operate at LOS D in the PM peak hour. The maximum queue length of the northbound approach at the intersection of South Greeley Avenue and King Street is expected to reach the north leg of South Greeley Avenue / Quaker Avenue but not exceed 205 feet.

ETC+30 Volumes

At estimated time of completion plus 30 years (ETC+30), expected to be in 2047, the volumes in this area are expected to increase by approximately 10% from existing traffic levels. According to the VISSIM results, under Alternative A, the eastbound left turn movement will worsen in both the AM and PM peak hours. At the intersection of South Greeley Avenue and Quaker Avenue, the eastbound left turn movement is expected to operate at LOS D and LOS E in the AM and PM peak hours, respectively. All other movements within the network are expected to continue to operate at the same LOS as with existing traffic levels. The maximum queue length of the northbound approach at the intersection of South Greeley Avenue and King Street is expected to worsen to a maximum of 279 feet, exceeding the distance to the north leg of the South Greeley Avenue / Quaker Avenue intersection. Some queuing is also expected in the train station plaza area, but this will not affect the operations of any other intersections in the downtown area.

Table 3: LOS Summary – Alternative A

Intersection	Approach ¹	Distance of Streets and Storage Bays (ft) ²	Lane Group ³	AM Peak Hour						PM Peak Hour					
				Existing Volumes			ETC+30 Volumes			Existing Volumes			ETC+30 Volumes		
				Max Queue (ft)	Delay (sec.)	LOS	Max Queue (ft)	Delay (sec.)	LOS	Max Queue (ft)	Delay (sec.)	LOS	Max Queue (ft)	Delay (sec.)	LOS
South Greeley Avenue (N-S) @ Woodburn Avenue [TWO-WAY STOP CONTROL]	EB	150	LTR	124	12.3	B	135	12.9	B	146	13.8	B	158	14.6	B
	WB	300	LTR	68	8.9	A	65	8.9	A	63	9.0	A	84	10.0	A
	NB	860	LTR	46	1.0	A	52	0.9	A	33	0.5	A	53	0.6	A
	SB	100	LTR	36	0.3	A	43	0.4	A	51	0.4	A	51	0.6	A
	Intersection				2.8	A		3.0	A		4.4	A		4.8	A
South Greeley Avenue (N-S) @ Quaker Avenue EB [TWO-WAY STOP CONTROL]	EB	500	L	257	23.9	C	271	29.7	D	253	25.4	D	273	38.7	E
		500	R	280	21.2	C	280	22.2	C	87	7.6	A	149	8.2	A
	NB	90	T	0	0.4	A	0	0.7	A	0	0.5	A	0	0.8	A
	SB	170	T	0	0.6	A	0	0.6	A	0	0.2	A	0	0.3	A
	Intersection				14.8	B		16.3	C		8.5	A		12.5	B
South Greeley Avenue (N-S) @ King Street [TWO-WAY STOP CONTROL]	WB	140	LTR	89	0.4	A	53	0.4	A	43	0.3	A	89	0.7	A
	NB	150	LT	205	15.3	C	279	19.2	C	168	16.8	C	186	17.9	C
		100	R	196	17.5	C	276	20.5	C	158	11.7	B	182	13.3	B
	SB	190	LTR	89	9.7	A	84	10.5	B	108	13.2	B	133	14.8	B
	Intersection				9.2	A		10.6	B		7.9	A		8.9	A

Notes:

5. EB – Eastbound, WB – Westbound, NB – Northbound, SB – Southbound.
6. Street length measurements based on distance to adjacent intersection or off-ramp.
7. L – Left, T – Through, R – Right, DefL – DeFacto Left Turn.
8. Shaded queue lengths exceed available distance to the nearest intersection or end of full-width storage bay. Shaded LOS indicates congested movement.

Alternative B

This alternative takes into consideration the “triangular roundabout” configuration at Quaker Avenue and South Greeley Avenue; however, it also considers a two-way Lower King Street along with the “baseline proposed” changes to the northbound approach on South Greeley Avenue at Lower King Street. The VISSIM model took into account the anticipated redistribution of traffic volume in the Hamlet in accordance with the O-D survey.

As noted in Figure 5 above, 51% of the volume exiting Woodburn Avenue travels west out of the Hamlet by making a left turn onto Quaker Avenue. Additionally, 33% of the volume exiting Woodburn Avenue travels northeast of the Hamlet onto King Street toward Bedford Road (NY 117). This represents the potential for 84% of Woodburn Avenue’s left turn PM peak traffic that may utilize Lower King Street in the eastbound direction to exit the train station plaza if it were converted to a two-way roadway. Because of the additional surge of volume that would enter the Greeley / King intersection, a traffic signal was modeled at this intersection.

For planning purposes, a simple Non-Actuated signal with a 60-second cycle length and two phases was used in the traffic analysis.

WSP previously performed a signal warrant analysis of the present day configuration of Greeley Avenue / King Street. If desired, WSP can modify its warrant analysis to include the potential volume increase of a “fourth leg” of eastbound Lower King Street.

Existing Volumes

At time of completion of the proposed reconfiguration, expected to be in 2017, the volumes in this area will be comparable to when the traffic counts were conducted (2013-2014). According to the VISSIM results, under Alternative B, all movements within the analyzed network are expected to operate at LOS C or better during both the AM and PM peak hours. The maximum queue length of the westbound approach at the intersection of Greeley Avenue / King Street would likely exceed the distance to the nearest intersection with Senter Street, but not exceed 195 feet.

ETC+30 Volumes

According to the VISSIM results, under Alternative B, all movements within the network are expected to continue to operate at LOS C or better during both the AM and PM peak hours. The maximum queue lengths would not significantly increase at any of the analyzed approaches.

Table 4: LOS Summary – Alternative B

Intersection	Approach ¹	Distance of Streets and Storage Bays (ft) ²	Lane Group ³	AM Peak Hour						PM Peak Hour					
				Existing Volumes			ETC+30 Volumes			Existing Volumes			ETC+30 Volumes		
				Max Queue (ft)	Delay (sec.)	LOS	Max Queue (ft)	Delay (sec.)	LOS	Max Queue (ft)	Delay (sec.)	LOS	Max Queue (ft)	Delay (sec.)	LOS
South Greeley Avenue (N-S) @ Woodburn Avenue [TWO-WAY STOP CONTROL]	EB	150	TR	54	9.4	A	57	9.2	A	49	8.0	A	50	9.0	A
	WB	300	LTR	58	8.8	A	94	9.2	A	61	8.6	A	97	9.3	A
	NB	860	LTR	48	1.0	A	48	0.8	A	33	0.3	A	41	0.4	A
	SB	100	LTR	29	0.3	A	33	0.3	A	28	0.3	A	37	0.4	A
	Intersection					1.4	A		1.5	A		1.8	A		2.0
South Greeley Avenue (N-S) @ Quaker Avenue EB [TWO-WAY STOP CONTROL]	EB	500	L	259	18.5	C	258	22.3	C	250	16.9	C	271	22.9	C
		500	R	280	21.0	C	280	22.2	C	87	7.4	A	92	7.8	A
	NB	90	T	0	0.1	A	0	0.2	A	0	0.2	A	0	0.3	A
	SB	170	T	0	0.7	A	0	0.8	A	0	0.2	A	0	0.2	A
	Intersection					15.0	C		16.4	C		7.2	A		9.4
South Greeley Avenue (N-S) @ King Street [SIGNALIZED]	EB	200	LTR	138	8.4	A	117	9.5	A	100	8.5	A	120	9.2	A
	WB	140	LTR	195	16.8	B	191	18.0	B	194	22.5	C	201	23.1	C
	NB	150	LT	90	9.4	A	81	9.8	A	102	12.6	B	114	12.0	B
		100	R	90	5.4	A	81	5.4	A	102	5.2	A	114	5.7	A
	SB	190	LTR	76	9.0	A	78	8.5	A	137	11.1	B	115	10.7	B
Intersection					10.8	B		11.5	B		13.8	B		14.1	B

Notes:

1. EB – Eastbound, WB – Westbound, NB – Northbound, SB – Southbound.
2. Street length measurements based on distance to adjacent intersection or off-ramp.
3. L – Left, T – Through, R – Right, DefL – DeFacto Left Turn.
4. Shaded queue lengths exceed available distance to the nearest intersection or end of full-width storage bay. Shaded LOS indicates congested movement.

Alternative C

If the installation of a new traffic signal at Greeley Avenue and King Street is not desirable, the continued use of a stop control is the recommended alternative. However, as noted in the above discussion of Alternative B, 84% of the volume of traffic exiting the train station is likely to divert to eastbound Lower King Street during the PM peak hour. Therefore, stop control was modeled in all four directions in VISSIM.

Existing Volumes

According to the VISSIM results, under Alternative C, all movements within the analyzed network are expected to operate at LOS C or better during both the AM and PM peak hours with the exception of the westbound approach of the Greeley / King intersection. At this location, the westbound approach is expected to operate at LOS D and LOS E in the AM and PM peak hours, respectively. The maximum queue length of the westbound approach at this intersection is expected to exceed the distance to the nearest intersection with Senter Street, but not exceed 206 feet.

ETC+30 Volumes

According to the VISSIM results, under Alternative C, all movements within the network are expected to continue to operate at the same LOS as with existing traffic levels. The maximum queue lengths are also not expected to significantly increase at any of the analyzed approaches.

Table 5: LOS Summary – Alternative C

Intersection	Approach ¹	Distance of Streets and Storage Bays (ft) ²	Lane Group ³	AM Peak Hour						PM Peak Hour					
				Existing Volumes			ETC+30 Volumes			Existing Volumes			ETC+30 Volumes		
				Max Queue (ft)	Delay (sec.)	LOS	Max Queue (ft)	Delay (sec.)	LOS	Max Queue (ft)	Delay (sec.)	LOS	Max Queue (ft)	Delay (sec.)	LOS
South Greeley Avenue (N-S) @ Woodburn Avenue [TWO-WAY STOP CONTROL]	EB	150	TR	53	9.4	A	57	9.1	A	49	7.9	A	50	8.7	A
	WB	300	LTR	59	8.7	A	65	8.6	A	62	8.6	A	97	9.4	A
	NB	860	LTR	48	0.9	A	40	0.9	A	33	0.4	A	41	0.4	A
	SB	100	LTR	29	0.3	A	35	0.3	A	29	0.4	A	29	0.6	A
	Intersection					1.4	A		1.5	A		1.9	A		2.1
South Greeley Avenue (N-S) @ Quaker Avenue EB [TWO-WAY STOP CONTROL]	EB	500	L	251	17.9	C	268	22.2	C	223	16.0	C	253	22.3	C
		500	R	280	21.0	C	280	22.1	C	87	7.4	A	96	7.6	A
	NB	90	T	0	0.2	A	0	0.2	A	0	0.3	A	0	0.3	A
	SB	170	T	0	0.5	A	0	0.4	A	0	0.1	A	0	0.2	A
	Intersection					14.9	B		16.4	C		6.9	A		9.3
South Greeley Avenue (N-S) @ King Street [ALL-WAY STOP CONTROL]	EB	200	LTR	107	9.2	A	116	9.5	A	119	10.1	B	119	10.7	B
	WB	140	LTR	202	30.5	D	200	34.9	D	206	37.4	E	201	38.3	E
	NB	150	LT	151	11.1	B	167	13.8	B	98	11.3	B	140	12.6	B
		100	R	143	14.3	B	158	16.6	C	93	10.1	B	131	11.0	B
	SB	190	LTR	74	8.1	A	71	8.5	A	91	10.1	B	119	11.2	B
Intersection					19.6	C		22.3	C		20.0	C		20.4	C

Notes:

1. EB – Eastbound, WB – Westbound, NB – Northbound, SB – Southbound.
2. Street length measurements based on distance to adjacent intersection or off-ramp.
3. L – Left, T – Through, R – Right, DefL – DeFacto Left Turn.
4. Shaded queue lengths exceed available distance to the nearest intersection or end of full-width storage bay. Shaded LOS indicates congested movement.

Conclusions / Recommendations

Based on the results of this analysis, the “triangular roundabout” configuration for the intersection of South Greeley Avenue and Quaker Avenue, *Alternative A* appears to work well without any other changes to the surrounding streetscape or traffic patterns. As a standalone option, it is feasible.

Alternative B, which combines a two-way Lower King Street configuration with signal control at Greeley / King and a “triangular roundabout” appears to work extremely well during all time periods and under both analyzed years, with all approaches operating at LOS C or better (see Table 4).

Alternative C, which is the same as *Alternative B* except with All-Way Stop control at Greeley / King, also operates well in comparison to *Alternative B*. It should be noted, however, that during the PM Peak in the ETC+30 scenario, levels of service begin to degrade to LOS E (see Table 5) with increasing delay.

From an operational perspective, the conversion of Lower King Street into a two-way street has added benefit to users of a “triangular roundabout” intersection at Quaker Avenue, as it is highly anticipated that vehicles will utilize an eastbound Lower King Street option to either reach Quaker Avenue or proceed to King Street. This would result in less volume turning left out of the train station and queueing on South Greeley Avenue between Woodburn and Quaker Avenues. Thus, vehicles wishing to enter the Hamlet and turn left onto South Greeley Avenue from eastbound Quaker Avenue would likely encounter less volume and have longer gaps to make their turn.

While the conversion of Lower King Street into a two-way street is operationally feasible, especially with a signal at the Greeley / King intersection, Lower King Street was originally a two-way roadway before conversion to a one-way street in order to address previous operational issues. The re-implementation of two-way traffic on Lower King Street may result in negative impacts, such as:

- Loss of on-street parking (16 existing diagonal spaces reduced to 7 curbside parallel spaces) in close proximity to local businesses
- Opposition from local businesses on and in the vicinity of Lower King Street
- Impacts to pedestrian safety
- Higher through volume traffic

Reversing the direction of Lower King Street to eastbound-only would also have several negative impacts, as noted earlier in the memorandum. It is not a recommended alternative.

Pending Town review, it is recommended that these findings be discussed with NYSDOT for their own review and consideration such that the Town's preferred concepts can be included in the final design plans for the overall project.