SIGHT DISTANCE, QUEUE ANALYSIS
&
PEDESTRAIN STUDY

HUNTINGTON STATION GATEWAY DEVELOPMENT

Huntington Station

Town of Huntington

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N & P JOB NO. 12019

NELSON & POPE
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SIGHT DISTANCE AND QUEUE ANALYSIS

Sight Distance

To assist in the evaluation of the proposed Huntington Station Gateway Development, Nelson & Pope was asked to investigate the sag vertical curve and determine stopping sight distance on NYS Route 110 in the vicinity of Broadway/Railroad St and the LIRR train and pedestrian bridges. This section of NYS Route 110 has a posted speed limit of 30 miles per hour and there is approximately a 4% downgrade on this portion of roadway. In order to perform a conservative analysis we used a speed of 35 mph for our analysis. Standard and observed values are summarized in the following table.

Table 1: Stopping Sight Distance Requirement

Roadway	Recommended Sight Distance (FT)		Recorded Sight Distance (FT)	
	3% downgrade	6% downgrade	Vehicle	Pavement
NYS Route 110	257	271	475	290

Upon review of the table above it can be seen that for a speed of 35 mph, 257 feet of sight distance is required for a 3% downgrade and 271 feet is required for a 6% downgrade. Field measurements indicate that a motorist can identify a vehicle at the lowest point of the roadway section from approximately 475 feet away and the lowest point of the pavement can be seen from approximately 290 feet. Therefore, ample sight distance is available.

Queue Analysis

Additionally, a queue analysis was conducted to assess the adequacy of the northbound left-turn storage at the intersection of NYS Route 110 and Broadway/Railroad St. The left-turn lane is 11 feet wide and provides 95 feet of storage with a 165 foot taper length. For the purpose of the Synchro analysis the storage was assumed to be 145 feet, the distance that can accommodate a car without blocking through traffic. According to the Synchro queue analysis of the Build Condition for the proposed Huntington Station Gateway Development, the longest 50th percentile queue (average) will be 52 feet and the longest 95th percentile queue will be 96 feet. Upon implementation of the proposed signal adjustments, the longest 50th percentile queue will be 43 feet and the longest 95th percentile queue will be 69 feet. It should also be noted that this queue will be metered by the upstream signal at NYS Route 110 and Depot Road. Based on these results we feel that the 95 foot storage and 165 foot taper length will adequately handle queue volume more than 95% of the time.

Furthermore, when considering the left-turn volumes under the Build Condition and available green time for the northbound movements, there is sufficient time available to process the forecast volumes. Based on forecast volumes and cycles per hour for each of the peak periods analyzed, the northbound left-turn movement will only need to process approximately 4 vehicles per cycle. A 4 vehicle queue will occupy approximately 80 feet of storage space of the provided 145 feet. Therefore, sufficient storage will be available in the northbound left-turn lane.

PEDESTRIAN STUDY

In order to determine the impact of the proposed project if any, on pedestrian amenities in the study area a pedestrian study was conducted to quantify the existing number of pedestrians using the amenities, identified any existing issues related to pedestrians, estimated the amount of pedestrian traffic that will be generated by the proposed project and identified any impacts created by the increase in pedestrian activity. In order to accomplish these tasks, the following was undertaken:

- A field survey of the existing pedestrian amenities was conducted during peak periods to identify any pedestrian flow issues and also identify any deficiencies on these pedestrian facilities. The following amenities were surveyed:
    - Sidewalks along Route 110 from Depot Road to Olive Street
    - Sidewalks along Railroad Street from Route 110 to Lowndes Ave
    - Sidewalks along Broadway from Route 110 to Biltmore Circle
    - Crosswalks and pedestrian waiting areas, traffic signal at the intersection of Route 110 and Broadway/Railroad Street.
    - Crosswalks at the intersection of Route 110 at Depot Road/2nd Street.
    - North and South Pedestrian Bridges.
- Pedestrian counts were conducted at the following location during the AM peak (5:00AM-8:30AM) and PM peak (5:00PM-7:30PM) of the Huntington Long Island Rail Road Station at the following locations:
    - Intersection of Route 110 and Broadway/Railroad Street (at all four approaches)
    - Intersection of Route 110 at Depot Road (northbound approach and westbound approach)
    - Intersection of Route 110 at E 2nd Street (westbound approach)
    - North Pedestrian Bridge
    - South Pedestrian Bridge

- In addition to the pedestrian crossing counts, pedestrian cluster counts were conducted at the four pedestrian waiting areas at the intersection of Route 110 at Broadway/Railroad Street. The maximum number of pedestrians waiting at theses corners at a given time during the weekday AM and PM peak periods was observed and recorded.

- The data was reviewed and analyzed.

Pedestrian Circulation Plan

The following information was obtained from the field observations

- Sidewalks are available along the sections of Route 110, Broadway and Railroad Street in the vicinity of the study area.
- The intersection of Route 110 at Broadway contains crosswalks on all four legs of the intersections. This signalized intersection is equipped with pedestrian signals on all four corners. Handicap ramps are also available.

- The intersection of Route 110 at Depot Road contains crosswalk on the south leg of Route 110 and on the east leg of Depot Road with handicap pedestrian ramps at all corners. The intersection is also equipped with pedestrian signals with countdown timers.
- During the pedestrian counts a significant number of pedestrians were Jaywalkers and only few pedestrians were observed using the pedestrian push buttons. There were a significant number of bicyclists riding on the sidewalk.
- A significant number of pedestrians utilized the pedestrian bridges reducing the number of pedestrians crossing Route 110 to access the Train Station.

From the review of the information obtained from the field survey and pedestrian counts it can be seen that the study area is adequately equipped with pedestrian amenities.

The location of the proposed project will be connected to the existing pedestrian facilities and hence pedestrian travelling to and from the site will not have to cross Route 110 at any section with no crosswalks. The pedestrian circulation plan included in the appendix of this reports outlines how pedestrians will travel to and from the site using existing sidewalks, crosswalks and the two pedestrian bridges over Route 110.

Pedestrian data analyses

As previously mentioned pedestrian data was collected in the study area during the weekday AM and PM peak periods. The following is a summary of the pedestrian data collected. The detailed data is contained in the appendix of the report.

Table 2: Peak Hour Pedestrian Volumes

		South Crosswalk		North Crosswalk		East Crosswalk		West Crosswalk		Total
Location	Peak Hour	EB	WB	EB	WB	NB	SB	NB	SB	
Route 110 at Broadway/Railroad St	AM peak hour	27	4	34	9	8	46	3	22	153
	PM peak Hour	2	10	2	18	36	6	14	15	103
Route 110 at Depot Rd	AM peak hour	8	13			18	11			50
	PM peak Hour	29	47			23	18			117
Route 110 at E 2nd St	AM peak hour					20	8			28
	PM peak Hour					15	17			32
North Pedestrian Bridge	AM peak hour	109	6							115
	PM peak Hour	10	103							113
South Pedestrian Bridge	AM peak hour	72	1							73
	PM peak Hour	11	55							66

The table above is a summary of the number of pedestrian crossing at the crosswalks and pedestrians facilities in the vicinity of the project area and the Long Island Railroad (LIRR) Huntington Station during the weekday AM and PM peak periods. Sidewalks and crosswalks are present at intersections in the vicinity of the Train Station and the study areas. From our field observations and the review of pedestrian data collected at these pedestrian facilities during peak periods these pedestrian facilities are

adequate to accommodate the existing pedestrian activities. There was no overcrowding observed at the sidewalks, crosswalks and pedestrian bridges during the counts.

In addition to the pedestrian counts, the maximum number of pedestrians waiting at the four corners of the intersection of Route 110 and Broadway/Railroad Street to cross was recorded. The following table summarizes the data.

Table 3: Pedestrian waiting area data

Corner	Maximum Platoon	Available pedestrian standing area in Square feet (sf)	Total area per pedestrian required *	Number of pedestrians that can be accommodated
NW Corner	4	185 sf	8 sf per pedestrian	23
NE Corner	7	290 sf	8 sf per pedestrian	36
SE Corner	5	240 sf	8 sf per pedestrian	30
SW Corner	5	250 sf	8 sf per pedestrian	31

*2010 Highway Capacity Manual

The table above shows the maximum platoon of pedestrians waiting at the four corners of the intersection of Route 110 and Broadway. The maximum number of pedestrians observed waiting to cross the street from any of the four corners is 7. According to the 2010 Highway Capacity Manual, a body ellipse of 1.5 ft. by 2ft, with a total area of 3 sf is used as the basic space for a single pedestrian. This represents the practical minimum for standing pedestrians. In evaluating a pedestrian facility, an area of 8sf is used as the buffer zone for each pedestrian. From the review of the data, the maximum number of pedestrian observed can be accommodated by any of the four corners.

Future Pedestrian activities

As previously mentioned in the Traffic Impact Study, the Proposed Project would be within walking distance of the Huntington Station stop on the LIRR. Therefore, based on the recommendation of ITE, there is a need to adjust the trip generation totals to reflect the availability of transit. For instance, the decision to drive to work rather than take the bus, train or walk is heavily influenced by the modal choices one has around them. In order adjust the trip generation for the use of transit in the Study Area, Journey to Work data (2008-2012 American Community Survey 5-Year Estimates) for the Huntington Station CDP was obtained and reviewed to determine the percentage of transit use within the Study Area. Based on review of the data, it was determined that approximately 3.4% of the population within Huntington Station walk to work. Approximately 8.7% of work trips to Huntington Station are also public transportation. Based on the available data, it is anticipated that 3.4% of the trips from the proposed project will be pedestrian trips. However, for the purpose of the pedestrian study it is more conservative to apply the full transit credit of 12.1%. Applying the 12.1% credit, the proposed project will generate 49 pedestrian trips during the AM peak period and 65 pedestrian trips during the PM peak period. These numbers are lower than the current number of pedestrians at the main intersection (Route 110 at

Broadway/Railroad Street). Hence the maximum number of pedestrians from the proposed project that will be waiting at any of the four corners of the intersection of Route 110 at Broadway will be less than 7 people and hence can be accommodated in the available waiting area without causing any pedestrian flow issues.

Conclusions

The results of the sight distance analysis revealed that there is adequate sight distance available to see vehicles at the bottom of the sagging vertical curve under the LIRR Bridge when traversing the northbound travel lanes on NYS Route 110.

The results of the northbound left-turn queue analysis for the intersection of NYS Route 110 at Broadway/Railroad Street revealed that there is sufficient storage to accommodate volumes forecast under the Build Condition for all peak periods

Based on the results of the pedestrian study as detailed in the body of this report, it is the professional opinion of Nelson & Pope that the additional pedestrian activity that may result from the proposed project is not expected to cause any significant pedestrian flow and circulation issues. The site layout and the proposed driveway will connect to the existing pedestrian amenities and will allow for safe pedestrian flow and circulation.

ATTACHMENTS

	Route 110 @ Broadway/Railroad St															
	North Crosswalk				East Crosswalk				South Croswalk				West Crosswalk			
	A East		B West		C East		D West		E North		F South		G North		H South	
	Count	Notes	Count	Notes	Count	Notes	Count	Notes	Count	Notes	Count	Notes	Count	Notes	Count	Notes
5:00 to 5:15			1	Jaywalker-1			1				1					1
5:15 to 5:30																
5:30 to 5:45		1			1						2		1		1	
5:45 to 6:00					1	Jaywalker-1	3	Button-1 (3 people)	1		3		1		3	Button-1
6:00 to 6:15	1		2		1	Jaywalker-1	3		1		3		3	Button-1	3	
6:15 to 6:30											1				2	Button-1
6:30 to 6:45			3		1	Cyclist-1	4				2	Button-2			3	Button Jaywalker-1
6:45 to 7:00	1		1	Jaywalker-1			5	Button-1 (3 people)			7	Button-1 Cyclist-1	1	Cyclist-1	7	Button-1 Cyclist-1
7:00 to 7:15	1	Button-1	4		4	Jaywalker-2 Cyclist-1	10	Button-3 Jaywalker-2 Cyclist-2			2	Button-1 Cyclist-1			1	
7:15 to 7:30			6	Button-1	1	Cyclist-1	8	Cyclist-1	1	Cyclist-1	4	Cyclist-1	4	Button-1 Cyclist-1	6	Button-1
7:30 to 7:45	3	Jaywalker-1 Cyclist-1	15	Jaywalker-4 Cyclist-1	3	Button-1 Cyclist-1	17	Button-4 Cyclist-3 Jaywalker-1	3	Cyclist-2	7				2	
7:45 to 8:00	1		7	Button-2 Jaywalker-2	1	Cyclist-1	10	Button-2 Cyclist-1			10	Button-5 Cyclist-1			11	
8:00 to 8:15	1	Jaywalker-1	4	Jaywalker-1	1	Jaywalker-1	9	Button-2 Jaywalker-1 Cyclist1	1	Button-1	7	Button-2	1		6	Cyclist-1 Jaywalker-1 Button-2 Wheelchair-1
8:15 to 8:30	4	Jaywalker-1	8	Jaywalker-2	3	Button-1 Cyclist-1 Jaywalker-1	10	Button-2			3	Button-1 Cyclist-1	2	Button-1	3	
AM Peak	9		34		8		46		4		27		3		22	
5:00 to 5:15	3	Button-1 (2 people)	2		5	Button-1 Cyclist-2	4	Button-2	2	Button-1 Cyclist-1	1	Button-1	3	Cyclist-2		
5:15 to 5:30	7	Button-1 Jaywalker-3	1	Jaywalker-1	5	Button-1 Cyclist-2	2		3		1	Cyclist-1	3	Cyclist-1	2	
5:30 to 5:45	4	Button-1 Jaywalker-3	2		5		2	Button-1			2	Button-1	1		2	
5:45 to 6:00	7		1	Button-1	7	Button-3	9	Button-3 Cyclist-1	1		1	Button-1	3	Cyclist-1		
6:00 to 6:15	3		3	Button-2	3	Button-1 Cyclist-2	3	Button-1 Cyclist-1	2	Button-1 Cyclist-1			3	Cyclist		
6:15 to 6:30	6				4	Button-2 Cyclist-1			1	Button-1			2	Button-1	2	Jaywalker-1
6:30 to 6:45	6	Button-1	2		10	Cyclist-2	2	Button-1	5	Button-3 Cyclist-1			6	Button-1 (2 people) Wheelchair-1 Cyclist-1	1	Button-1
6:45 to 7:00	1				11	Button-1 Cyclist-5 Jaywalker-1	1		2		2	Button-1	2		11	Cyclist-1
7:00 to 7:15	2	Button-1 (2 people)			4	Cyclist-2 Jaywalker-1	1		1				4	Jaywalker-2	2	Cyclist-2
7:15 to 7:30	9	Button-1 (2 people)			11	Jaywalker-1 Cyclist-1	2	Cyclist-1	2	Cyclist-1			2	Cyclist-2	1	Cyclist-1
PM Peak	18		2	0	36		6		10		2		14		15	

	LIRR Pedestrain Bridges							
	North Bridge				South Bridge			
	A West		B East		C West		D East	
	Count	Notes	Count	Notes	Count	Notes	Count	Notes
5:00 to 5:15	1		10					
5:15 to 5:30			3					
5:30 to 5:45	3		14				4	
5:45 to 6:00			2		1			
6:00 to 6:15			18				5	
6:15 to 6:30			6	Cyclist-1			3	
6:30 to 6:45			25	Cyclist-2			10	
6:45 to 7:00			22		1		12	
7:00 to 7:15	3		30	Cyclist-1	1		14	
7:15 to 7:30	2		31				28	
7:30 to 7:45	1	Cyclist-1	26				20	
7:45 to 8:00			22				10	
8:00 to 8:15	1		13				3	
8:15 to 8:30	1		18				15	
AM Peak	6		109		1		72	
5:00 to 5:15	7		7		8		3	
5:15 to 5:30	16		2		4		2	
5:30 to 5:45	15		1		11	Cyclist-1	1	Cyclist-1
5:45 to 6:00	16		2		6		2	
6:00 to 6:15	19		6		9		1	
6:15 to 6:30	18		3		12		8	
6:30 to 6:45	44	Cyclist-1			16		1	
6:45 to 7:00	22		1		18		1	
7:00 to 7:15	1							
7:15 to 7:30	19				10		2	Skateboarders-2
PM Peak	103		10		55		11	

	Route 110 @ Depot Rd								E 2nd St			
	South Crosswalk				East Crosswalk				East Crosswalk			
	A Westbound		B Eastbound		C Southbound		D Northbound		E Southbound		F Northbound	
	Count	Notes	Count	Notes	Count	Notes	Count	Notes	Count	Notes	Count	Notes
5:00 to 5:15	2				1				1			
5:15 to 5:30			1	Jaywalker-1			2				2	
5:30 to 5:45	2		4								2	
5:45 to 6:00	1	Jaywalker-1	1	Jaywalker-1					1			
6:00 to 6:15	3	Jaywalker-1	2	Jaywalker-2	2		2				1	
6:15 to 6:30	1		4		1		3	Cyclist-2	3		4	Cyclist-2
6:30 to 6:45	4	Jaywalker-2	3				2		1	Cyclist-1	2	
6:45 to 7:00	3		2	Jaywalker-1	3	Cyclist-1	4	Cyclist-2	3	Cyclist-1	7	Cyclist-4
7:00 to 7:15	4	Jaywalker-3	3	Cyclist-1	5	Cyclist-2	2	Cyclist-1	4	Cyclist-2	2	Cyclist-2
7:15 to 7:30	4	Jaywalker-1 Cyclist-1			2		5	Cyclist-2 Button-1			5	Cyclist-1
7:30 to 7:45	2		3	Button-1	1		7	Cyclist-3	1	Cyclist-1	6	Cyclist-3
7:45 to 8:00	3	Button-1	1	Jaywalker-1	3	Cyclist-1			2	Cyclist-2	1	Cyclist-1
8:00 to 8:15	6	Button-2			2				2		2	Cyclist-1
8:15 to 8:30	6	Button-1 Jaywalker-1	4	Button-2	5	Cyclist-1	3		2	Cyclist-1	1	
AM Peak	13		8		11		18		8		20	
5:00 to 5:15	2	Jaywalker-2	6	Button-2 Cyclist-2 Jaywalker-2	2	Cyclist-2	2	Cyclist-2	2	Cyclist-2	6	Cyclist-3 Jaywalker-1
5:15 to 5:30	9	Jaywalker-6 Cyclist-1	12	Jaywalker-10 Jaycyclist-2	3	Jaywalker-1 Cyclist-1	2	Cyclist-1			2	Cyclist-1 Jaywalker-1
5:30 to 5:45	8	Jaywalker-6	11	Jaywalker-5 Jaycyclist-3	8	Cyclist-2	9	Cyclist-2	4	Cyclist-2	5	Jaywalker-1 Cyclist-2
5:45 to 6:00	20	Jaywalker-11	14	Jaywalker-5 Jaycyclist-1	2		5		6	Cyclist-1	3	Jaywalker-1
6:00 to 6:15	10	Button-1 Jaywalker-5 Cyclist-3 Jaycyclist-2	14	Jaywalker-12 Jaycyclist-1	3	Button-1 Cyclist-2	5	Button-1 Cyclist-1	4	Cyclist-3	4	
6:15 to 6:30	9	Jaywalker-11	10	Jaywalker-10 Jaycyclist-1	5	Cyclist-1	4		2		3	Jaywalker-1 Cyclist-1
6:30 to 6:45	5	Jaywalker-4	6	Jaywalker-3 Jaycyclist-1	2	Cyclist-1	3		5	Cyclist-2	5	Cyclist-2
6:45 to 7:00	5	Jaywaler-2 Jaycyclist-1	5	Cyclist-1 Jaycyclist-2	2	Jaywalker-1	3	Cyclist-3	2	Cyclist-1	6	Cyclist-5
7:00 to 7:15	3	Jaywalker-2	11	Jaywalker-5 Jaycyclist-1	2	Button-1 Cyclist-1	3	Cyclist-1			2	Cyclist-1
7:15 to 7:30	1		3		4	Cyclist-1	4	Button1 Cyclist-1	2	Cyclist-1	1	Cyclist-1
PM Peak	47		49		18		23		17		15	

Pedestrian Cluster Counts

	NW Corner	NE Corner	SE Corner	SW Corner
5:00 to 5:15	1	1	1	1
5:15 to 5:30	1	1	1	1
5:30 to 5:45	1	1	1	1
5:45 to 6:00	1	1	1	2
6:00 to 6:15	2	2	1	1
6:15 to 6:30	1	1	1	1
6:30 to 6:45	1	1	1	1
6:45 to 7:00	3	1	1	2
7:00 to 7:15	2	1	1	1
7:15 to 7:30	2	2	1	2
7:30 to 7:45	2	1	3	1
7:45 to 8:00	3	3	3	1
8:00 to 8:15	1	2	1	2
8:15 to 8:30	2	2	2	1
	1	1	1	1
5:00 to 5:15	2	2	2	1
5:15 to 5:30	1	1	2	1
5:30 to 5:45	4	2	2	1
5:45 to 6:00	1	2	2	1
6:00 to 6:15	1	1	5	1
6:15 to 6:30	1	2	3	1
6:30 to 6:45	1	7	3	1
6:45 to 7:00	1	1	1	5
7:00 to 7:15	1	1	1	2
7:15 to 7:30	1	1	1	1
Maximum	4	7	5	5

Pedestrian Circulation Plan
Huntington Station, NY

0 50 100 150 200
Feet

7/20/15

N