Pedestrian Mobility and Safety Study

New York City Department of Consumer Affairs

May 3, 2017

AKRF

A. INTRODUCTION

The streets of Manhattan have been transformed in recent years to accommodate ever-increasing numbers of pedestrians. In some areas, sidewalks have been widened by removing an adjacent travel lane, street crossing lengths have been minimized via curb extensions and pedestrian islands, and pedestrian plazas have been created and improved. Yet, even with these pedestrian improvements, there are areas where congestion frequently occurs near several of New York City's iconic buildings and tourist attractions. At these locations, residents and daily commuters compete with tourists and ticket vendors for use of the limited sidewalk space. It is not surprising that points of conflict or delay in the pedestrian systems still occur given the concurrent upward trends in New York City's population (from 8.2 million in 2010 to 8.6 million in 2015) and the numbers of tourists visiting the City (from 48.8 million visitors in 2010 to 58.3 million visitors in 2015 (**Figure 1**). New York City's economy benefits from its popularity as a tourist destination; however, the public spaces and transportation infrastructure—including subways, buses, and streets—is under increasing stress to support the multiple, often conflicting, functions of residents, tourists, and businesses.

This study aims to answer the question, "Does the presence of ticket seller and tour bus queue obstructions result in a loss of available sidewalk space that would be considered significant?" To determine the answer to this question, five of the busiest tourist districts in Manhattan—Battery Park, Park Row/City Hall, Herald Square/Empire State Building, Times Square, and Columbus Circle—were assessed to identify choke points caused by ticket seller activities and where tour bus-related activities regularly occur on busy sidewalks. Within these five districts (**Figure 2**), seven locations were identified for observations and a more detailed analysis.

The observations in this study consist of identifying and noting choke point locations and times of day using video recordings and photos. The analysis in this study employs the methodology presented in the 2014 City Environmental Quality Review (CEQR) Technical Manual, which follows that presented in the 2010 Highway Capacity Manual (HCM). This methodology examines and quantifies the quality and comfort of pedestrian movement, or level of service (LOS) based on the available pedestrian space relative to the volume of pedestrians. This study also relies on the impact criteria found in the CEQR Technical Manual which represent a reasonable threshold to compare pedestrian levels of service under the scenarios with and without the observed tourism-related obstructions.

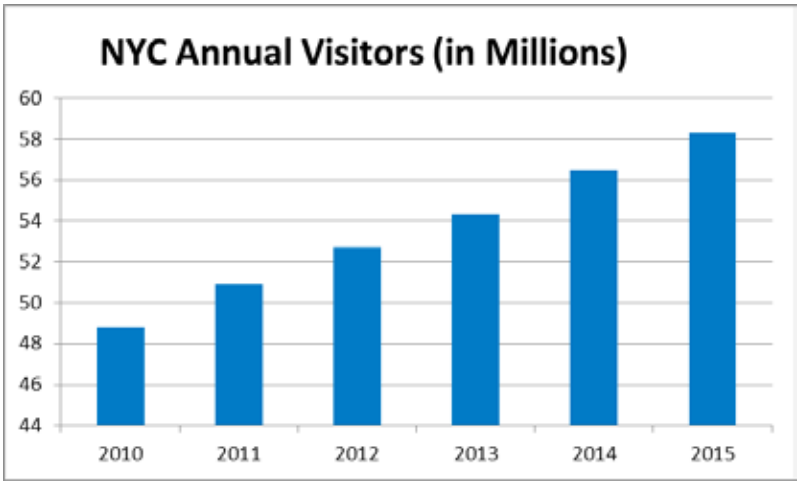


Figure 1: NYC Visitor Trends

B. EXECUTIVE SUMMARY

STUDY AREAS AND SUB-AREAS

Through discussions with the New York City Department of Consumer Affairs (DCA), the New York City Police Department (NYPD), and the New York City Department of Transportation (NYCDOT), five key areas were identified for the pedestrian safety evaluation based on reports of high volumes of ticket seller activity:

1) Battery Park
2) City Hall/Park Row
3) Herald Square/ Empire State Building
4) Times Square
5) Columbus Circle

Preliminary field visits were conducted at each of the key study areas to identify sub-areas with pedestrian flow that was noticeably affected by tour bus ticket seller activities. The seven sub-areas, or locations, listed below were identified for detailed data collection. At each of these seven locations a significant volume of ticket vendor and curbside tour bus activity was observed (see **Figure 2**: Study Location Key).

Location 1: West sidewalk of State Street between Battery Place and Bridge Street
Location 2: North sidewalk of Park Row between Broadway and Beekman Street
Location 3a: North sidewalk of West 34th Street between Sixth Avenue and Fifth Avenue
Location 3b: West sidewalk of Fifth Avenue between West 34th Street and West 33rd Street
Location 4a: North sidewalk of West 42nd Street between Eighth Avenue and Seventh Avenue
Location 4b: West sidewalk of Seventh Avenue between West 48th Street and West 49th Street
Location 5: East sidewalk of Central Park West between Columbus Circle and West 61st Street

KEY OBSERVATIONS

AKRF conducted site observations on two weekdays during the weekday midday (11:00 AM to 2:00 PM) and weekday PM periods (4:00 PM to 7:00 PM) and one weekend during the daytime (12:00 PM to 6:00 PM). Pedestrian counts were recorded and sources of sidewalk obstructions such as tour bus queuing behavior or ticket seller activities were noted. The data collection resulted in the following key observations made for each location and **Table 1**: Summary of Observed Sidewalk Obstructions.

Location 1: At State Street, the narrowest point of the sidewalk was partially blocked due to tour bus queuing perpendicular to pedestrian flows on sidewalks at times during all observation periods;

Location 2: At Park Row, the narrowest point of the sidewalk was partially blocked due to tour bus queueing parallel to the fence. When passengers proceeded to board the bus on the weekday PM and weekend day peak hours, the narrowest point of the side walk was fully blocked;

Location 3a: On West 34th Street, the sidewalk flow was obstructed by frequently occurring ticket vending activities and to a lesser extent tour bus queueing during all observation periods. On numerous occasions, several ticket vendors were observed clustering around potential customers within the sidewalk space typically used by

pedestrians;

Location 3b: On Fifth Avenue, the sidewalk flow was obstructed by frequently occurring ticket vending activities on weekdays;

Location 4a: On West 42nd Street, the sidewalk space typically used by pedestrians was partially reduced by ticket vending activities and tour bus queueing parallel to curb during all observation periods;

Location 4b: On Seventh Avenue, similar to West 42nd Street, effective sidewalk space was partially reduced by ticket vending activities and tour bus queueing parallel to curb during all observation periods;

Location 5: On Central Park West, the sidewalk space was blocked and the subway station entrance was partially blocked due to tour bus queueing perpendicular to sidewalk pedestrian flows in the weekday midday and weekend day peak hours.

Figure 2: Study Location Key

Study Area	Location		Weekday Midday Peak Hour			Weekday PM Peak Hour			Weekend Day Peak Hour		
			Tour Bus Queuing Activity	Ticket Vending Activity	Other Temporary Physical Obstructions	Tour Bus Queuing Activity	Ticket Vending Activity	Other Temporary Physical Obstructions	Tour Bus Queuing Activity	Ticket Vending Activity	Other Temporary Physical Obstructions
1	Location 1	West sidewalk of State Street between Battery Place and Bridge Street	+			+			+		
2	Location 2	North sidewalk of Park Row between Broadway and Beekman Street				+			+		
3	Location 3a	South sidewalk of West 34th Street between Sixth Avenue and Fifth Avenue	+	+		+	+		+	+	
	Location 3b	West sidewalk of Fifth Avenue between West 34th Street and West 33rd Street		+							**
4	Location 4a	North sidewalk of West 42nd Street between Eighth Avenue and Seventh Avenue		+		+	+		+	+	
	Location 4b	West sidewalk of Seventh Avenue between West 48th Street and West 49th Street	+	+		+	+		+	+	
5	Location 5	East sidewalk of Central Park West between Columbus Circle and West 61st Street	+					*			

\+ Obstruction observed
* Metal barricades on sidewalk
** Empire State Building observation deck queuing stanchions

Table 1: Summary of Observed Sidewalk Obstructions

LEVEL OF SERVICE (LOS) ANALYSIS

Two scenarios were applied to a comparative analysis: Scenario 1 was the presence of queuing for tour buses but no vendor activity and Scenario 2 was the presence of both queuing and vendor activity. Each was compared to a third scenario of pedestrian level of service without any tour bus related activity.

As a result of the comparative analysis, several locations (listed below and shown in **Table 2**: Summary of Significant Impacts to Pedestrian Flow) were identified where tour bus related activity had significant impacts on the pedestrian infrastructure LOS.

- When there was queuing but no vendor activity, significant impacts were found at:
  - Location 2 during weekday PM and weekend day peak hours,
  - Location 4a during weekday PM and weekend day peak hours, and
  - Location 5 during the weekend day peak hour.
- When there was queuing and vendor activity present, significant impacts were also found at:
  - Location 3a during weekday midday and weekday PM peak hours,
  - Location 4a during the weekday midday (in addition to other peak hours already impacted without the presence of vendors), and
  - Location 4b during the weekend day peak hour.

INTERSECTION SAFETY DATA REVIEW

In addition to the pedestrian LOS comparative analysis, the NYCDOT rolling total of crash data for the most recent three-year period was reviewed for the five study areas. Three intersections adjacent to the analyzed sidewalks were identified as "high crash locations" during the 2013 to 2015 period according to the CEQR Technical Manual because they had more than 48 vehicle crashes or five pedestrian/bicycle injury crashes during any consecutive 12-month period during the most recent three years of data available. This is important because the presence of high crash locations adjacent to high pedestrian tourist congestion areas indicates the potential for increased safety concerns for pedestrians.

- Fifth Avenue and West 34th Street in Study Area 3
- Eighth Avenue and West 42nd Street in Study Area 4
- Seventh Avenue and West 48th Street in Study Area 4

Study Area	Location		Weekday Midday Peak Hour		Weekday PM Peak Hour		Weekend Day Peak Hour	
			WITH QUEUING	WITH QUEUING AND VENDOR ACTIVITY	WITH QUEUING	WITH QUEUING AND VENDOR ACTIVITY	WITH QUEUING	WITH QUEUING AND VENDOR ACTIVITY
1	Location 1	West sidewalk of State Street between Battery Place and Bridge Street						
2	Location 2	North sidewalk of Park Row between Broadway and Beekman Street			Q	Q	Q	Q
3	Location 3a	South sidewalk of West 34th Street between Sixth Avenue and Fifth Avenue		V		V		V
	Location 3b	West sidewalk of Fifth Avenue between West 34th Street and West 33rd Street						
4	Location 4a	North sidewalk of West 42nd Street between Eighth Avenue and Seventh Avenue		V	Q	V**	Q	V**
	Location 4b	West sidewalk of Seventh Avenue between West 48th Street and West 49th Street						V*
5	Location 5	East sidewalk of Central Park West between Columbus Circle and West 61st Street					Q	Q

Q Significant impact due to queuing
V Significant impact due to vendor activity
V* Significant impact due to queuing combined with vendor activity
V** Significant impact due to queuing and further exacerbated due to vendor activity

Table 2: Summary of Significant Impacts to Pedestrian Flow

RECOMMENDATIONS

The pedestrian LOS comparative analysis, the review of crash data, and the observations of sidewalk conditions were presented to DCA, NYCDOT, and NYPD at a meeting held at DCA on January 24, 2017.

The focus of this study is the activity related specifically to tour bus ticket sellers and queuing for tour buses because of the representative size of these industries and the ease of identifying its ticket seller employees. An analysis of internal data conducted by DCA found that, as of April 2017, approximately 60 percent of all licensed ticket sellers vend for tour bus companies. During the study activity related to other industries (e.g. Empire State Building Observatory Deck queuing and ticket sellers for the Liberty Island Ferry) was noted. As such, the recommendations below would impact activity related to these other industries as well.

The following policy recommendations were developed at that meeting based on discussions with these agencies.

- Establish a licensing system to regulate tour bus companies' and other ticker sellers' use of pedestrian spaces. Regulations should be clear, simple and be easily enforceable by police.

- Establish parameters for acceptable quantity of tour bus related activity (buses stopping and queuing) and other ticket selling activities for each block or location based on sidewalks' capacity.

- Develop educational material and training requirements for tour bus companies, their employees, and other ticket sellers to inform them of expectations and requirements for licensure and to guide them on best practices for reducing sidewalk bottlenecks and assuring pedestrian/tourist safety.

- Identify locations where tour bus stops and ticket selling activity should be prohibited (i.e. at locations or blocks with narrow sidewalks).

- Regulate ticket selling activity (for tour buses and other industries).
  - Establish a seller-per-block-face density cap for all ticket seller activity.
  - Restrict vending activities to the furniture zone of sidewalks abutting active roadways. This area of the sidewalk, often reserved for street furniture, planters, and sign posts, would typically not be available for walking.

- Regulate bus queuing activity.
  - Designate locations where tour bus queuing is permitted which reflect existing regulations for minimum distance from subway station entrances and exits. These locations should be areas with wider sidewalks and minimal permanent obstacles.
  - Queuing should be oriented along the curbline (parallel to the flow of traffic at locations abutting active roadways).

C. METHODOLOGY

PEDESTRIAN OPERATIONS

The adequacy of the study area's sidewalks in relation to the demand imposed on them is evaluated in this study based on the methodologies presented in the 2010 HCM and procedures detailed in the 2014 CEQR Technical Manual. The primary performance measure for sidewalks and walkways is pedestrian space, expressed as square feet per pedestrian (SFP), which is an indicator of the quality of pedestrian movement and comfort. The calculation of the sidewalk SFP is based on the pedestrian volumes by direction, the effective sidewalk or walkway width, and average walking speed. The SFP forms the basis for a sidewalk LOS analysis. The determination of sidewalk LOS is also dependent on whether the pedestrian flow being analyzed is best described as "non-platoon" or "platoon." Non-platoon flow occurs when pedestrian volume within the peak 15-minute period is relatively uniform, whereas, platoon flow occurs when pedestrian volumes vary significantly with the peak 15-minute period. Such variation typically occurs near bus stops, subway stations, and/or where adjacent crosswalks account for much of the walkway's pedestrian volume. For the purposes of this analysis, platoon flow will be analyzed to measure pedestrian operations because the pedestrian flow through each of the analysis locations occurs under platoon conditions. The LOS standards for sidewalks are summarized in **Table 3**: Level of Service Criteria for Pedestrian Elements. The CEQR Technical Manual specifies acceptable LOS in Central Business District (CBD) areas is mid-LOS D or better.

SIGNIFICANT IMPACT CRITERIA

The determination of significant pedestrian impacts considers the level of predicted decrease in pedestrian space between the No Action and With Action conditions, or for this study, between a scenario without any ticket vending or tour bus queuing activities and scenarios with ticket vending and/or tour bus activities. The sliding-scale formula for determining significant sidewalk impacts for platoon flow, where Y is the decrease in pedestrian space in SFP and X is the No Action pedestrian space in SFP is Y>_X/(9.5 – 0.321). Since a decrease in pedestrian space within acceptable levels would not constitute a significant impact, these formulas would apply only if the With Action pedestrian space falls short of LOS C in non-CBD areas or mid-LOS D in CBD areas. **Table 4**: Significant Impact Guidance for Sidewalks summarizes the sliding scale guidance provided by the CEQR Technical Manual for determining potential significant sidewalk impacts.

VEHICULAR AND PEDESTRIAN SAFETY EVALUATION

Crash data was obtained from DOT to assess safety conditions at intersections near sidewalk locations that were identified in each study area as most affected by either or both ticket vending and tour bus queuing activities, to provide greater context to the findings of the pedestrian analyses and to identify intersections where congested conditions nearby could pose safety concerns due to insufficient walking space. Locations where 48 or more total reportable and non-reportable crashes or five or more pedestrian/bicyclist injury crashes occurred in any consecutive 12 months of the most recent three-year period for which data are available are considered high crash locations according to the CEQR Technical Manual. For the purposes of this study, that metric has been applied to study area intersections to identify locations adjacent to ticket seller activities that have a history of higher than average crash totals.

Non-Platoon Flow				Platoon Flow			
Sliding Scale Formula: $Y \geq X/9.0 - 0.31$				Sliding Scale Formula: $Y \geq X/(9.5 - 0.321)$			
Non-CBD Areas		CBD Areas		Non-CBD Areas		CBD Areas	
No Action Ped. Space (X, SFP)	With Action Ped. Space Reduc. (Y, SFP)	No Action Ped. Space (X, SFP)	With Action Ped. Space Reduc. (Y, SFP)	No Action Ped. Space (X, SFP)	With Action Ped. Space Reduc. (Y, SFP)	No Action Ped. Space (X, SFP)	With Action Ped. Space Reduc. (Y, SFP)
–	–	–	–	43.5 to 44.3	≥ 4.3	–	–
–	–	–	–	42.5 to 43.4	≥ 4.2	–	–
–	–	–	–	41.6 to 42.4	≥ 4.1	–	–
–	–	–	–	40.6 to 41.5	≥ 4.0	–	–
–	–	–	–	39.7 to 40.5	≥ 3.9	–	–
–	–	–	–	38.7 to 39.6	≥ 3.8	38.7 to 39.2	≥ 3.8
–	–	–	–	37.8 to 38.6	≥ 3.7	37.8 to 38.6	≥ 3.7
–	–	–	–	36.8 to 37.7	≥ 3.6	36.8 to 37.7	≥ 3.6
–	–	–	–	35.9 to 36.7	≥ 3.5	35.9 to 36.7	≥ 3.5
–	–	–	–	34.9 to 35.8	≥ 3.4	34.9 to 35.8	≥ 3.4
–	–	–	–	34.0 to 34.8	≥ 3.3	34.0 to 34.8	≥ 3.3
–	–	–	–	33.0 to 33.9	≥ 3.2	33.0 to 33.9	≥ 3.2
–	–	–	–	32.1 to 32.9	≥ 3.1	32.1 to 32.9	≥ 3.1
–	–	–	–	31.1 to 32.0	≥ 3.0	31.1 to 32.0	≥ 3.0
–	–	–	–	30.2 to 31.0	≥ 2.9	30.2 to 31.0	≥ 2.9
–	–	–	–	29.2 to 30.1	≥ 2.8	29.2 to 30.1	≥ 2.8
25.8 to 26.6	≥ 2.6	–	–	28.3 to 29.1	≥ 2.7	28.3 to 29.1	≥ 2.7
24.9 to 25.7	≥ 2.5	–	–	27.3 to 28.2	≥ 2.6	27.3 to 28.2	≥ 2.6
24.0 to 24.8	≥ 2.4	–	–	26.4 to 27.2	≥ 2.5	26.4 to 27.2	≥ 2.5
23.1 to 23.9	≥ 2.3	–	–	25.4 to 26.3	≥ 2.4	25.4 to 26.3	≥ 2.4
22.2 to 23.0	≥ 2.2	–	–	24.5 to 25.3	≥ 2.3	24.5 to 25.3	≥ 2.3
21.3 to 22.1	≥ 2.1	21.3 to 21.5	≥ 2.1	23.5 to 24.4	≥ 2.2	23.5 to 24.4	≥ 2.2
20.4 to 21.2	≥ 2.0	20.4 to 21.2	≥ 2.0	22.6 to 23.4	≥ 2.1	22.6 to 23.4	≥ 2.1
19.5 to 20.3	≥ 1.9	19.5 to 20.3	≥ 1.9	21.6 to 22.5	≥ 2.0	21.6 to 22.5	≥ 2.0
18.6 to 19.4	≥ 1.8	18.6 to 19.4	≥ 1.8	20.7 to 21.5	≥ 1.9	20.7 to 21.5	≥ 1.9
17.7 to 18.5	≥ 1.7	17.7 to 18.5	≥ 1.7	19.7 to 20.6	≥ 1.8	19.7 to 20.6	≥ 1.8
16.8 to 17.6	≥ 1.6	16.8 to 17.6	≥ 1.6	18.8 to 19.6	≥ 1.7	18.8 to 19.6	≥ 1.7
15.9 to 16.7	≥ 1.5	15.9 to 16.7	≥ 1.5	17.8 to 18.7	≥ 1.6	17.8 to 18.7	≥ 1.6
15.0 to 15.8	≥ 1.4	15.0 to 15.8	≥ 1.4	16.9 to 17.7	≥ 1.5	16.9 to 17.7	≥ 1.5
14.1 to 14.9	≥ 1.3	14.1 to 14.9	≥ 1.3	15.9 to 16.8	≥ 1.4	15.9 to 16.8	≥ 1.4
13.2 to 14.0	≥ 1.2	13.2 to 14.0	≥ 1.2	15.0 to 15.8	≥ 1.3	15.0 to 15.8	≥ 1.3
12.3 to 13.1	≥ 1.1	12.3 to 13.1	≥ 1.1	14.0 to 14.9	≥ 1.2	14.0 to 14.9	≥ 1.2
11.4 to 12.2	≥ 1.0	11.4 to 12.2	≥ 1.0	13.1 to 13.9	≥ 1.1	13.1 to 13.9	≥ 1.1
10.5 to 11.3	≥ 0.9	10.5 to 11.3	≥ 0.9	12.1 to 13.0	≥ 1.0	12.1 to 13.0	≥ 1.0
9.6 to 10.4	≥ 0.8	9.6 to 10.4	≥ 0.8	11.2 to 12.0	≥ 0.9	11.2 to 12.0	≥ 0.9
8.7 to 9.5	≥ 0.7	8.7 to 9.5	≥ 0.7	10.2 to 11.1	≥ 0.8	10.2 to 11.1	≥ 0.8
7.8 to 8.6	≥ 0.6	7.8 to 8.6	≥ 0.6	9.3 to 10.1	≥ 0.7	9.3 to 10.1	≥ 0.7
6.9 to 7.7	≥ 0.5	6.9 to 7.7	≥ 0.5	8.3 to 9.2	≥ 0.6	8.3 to 9.2	≥ 0.6
6.0 to 6.8	≥ 0.4	6.0 to 6.8	≥ 0.4	7.4 to 8.2	≥ 0.5	7.4 to 8.2	≥ 0.5
5.1 to 5.9	≥ 0.3	5.1 to 5.9	≥ 0.3	6.4 to 7.3	≥ 0.4	6.4 to 7.3	≥ 0.4
< 5.1	≥ 0.2	< 5.1	≥ 0.2	< 6.4	≥ 0.3	< 6.4	≥ 0.3

Notes: SFP = square feet per pedestrian; Y = decrease in pedestrian space in SFP; X = No Action pedestrian space in SFP.
Sources: New York City Mayor's Office of Environmental Coordination, *CEQR Technical Manual* .

Table 3: Level of Service Criteria for Pedestrian Elements

Level of Service Criteria for Pedestrian Elements

LOS	Sidewalks	
	Non-Platoon Flow	Platoon Flow
A	> 60 SFP	> 530 SFP
B	> 40 and ≤ 60 SFP	> 90 and ≤ 530 SFP
C	> 24 and ≤ 40 SFP	> 40 and ≤ 90 SFP
D	> 15 and ≤ 24 SFP	> 23 and ≤ 40 SFP
E	> 8 and ≤ 15 SFP	> 11 and ≤ 23 SFP
F	≤ 8 SFP	≤ 11 SFP
Notes: SFP = square feet per pedestrian. Source: New York City Mayor's Office of Environmental Coordination, *CEQR Technical Manual* .		

Table 4: Significant Impact Guidance for Sidewalks

DEFINITIONS

The following terms are used throughout this report.

- Platoon – A platoon is defined as a group of pedestrians traveling together.
- Effective width – The width available on each sidewalk to be used by pedestrians. It is determined by taking the total measured width of the sidewalk and deducting space occupied by physical obstructions and shy distance.
- Physical obstructions – An objects that obstructs or impedes pedestrians flow on the sidewalk, such as phone booths, fire hydrants, metal barricades, signs, stanchions, street furniture, tree pits, etc.
- Shy distance – An assumed width between or immediately adjacent to physical obstructions that pedestrians do not occupy as walking space.
- Vendor – A person who markets and sells tickets on city sidewalks.
- Queuing activity – Any observed activity where pedestrians line up on the sidewalk to board a tour bus.
- SFP – Square feet per pedestrian: measurement of the available effective sidewalk space being occupied by pedestrian volumes.
- LOS – Level of Service: measurement of effectiveness of sidewalk operations in a given hour, based on the square feet per pedestrian (SFP) measured or projected.

D. ANALYSIS

STUDY AREAS AND SUB-AREAS

Based on discussions with the New York City Department of Consumer Affairs (DCA), five key areas were identified for the pedestrian safety evaluation (see **Figure 2**):

1) Battery Park
2) City Hall/Park Row
3) Herald Square/ Empire State Building
4) Times Square
5) Columbus Circle

Preliminary field visits were conducted at each of the key study areas to identify sub-areas with pedestrian flow that was noticeably affected by tour bus ticket seller activities. The seven sub-areas, or locations, listed below were identified for detailed data collection. At each of these seven locations a significant the volume of ticket vendor and curbside tour bus activities activity was observed.

Location 1: West sidewalk of State Street between Battery Place and Bridge Street
Location 2: North sidewalk of Park Row between Broadway and Beekman Street
Location 3a: South sidewalk of West 34th Street between Sixth Avenue and Fifth Avenue
Location 3b: West sidewalk of Fifth Avenue between West 34th Street and West 33rd Street
Location 4a: North sidewalk of West 42nd Street between Eighth Avenue and Seventh Avenue
Location 4b: West sidewalk of Seventh Avenue between West 48th Street and West 49th Street
Location 5: East sidewalk of Central Park West between Columbus Circle and West 61st Street

DATES AND TIMES OF DATA COLLECTION

Pedestrian counts data was collected at each of the seven locations analyzed at the following days and times:

- Wednesday, December 21, 2016, 11:00 AM to 2:00 PM and from 4:00 PM to 7:00 PM
- Thursday, December 22, 2016, 11:00 AM to 2:00 PM and from 4:00 PM to 7:00 PM
- Monday, December 26, 2016 (Christmas day-observed), 12:00 PM to 6:00 PM*

*Data collection for “weekend conditions” for Study Area 4 (Times Square) took place between 12:00 PM to 6:00 PM on Sunday, January 1, 2017 rather than December 26, 2016.

OBSERVATIONS

STUDY AREA 1: BATTERY PARK

One location was identified in the Study Area 1 where pedestrian flow would potentially be disrupted by tour bus queuing activity. The LOS analysis for Location 1, the west sidewalk of State Street between Battery Place and Bridge Street (**Figure 3**) is summarized below.

Initial Observations

Location 1 is a sidewalk immediately adjacent to a paved pedestrian plaza at the north-east corner of Battery Park. An aboveground structure that provides access to the Bowling Green subway station sits within the pedestrian plaza. The subway entrance structure creates a pinch point in the pedestrian space which is 21 feet wide at its narrowest point. The presence of light poles, grates, a fire hydrant and other physical obstructions within the sidewalk area causes the effective width of the pedestrian travel zone to be 14.5 feet at the narrowest point.

The presence of the subway access at Location 1 adds to the number of pedestrians in the immediate area and complicates the pedestrian traffic patterns. Tour buses were observed stopping to drop off and pick up customers near subway entrance structure entrance and immediately to its north and south. During the preliminary field visit, several ticket vendors were actively selling bus tickets.

Data Collection and Analysis

The peak hours in the study area were identified as 12:30 PM to 1:30 PM and 4:00 PM to 5:00 PM on weekdays and 3:45 PM to 4:45 PM on the weekend day.

In all observation periods during the weekday data collection, ticket vendor activity was observed to be infrequent and did not factor as an obstruction to pedestrian flows. During all observation periods, most of the ticket vendor and tour bus employees were positioned at the point where the sidewalk is wider and were not observed to create choke points. However, tour bus queuing behavior was observed to occasionally but noticeably restrict the walking space available at the narrowest point of this sidewalk. Queues were observed to occupy approximately one-third of the total width of the sidewalk, as shown in **Image 1** and **Image 2**. Tour bus passengers who disembarked in large groups (platoons) contributed to additional sidewalk congestion. After accounting for the obstructions created by the queuing behavior and shy distance, the effective width of the sidewalk would be approximately 11.5 feet.

During the weekend day data collection, it was also observed that ticket vendor activity was infrequent and did not factor as an obstruction to pedestrian flows, but that tour bus queuing behavior resulted in an even more restrictive choke point near the narrowest point of the sidewalk, as queues were organized perpendicularly to the sidewalk, occupying approximately two-thirds of the available sidewalk space, as shown in **Image 3**. Tour bus passengers who disembarked in platoons also contributed to additional sidewalk congestion, occupying a similar proportion of the available sidewalk space, as shown in **Image 4**. After accounting for the obstructions created by this queuing behavior on the weekend day, the effective width of the sidewalk would be approximately 7 feet.

Photographic Documentation

*The images on the following pages are included to illustrate conditions of sidewalk crowding when tour bus related activity is present. It should be noted that the images were selected to demonstrate the ‘worst case’ conditions which are episodic and not the usual condition of the pedestrian space.

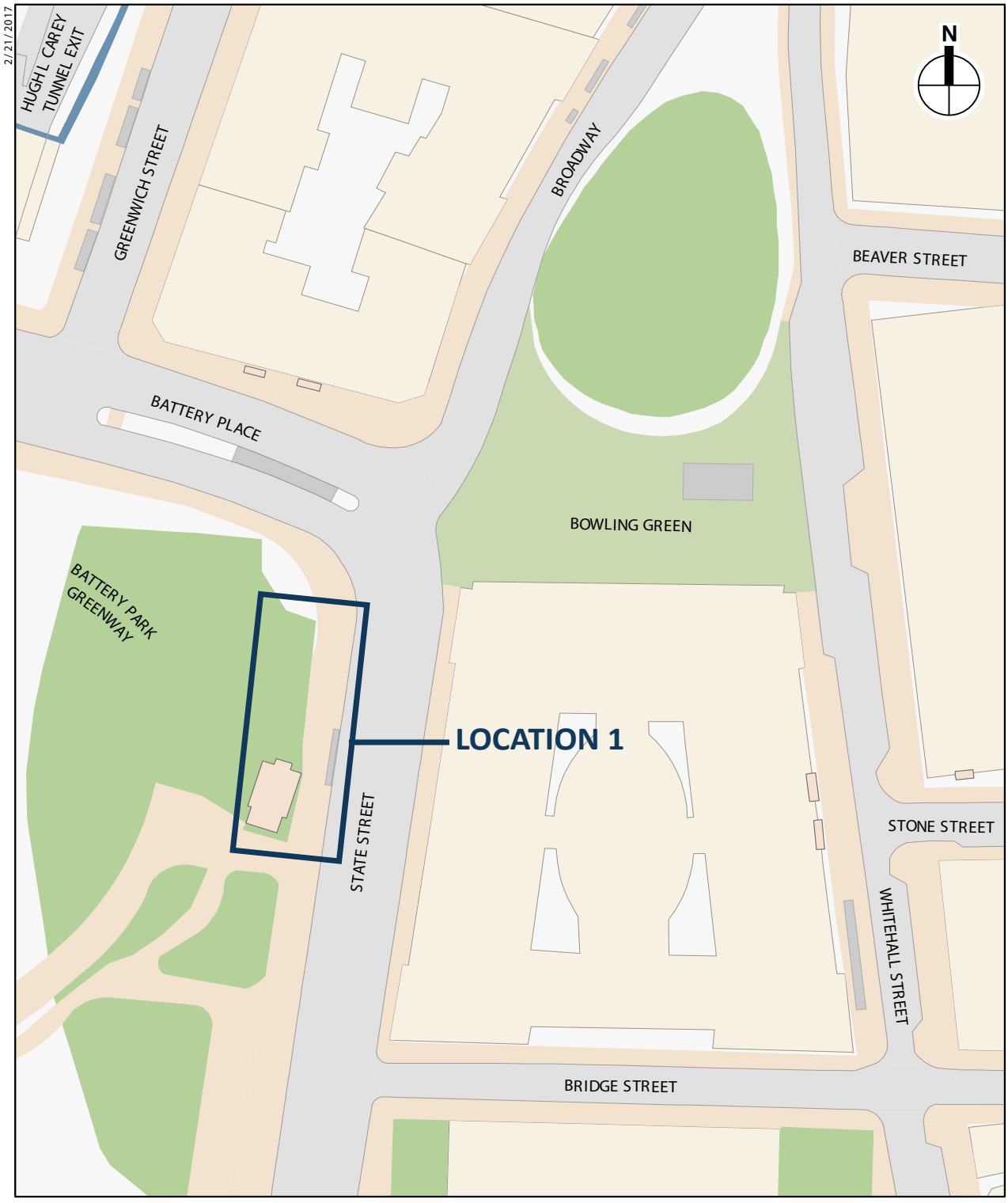


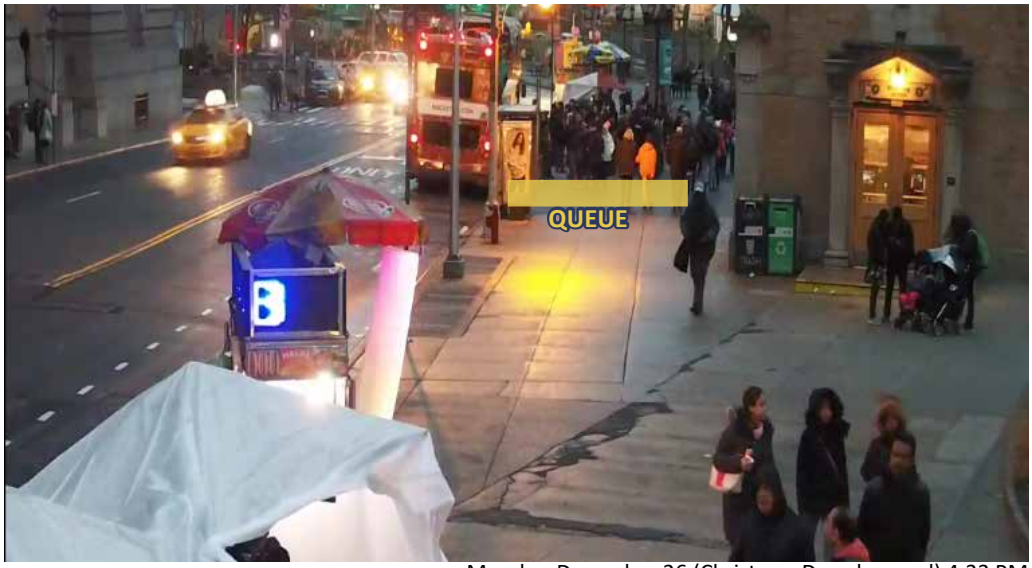
Figure 3: Sidewalk Analysis Location 1

Thursday, December 22. 1:12 PM

Image 1: Weekday midday peak hour, sidewalk with queuing.

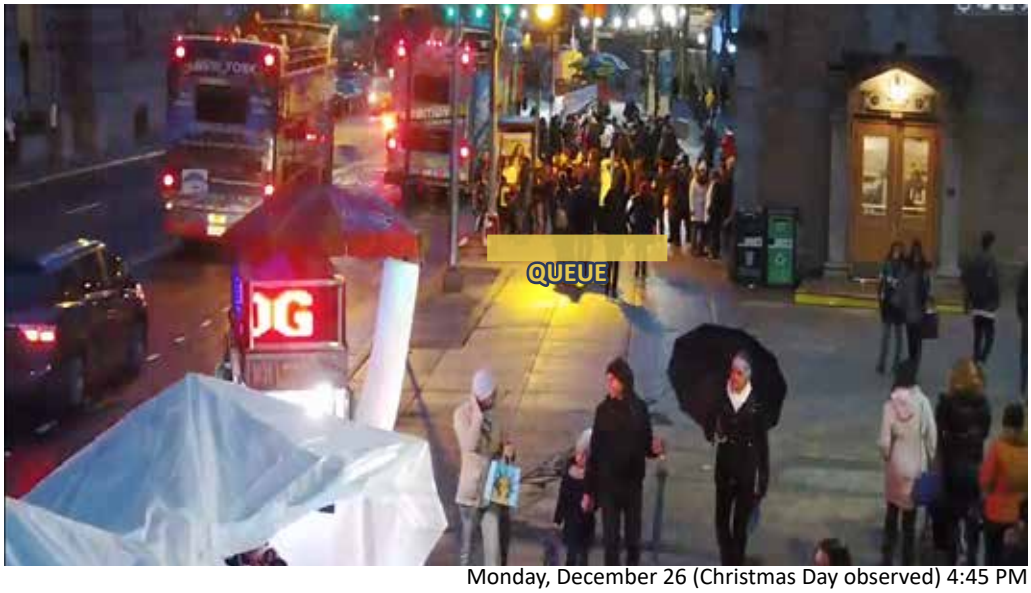
Wednesday, December 21. 4:21 PM

Image 2: Weekday pm peak hour, sidewalk with queuing.



Monday, December 26 (Christmas Day observed) 4:33 PM

Image 3: Weekend peak hour, sidewalk with queuing.



Monday, December 26 (Christmas Day observed) 4:45 PM

Image 4: Weekend peak hour, sidewalk with queuing.

STUDY AREA 2: CITY HALL/PARK ROW

One location was identified in the Study Area 2 where pedestrian flow would potentially be disrupted by tour bus activity. The LOS analysis for Location 2, the north sidewalk of Park Row between Broadway and Beekman Street (**Figure 4**) is summarized below.

Initial Observations

Location 2 is a sidewalk on the east side of City Hall Park, immediately adjacent to its southernmost point. A curb mounted steel fence, +/- 6 feet in height creates a border between the park space and the sidewalk for the entire length of this area. The width of the sidewalk is approximately 15 feet, but due to the presence of the fence, street light poles, traffic signage and other physical obstacles, the effective width for pedestrian travel is 7.5 feet.

During the preliminary field visit, several ticket vendors were observed to be active at Location 2. In addition to selling tickets the vendors appeared to be organizing the bus queuing and boarding activity. It did not appear that the presence of vendors was causing obstruction to pedestrian flows.

Data Collection and Analysis

The peak hours in the study area were identified as 12:45 PM to 1:45 PM and 4:00 PM to 5:00 PM on weekdays and 1:15 PM to 2:15 PM on the weekend day

During the weekday data collection period, ticket vending activities were not observed to be frequent; however tour bus company employees were present. The employees appeared to be assisting with tour bus queuing and boarding which reduced the queues obstructive effects on pedestrian flows. During the weekday midday peak hour, tour bus queuing was observed to be infrequent, with the typical condition shown in **Image 5**. During the weekday PM peak hour, tour bus queuing was observed to be much more persistent, and did obstruct to pedestrian flows at the narrowest point of the sidewalk.

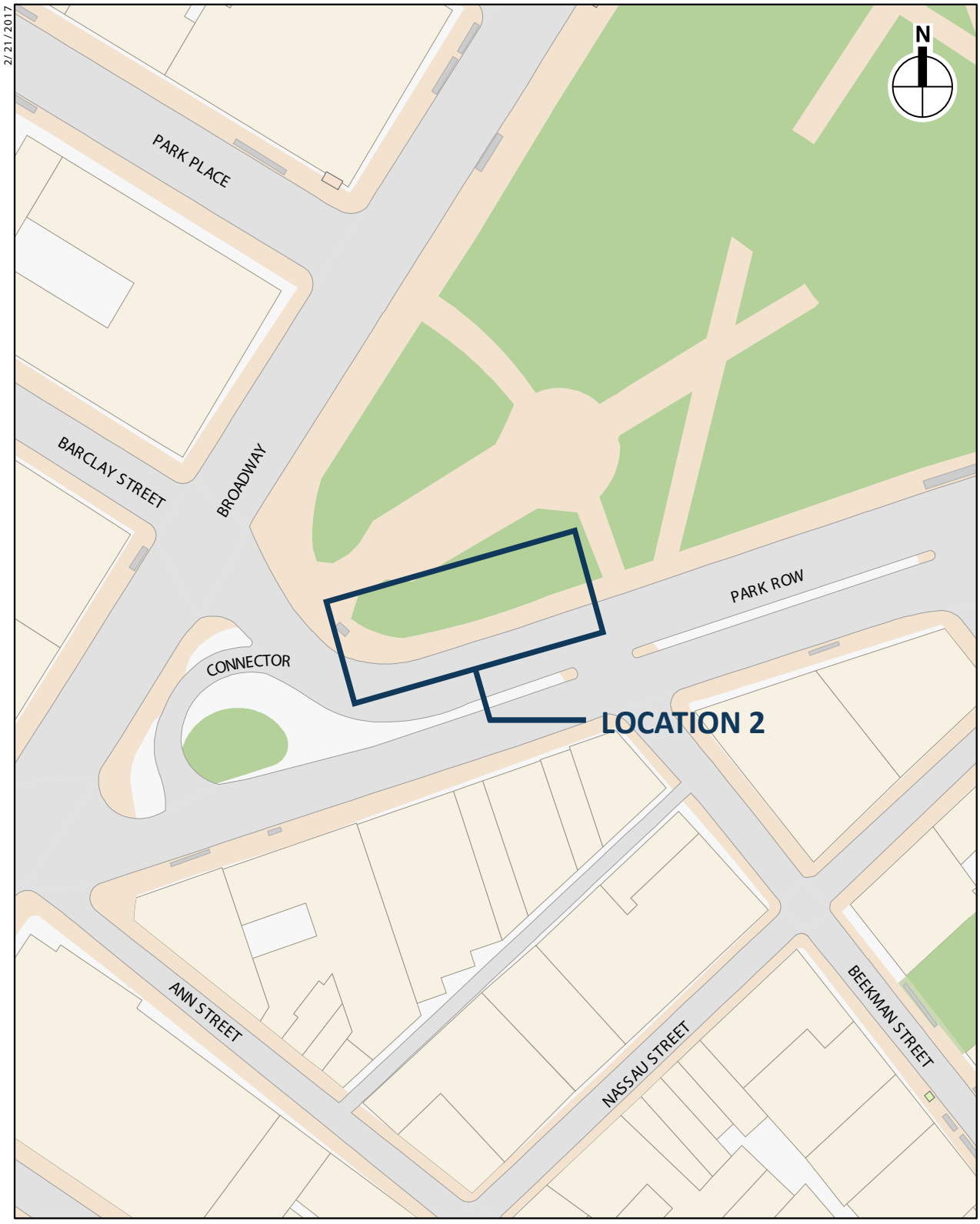


Figure 4: Sidewalk Analysis Location 2

Wednesday, December 21. 12:45 PM

Image 5: Weekday midday peak hour.

Thursday, December 22. 4:18 PM

Image 6: Weekday PM peak hour, sidewalk with queuing adjacent to fence.

Thursday, December 22. 4:20 PM

Image 7: Weekday PM peak hour, sidewalk with queuing adjacent to fence. Weekend peak hour, sidewalk during boarding.

Monday, December 26 (Christmas Day observed) 4:32 PM

Image 8: Weekend peak hour, sidewalk during bus boarding.

Queues were typically organized along the fence side of the sidewalk at the narrowest point. Traffic signs located adjacent to the curb at this location further reduced the available pedestrian space. As shown in **Image 6**, the queuing area obstructed roughly half of the remaining effective width. This resulted in significant limitation of walking space for pedestrians. **Image 7** shows the sidewalk condition when the queue snakes around and blocks the entire width of the sidewalk during bus boarding. These photos illustrate a temporary condition that would last for several minutes during bus boarding. After accounting for this observed queuing behavior, the effective width of the sidewalk available for pedestrian flow would be 2 feet in the weekday PM peak hour, but would remain at 7.5 feet in the weekday midday peak hour.

Similar to the weekday, there was little vendor activity however tour bus employees were observed to be active in assisting with the bus queuing. As was observed on the weekday the employees' efforts seem to minimize any obstruction to pedestrian flows. Queuing behavior observed during the weekend day, shown in **Image 8**, was similar to that of the weekday PM peak period. After accounting for the queuing area, the physical obstructions, and shy distance, the effective width of the sidewalk available for pedestrian flow would be 2 feet during the weekend day peak hour.

Site Photos

*The images above are included to illustrate conditions of sidewalk crowding when tour bus related activity is present. It should be noted that the images were selected to demonstrate the 'worst case' conditions which are episodic and not the usual condition of the pedestrian space.

STUDY AREA 3: HERALD SQUARE/ EMPIRE STATE BUILDING

Two locations were identified in the Study Area 3 where pedestrian flow would potentially be disrupted by tour bus activity. The LOS analysis for Location 3a the south sidewalk of West 34th Street between Sixth Avenue and Fifth Avenue (**Figure 5**) and the LOS analysis for Location 3b the west sidewalk of Fifth Avenue between West 34th Street and West 33rd Street (**Figure 6**) are summarized below.

Location 3a

Initial Observations

Location 3a is midway between Fifth and Sixth avenues. At this location the sidewalk is lined with first floor retail uses and doorways providing access to upper levels of commercial or business office uses. The vehicle travel lane closest to the sidewalk at this location is a designated bus lane painted red. This segment of the sidewalk is 23 feet wide. Physical obstructions including garbage receptacles, a bike rack, street lights, a former public pay phone booth, concrete planters and traffic signage limits the effective width for pedestrian travel to is 14.5 feet.

During the preliminary field reconnaissance, Location 3a was observed to have the most active ticket vendor activities of all the locations identified for the study. Ticket vendor activities were also observed to have a substantial influence on pedestrian operations. Clusters of six or seven ticket vendors were observed to actively stop pedestrians to sell tour bus tickets.

Data Collection and Analysis

The peak hours in this study area were identified as 12:15 PM to 1:15 PM and 5:15 PM to 6:15 PM on weekdays and 4:00 PM to 5:00 PM on the weekend day.

During all of the data collection periods the sidewalk was observed to be frequently obstructed by ticket vending, tour bus queuing, or both activities occurring simultaneously. Ticket vendor activities at this location were observed to have a large effect on pedestrian flow. The vendors were primarily positioned at the Sbarro store frontage adjacent to the tour bus stop. Ticket vendors were often observed to walk around very slowly, impeding pedestrian flows and requiring pedestrians to maneuver their way around the vendor. Ticket vendors were also observed to stop pedestrians in the middle of the sidewalk, causing pedestrians walking behind them to stop abruptly and then maneuver around them.

Notable ticket vendor behavior included clustering around a group of tourists when they stop to talk to one vendor. The number of ticket vendors clustering around prospective customers ranged from three to six. The number of prospective customers observed to be in the cluster causing the sidewalk obstructions ranged from four to thirteen. On several occasions during the weekday data collection periods clustering of vendors caused obstructions that lasted up to 15 minutes. Clustering was observed once during the weekend day, lasting for a six minute period when roughly six ticket vendors were clustered around approximately six prospective customers.

When the ticket purchase transaction was complete, the customers would usually move to the edges of the sidewalk. Typically the queues formed near the curb, occupying the space between planters and other physical elements which is not used for pedestrian flow. During all observation periods, queues would occasionally form perpendicular to the sidewalk, causing obstruction to the pedestrian flow.

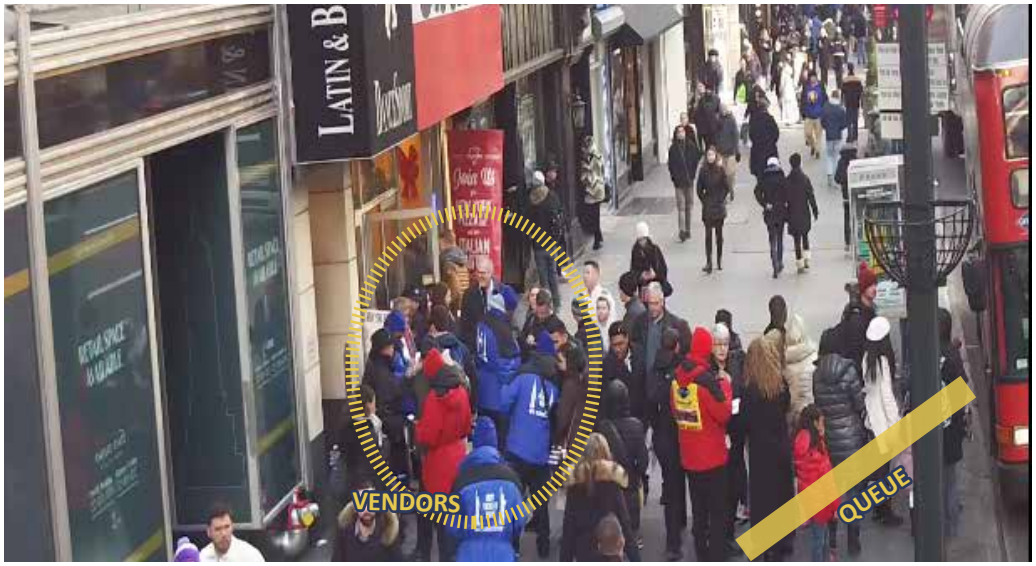
Figure 5: Sidewalk Analysis Location 3a

During the weekend day peak hour tour bus queuing and ticket vendor activities combined to create choke points along this sidewalk. With the queuing behavior, which created an approximately 4-foot obstruction, the effective width of the sidewalk was reduced to 10.5 feet. When both queuing and vendor activities took place simultaneously the effective width for pedestrian flow was reduced to approximately 4.5 feet. At times during the weekday midday peak hour, the groups of tourists and ticket vendors became quite large and occupied up to two-thirds of the available sidewalk space. During the weekend peak hour ticket vendors and customers were observed to occupy approximately one-third of the available sidewalk space. During the weekday PM peak hour, some pedestrians were observed to be walking in the bus lane due to the congested conditions and tour bus/ticket vendor activities on the sidewalk.

Images 9 through 14 illustrate the typical conditions of the sidewalk with tour bus related activity present.

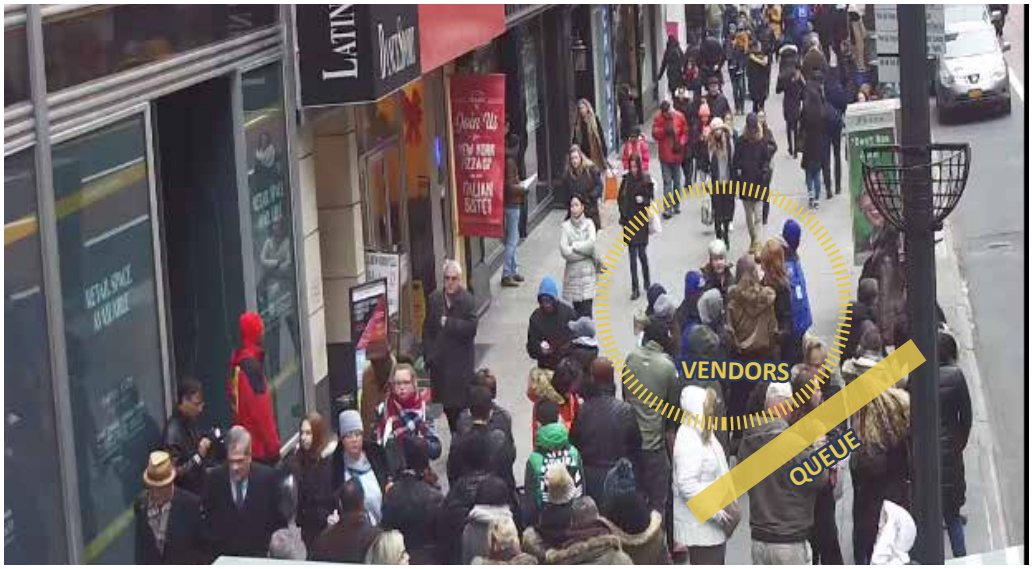
Site Photos

*The images below are included to illustrate conditions of sidewalk crowding when tour bus related activity is present. It should be noted that the images were selected to demonstrate the 'worst case' conditions which are episodic and not the usual condition of the pedestrian space.



Thursday, December 22. 12:43 PM.

Image 9: Weekday midday peak hour, ticket vending activities and clustering creating choke point on West 34th Street sidewalk.



Wednesday, December 21. 12:57 PM.

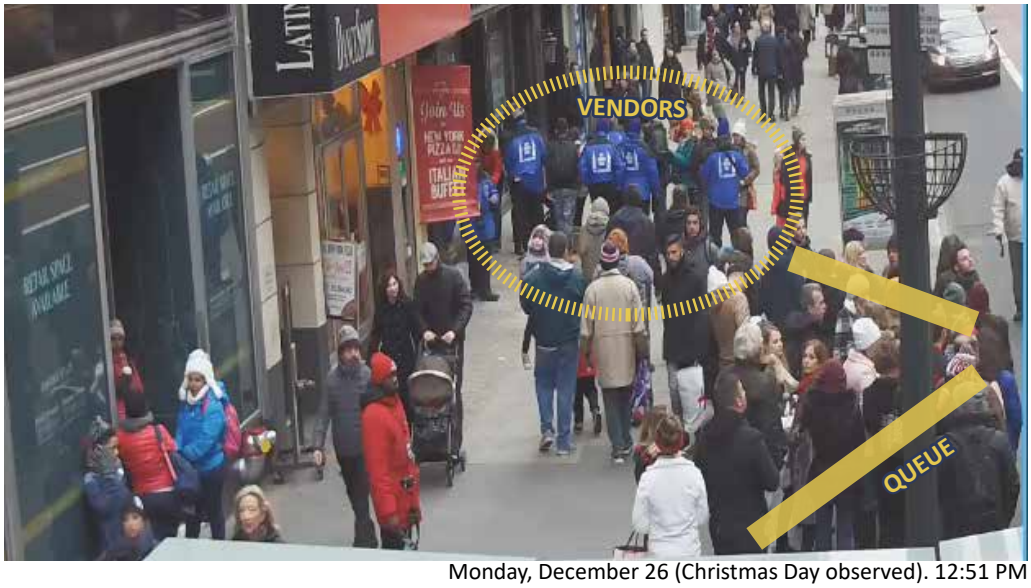
Image 10: Weekday midday peak hour, tour bus queuing behavior and ticket vending activity creating choke point on West 34th Street sidewalk.

Wednesday, December 21. 5:42 PM.

Image 11: Weekday PM peak hour, ticket vending activities creating choke point on West 34th Street sidewalk.

Thursday, December 22. 7:40 PM

Image 12: Weekday PM peak hour, ticket vendor clustering and prospective customers creating an obstruction.



Monday, December 26 (Christmas Day observed). 12:51 PM

Image 13: Weekend peak hour, ticket vendor clustering and prospective customers and queuing creating an obstruction.

Monday, December 26 (Christmas Day observed). 2:37 PM

Image 14: Weekend peak hour, ticket vending activities and tour bus queuing creating choke point.

Location 3b

Initial Observations

Location 3b is located on Fifth Avenue around the corner from Location 3a. This is the sidewalk at the 'Observatory Entrance' of the Empire State building. The sidewalk is 23 feet wide for the length of the block although planters and street furniture and traffic signage reduces the effective width of the sidewalk for pedestrian travel to 16.5 feet. During the preliminary field visit ticket vendor activities, including vendors approaching pedestrians to sell tour bus tickets was observed at this location.

Data Collection and Analysis

The peak hours in this study area were identified as 12:15 PM to 1:15 PM and 5:15 PM to 6:15 PM on weekdays and 4:00 PM to 5:00 PM on the weekend day.

During the weekday data collection, there were up to seven ticket agents observed to actively intercept and talk to a number of pedestrians on this sidewalk during the midday peak hour. At times, after one ticket agent approached a potential customer, other ticket agents would form a cluster around the customer creating choke points. At times approximately half of the available sidewalk width would be occupied by this activity. As shown in **Image 15** and **Image 16**, ticket agent activity was observed to slow down pedestrian traffic and require pedestrians using this sidewalk to maneuver around them. No tour bus queues were observed along this sidewalk. After accounting for this additional obstruction, the effective width of the sidewalk with ticket vendor activities would be reduced to 8.5 feet during the weekday midday peak hour.

During the weekday PM peak hour, no vendors were observed to be present. During the weekend day peak hour, no tour bus queues were observed along this sidewalk, but a queue area was established next to the building for the Empire State Building observation deck. This queue, shown in **Image 17** occupied approximately two-thirds of the available sidewalk space making the effective width of the sidewalk 5 feet. Several ticket vendors were observed to stand in the middle of the sidewalk in the section of a wider segment of the sidewalk thereby not creating a choke point. After accounting for this ticket vendor activity, taking note of the location, the effective width of this sidewalk remained 5 feet.

Site Photos

*The images on the following pages are included to illustrate conditions of sidewalk crowding when tour bus related activity is present. It should be noted that the images were selected to demonstrate the 'worst case' conditions which are episodic and not the usual condition of the pedestrian space.

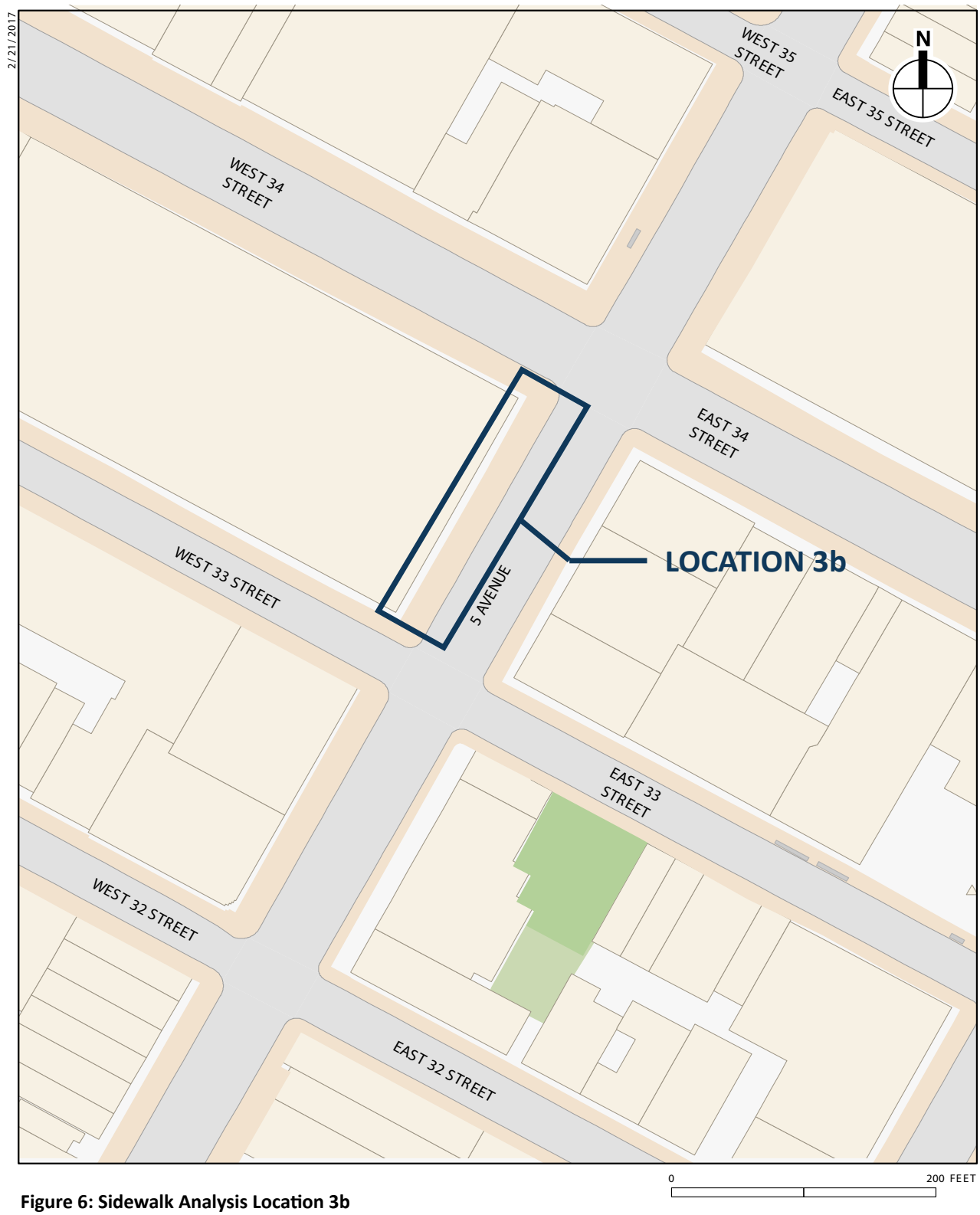
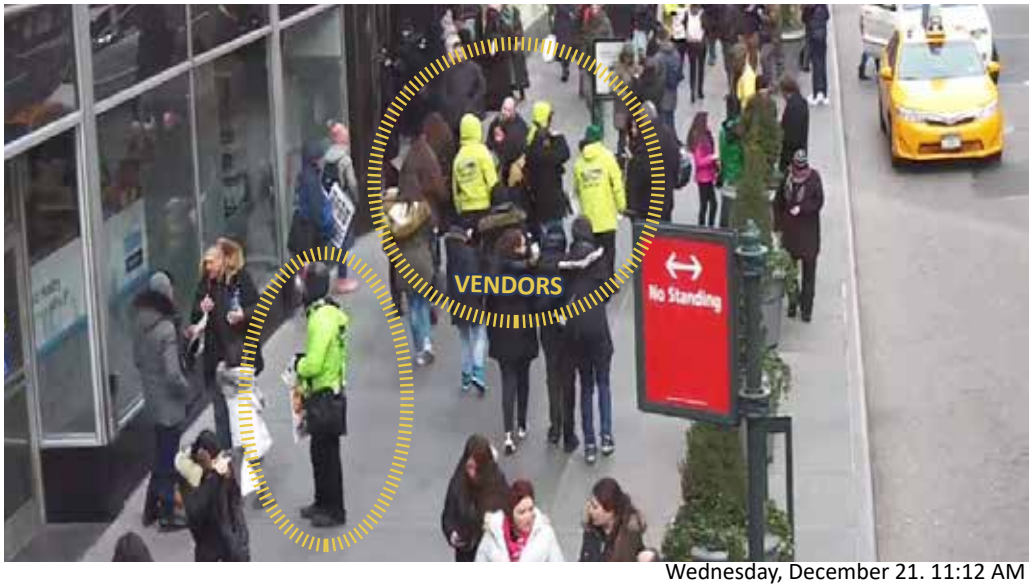


Figure 6: Sidewalk Analysis Location 3b



Wednesday, December 21. 11:12 AM

Image 15: Weekday midday peak hour, ticket vending activities creating choke

Thursday, December 22. 12:52 PM

Image 16: Weekday midday peak hour, ticket vendors creating choke point during more congested conditions.

Monday, December 26, (Christmas Day observed). 4:22 PM

Image 17: Weekend peak hour, Empire State Building observation deck queue creating choke point.

STUDY AREA 4: TIMES SQUARE

Two locations were identified in the Study Area 4 where pedestrian flow would potentially be disrupted by tour bus activity. The LOS analysis for Location 4a the north sidewalk of West 42nd Street between Eighth Avenue and Seventh Avenue (**Figure 7**) and the LOS analysis for Location 3b the west sidewalk of Seventh Avenue between West 48th Street and West 49th Street (**Figure 8**) are summarized below.

Location 4a

Initial Observations

This location is in the heart of the busy Times Square tourist district. The first floor frontage uses in the building adjacent to the sidewalk just east of Eighth Avenue include restaurants, entrances to hotels, the entrance to movie theater and tourist attraction/retail establishments. The vehicle travel lane closest to the sidewalk at this location is a designated bus lane with no special colored pavement. The sidewalk at Location 4a is 21.5 feet wide. There are minimal permanent physical obstructions located within the sidewalk at this location, there is however a large number of pedestrian demand due to its proximity to nearby theaters, the Port Authority Bus Terminal, and many tourist/retail attractions.

During the preliminary field visit, ticket vendor were observed in front of the Five Guys Burger and Starbucks retail frontages as well as near the Big Bus Tours, The Ride, and Gray Line tour bus stops (**Image 18**). Vendors were observed to actively stop pedestrians and temporarily created a choke point in the sidewalk by doing so. Movable metal barricades had been placed by the curb provide a separation for tour bus queuing which formed parallel to the curb. This appeared to alleviate potential obstruction to pedestrian flows. After accounting for the passenger queuing area and other physical obstructions the effective width of the sidewalk for pedestrian travel was approximately 8 feet.

Data Collection and Analysis

The peak hours in the Times Square study area were identified as 12:45 PM to 1:45 PM and 6:00 PM to 7:00 PM on weekdays and 5:00 PM to 6:00 PM on the weekend day.

Typical sidewalk conditions observed at this location during the data collection are depicted in the photos and video screenshots in **Images 19 through 22**. Five or six vendors were operating at this location during the weekday midday peak period, but were not observed to consistently obstruct pedestrian flows. Large groups were observed to gather for two different bus companies' services, Big Bus NYC and The Ride Bus. Queues were observed most frequently from 11 AM to 12 PM. Queuing behavior for tour buses on this sidewalk consisted of groups waiting near the metal barricades for the bus to arrive, then queuing on the curb side of the metal barricades to board the bus. Queues were observed to be set up on both the inside and outside of the metal barricades. A school bus was also observed on Wednesday, December 21 to use the tour bus stop to pick up passengers.

The sidewalk was much more heavily utilized in the weekday PM peak period than during the midday peak period, with many commuters heading westbound in the direction of the Port Authority Bus Terminal. Bus queuing was also observed, primarily from around 5:15 PM and 5:30 PM, with similar behavior, as passengers would wait by the curb near the metal barricades to board the bus. Vendors and promoters not associated with the tour bus companies were observed to walk up and down the sidewalk handing out flyers.

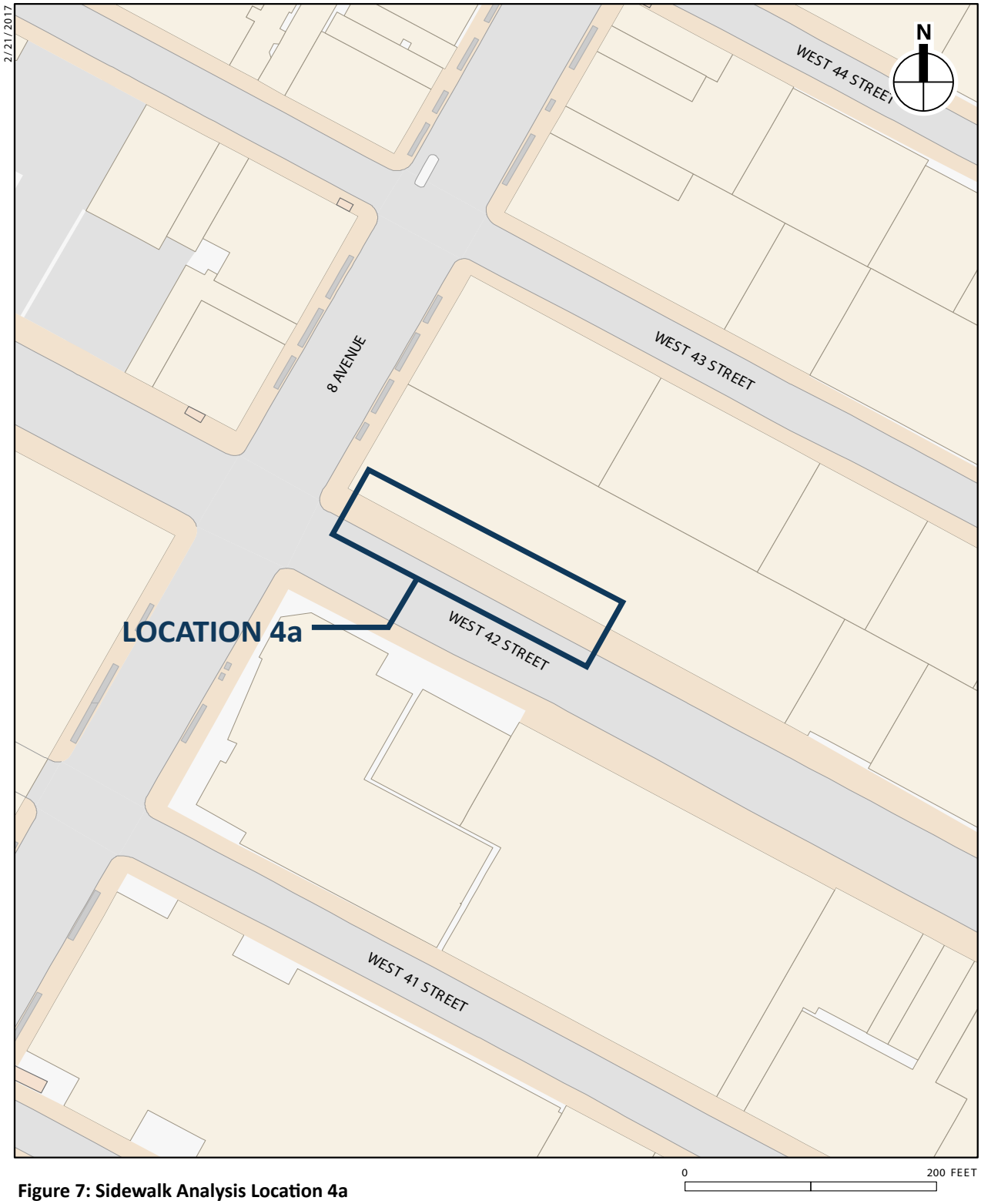


Figure 7: Sidewalk Analysis Location 4a

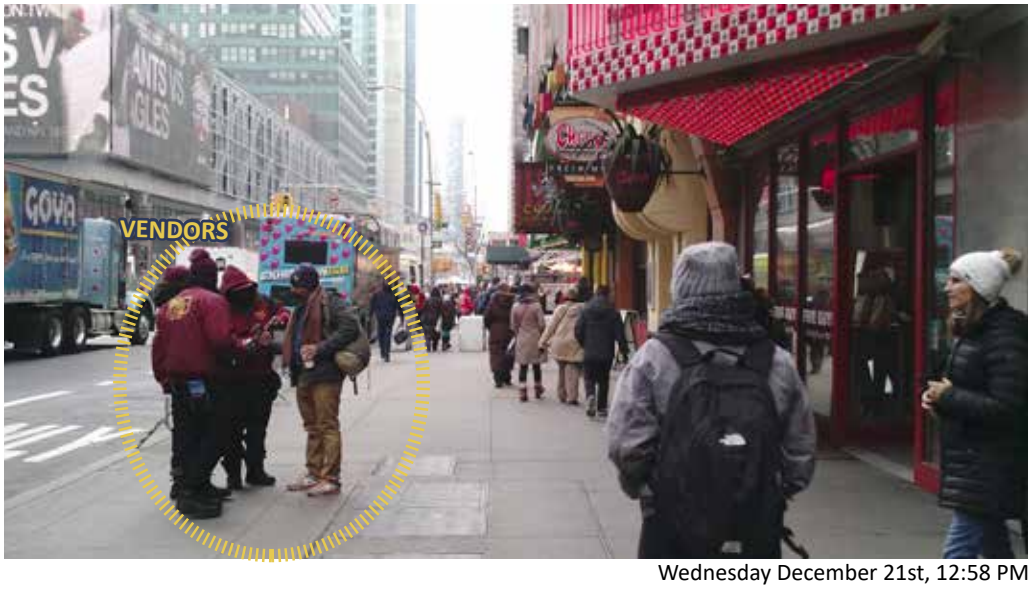
Two groups of vendors were observed to be active during the weekend day data collection period: Big Bus NYC and Gray Line. The queueing behavior for the tour buses was relatively consistent in its method of organization during the weekend day as well, with the metal barricades set up and the lines neatly organized by the tour bus staff, not interfering with pedestrian flows. The Gray Line vendors were stationed closer to the intersection of West 42nd Street and Eighth Avenue, which were observed to cause occasional issues with pedestrian flows when the volume of pedestrians increased later in the day. Ticket vendor activities for Big Bus NYC were observed to be less prevalent later in the day, when pedestrian traffic increased.

Site Photos

*The images on the following pages are included to illustrate conditions of sidewalk crowding when tour bus related activity is present. It should be noted that the images were selected to demonstrate the 'worst case' conditions which are episodic and not the usual condition of the pedestrian space.

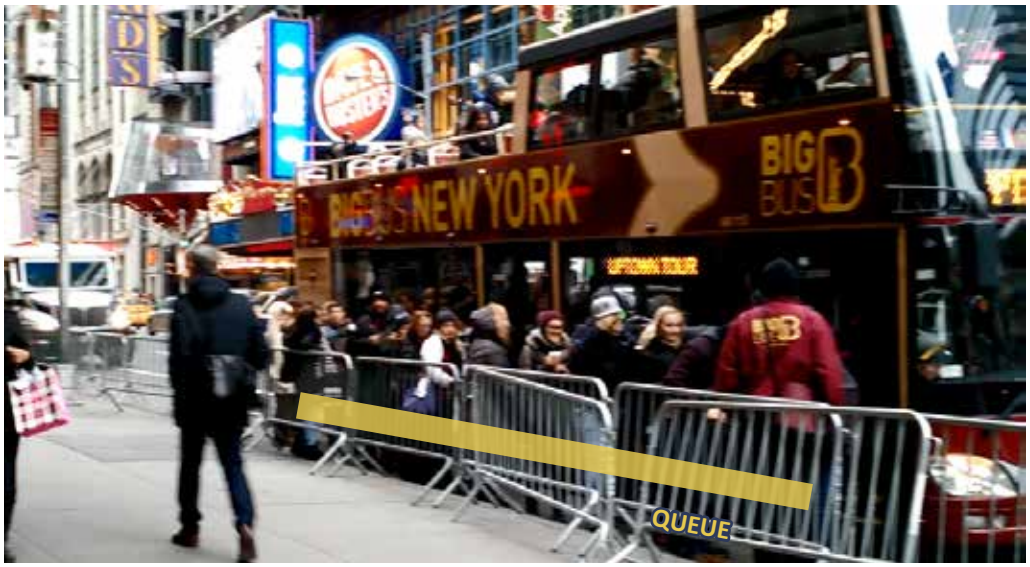
December 8, 2016

Image 18: Preliminary field visit.



Wednesday December 21st, 12:58 PM

Image 19: Weekday midday peak hour

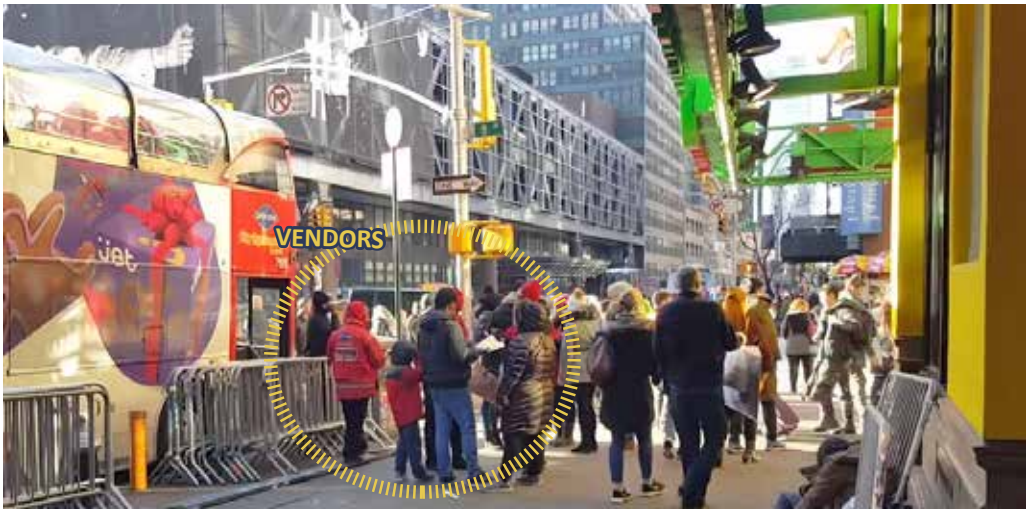


Thursday, December 22nd, 11:28 AM

Image 20: Weekday midday peak hour, tour bus queuing behavior.

Wednesday, December 21st, 6:14 PM

Image 21: Weekday midday peak hour with queuing.



Sunday, January 1st. 4:27 PM.

Image 22: Weekend peak hour, Gray Line ticket vendor activities on north sidewalk of West 42nd Street between Eighth and Seventh Avenues.

Location 4b

Initial Observations

The peak hours in the Times Square study area were identified as 12:45 PM to 1:45 PM and 6:00 PM to 7:00 PM on weekdays and 5:00 PM to 6:00 PM on the weekend day.

The building frontage on this Seventh Avenue block is somewhat varied. It includes tourist oriented retail, an entrance to an office building and eating establishments. This location was observed to be one of the busiest in terms of overall pedestrian and tourist activity. The sidewalk is 20 feet wide. Due to the constant presence of queues and permanent physical obstructions including street light posts, newspaper boxes, former public pay and subway vents the effective width of the sidewalk for pedestrian travel was approximately 12.5 feet.

During the preliminary field visit significant ticket vendor activities were observed (**Image 23**). Approximately seven Big Bus ticket vendors were observed to be active at this location, along with a number of ticket vendors for Gray Line, which has a nearby stop at West 50th Street. Ticket vendors were observed to be active in stopping pedestrians and talking to them, and tour bus personnel were active in organizing bus queues.

Data Collection and Analysis

Typical conditions and queuing behavior observed during the data collection are depicted in the **Images 24 through 29**. A number of Big Bus NYC staff members were active at this location throughout the data collection period. Vendors were present along with staff assisting in the organization of bus boarding and queuing. Staff members were observed primarily standing near the edges of the sidewalk and did not frequently interfere with pedestrian flows. Tour bus queues were set up along the curb, creating an obstruction that occupied a small part of the sidewalk. Generally, the tour bus queues did not create a choke point on the sidewalk in the midday peak period. However during a brief period when there was temporary construction at the adjacent M&M's store, the additional obstruction along with the tour bus related activity did affect the pedestrian flow. This condition lasted approximately 40 minutes.

Queuing behavior in the weekday PM peak periods were similar to that observed to the weekday midday peak period, with tour bus personnel organizing the queues parallel to the curb. This obstruction did not hinder pedestrian flow in the midday peak hour. In the PM and weekend peak hours when pedestrian volumes and activities were much greater there was some effect on pedestrian flow. Overall, this location is very busy on weekdays due to various commercial activities, including Broadway show promoters and costumed characters stopping and talking to pedestrians in the middle of the sidewalk.

During the weekend data collection period on Sunday, January 1st, tour bus activities were observed to have a greater effect on the sidewalk's capacity, as tour bus queues were observed to be longer and occupied nearly a quarter of the sidewalk width. Queuing conditions were also observed to be more sustained than during the weekday: bus queues were observed to occur throughout the day. Some tour bus staff or passengers were also observed to stand on the building side. The sidewalk was significantly congested during the weekend peak hour of 5:00 PM to 6:00 PM, primarily due to the volume of pedestrian activity and the limited availability in sidewalk space caused by tour bus queuing activities.

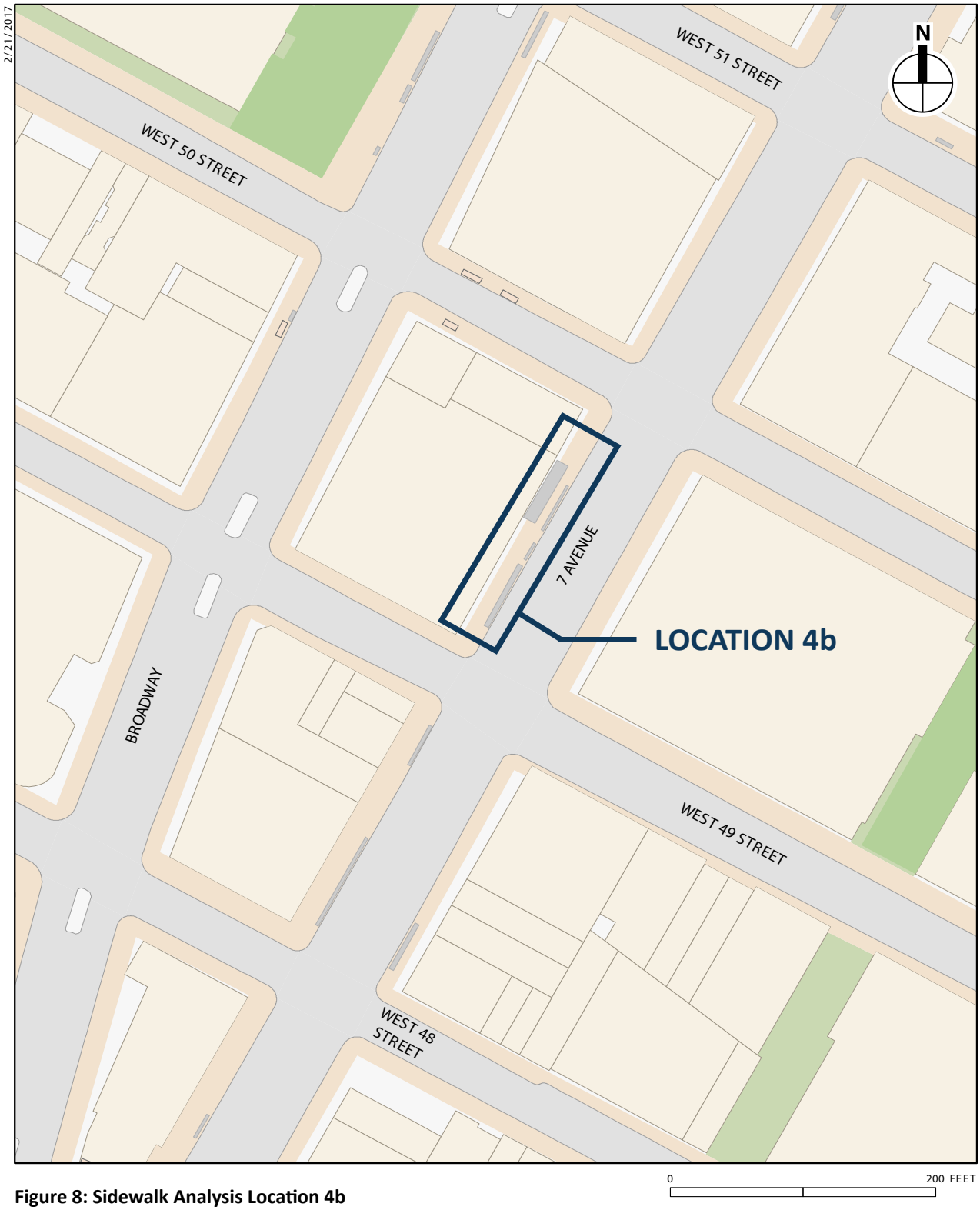


Figure 8: Sidewalk Analysis Location 4b

December 8, 2016

Image 23: Preliminary field visit.

Thursday, December 22nd, 12:45 PM

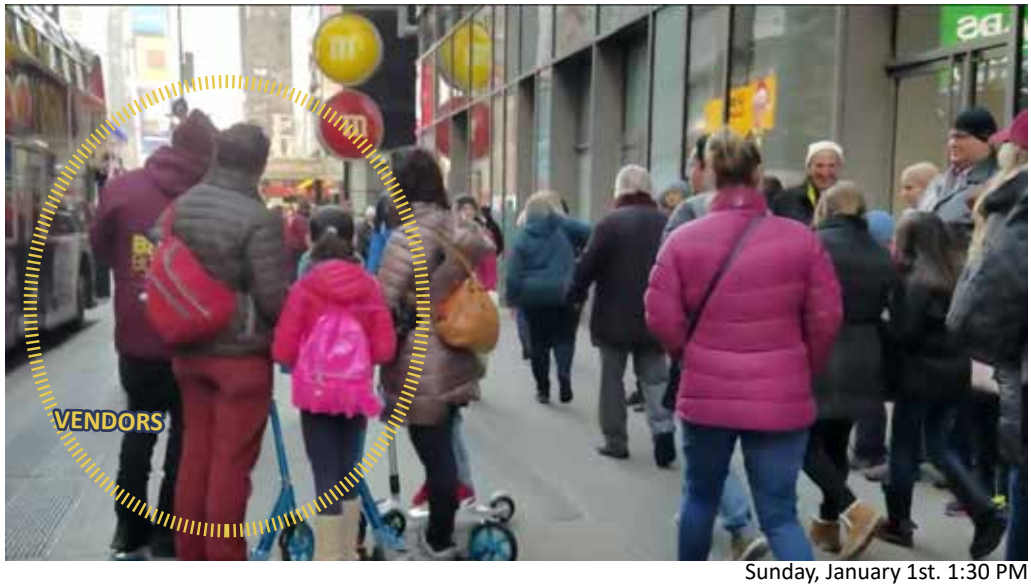
Image 24: Weekday midday peak hour.

Wednesday, December 21st, 11:30 AM

Image 25: Weekday midday peak hour, temporary construction at the M&M's store occurred from 11:00 AM to 11:40 AM, causing a sidewalk obstruction.

Wednesday, December 21st, 6:30 PM

Image 26: Weekday PM peak hour. with queuing.



Sunday, January 1st. 1:30 PM

Image 27: Weekend day observation period, ticket vendor activity present.

Sunday, January 1st. 2:45 PM

Image 28: Weekend day observation period, long queues along curb.

Sunday, January 1st. 5:45 PM

Image 29: Weekend peak hour, long queues along curb.

Site Photos

*The images on the previous page are included to illustrate conditions of sidewalk crowding when tour bus related activity is present. It should be noted that the images were selected to demonstrate the 'worst case' conditions which are episodic and not the usual condition of the pedestrian space.

STUDY AREA 5: COLUMBUS CIRCLE

One location was identified in the Study Area 5 where pedestrian flow would potentially be disrupted by tour bus activity. The LOS analysis for Location 5, the east sidewalk of Central Park West between Columbus Circle and West 61st Street (**Figure 9**) is summarized below.

Initial Observations

Location 5 is at the south-west corner of Central Park on Central Park West. At this location sidewalk is 30 feet wide. This plaza-like sidewalk serves numerous functions. Permeant obstructions to pedestrian flow include a newsstand/kiosk, traffic signs and street light poles. Accounting for these obstructions the sidewalk had an effective width of 11.5 feet at its narrowest point. In addition, MTA bus stop and the entrance to the Columbus Avenue subway station at this location adds to the number of pedestrians in the immediate area and complicates the pedestrian traffic patterns. It should also be noted that during the Data collection period a temporary market set up along this sidewalk as well.

During the preliminary field visit, metal barricades were set up to organize queuing and to provide separation between the queues and the roadway. Some ticket vendor activities were observed, however the vendor activity did not appear to obstruct or influence pedestrian flows.

Data Collection and Analysis

The peak hours in the study area were identified as 12:45 PM to 1:45 PM and 4:30 PM to 5:30 PM on weekdays and 1:15 PM to 2:15 PM on the weekend day.

Queuing behavior at this location was observed to be partially or completely obstructed the pedestrian flow frequently. This would occur due the location of the queues, at the narrowest point of the sidewalk segment, and due to the fact that the ques would form perpendicular to pedestrian flow. This behavior, illustrated **Images 30 through 32**, was observed during the midday peak periods for both weekdays and the weekend day. Choke points were temporarily created for both the sidewalk pedestrian flow and the pedestrian access to the adjacent subway station. As shown in **Image 33**, this condition was not observed during the weekday PM peak period, as the volume of tour bus activity diminished significantly during that period. After accounting for this condition, the effective width of the sidewalk was reduced to 2 feet in the weekday midday and weekend day peak hours. The effective width of the sidewalk was reduced to 7.5 feet in the weekday PM peak hour after accounting for the permanent kiosk, metal barricades set up for queuing, and shy distance.

Site Photos

*The images on the following pages are included to illustrate conditions of sidewalk crowding when tour bus related activity is present. It should be noted that the images were selected to demonstrate the 'worst case' conditions which are episodic and not the usual condition of the pedestrian space.

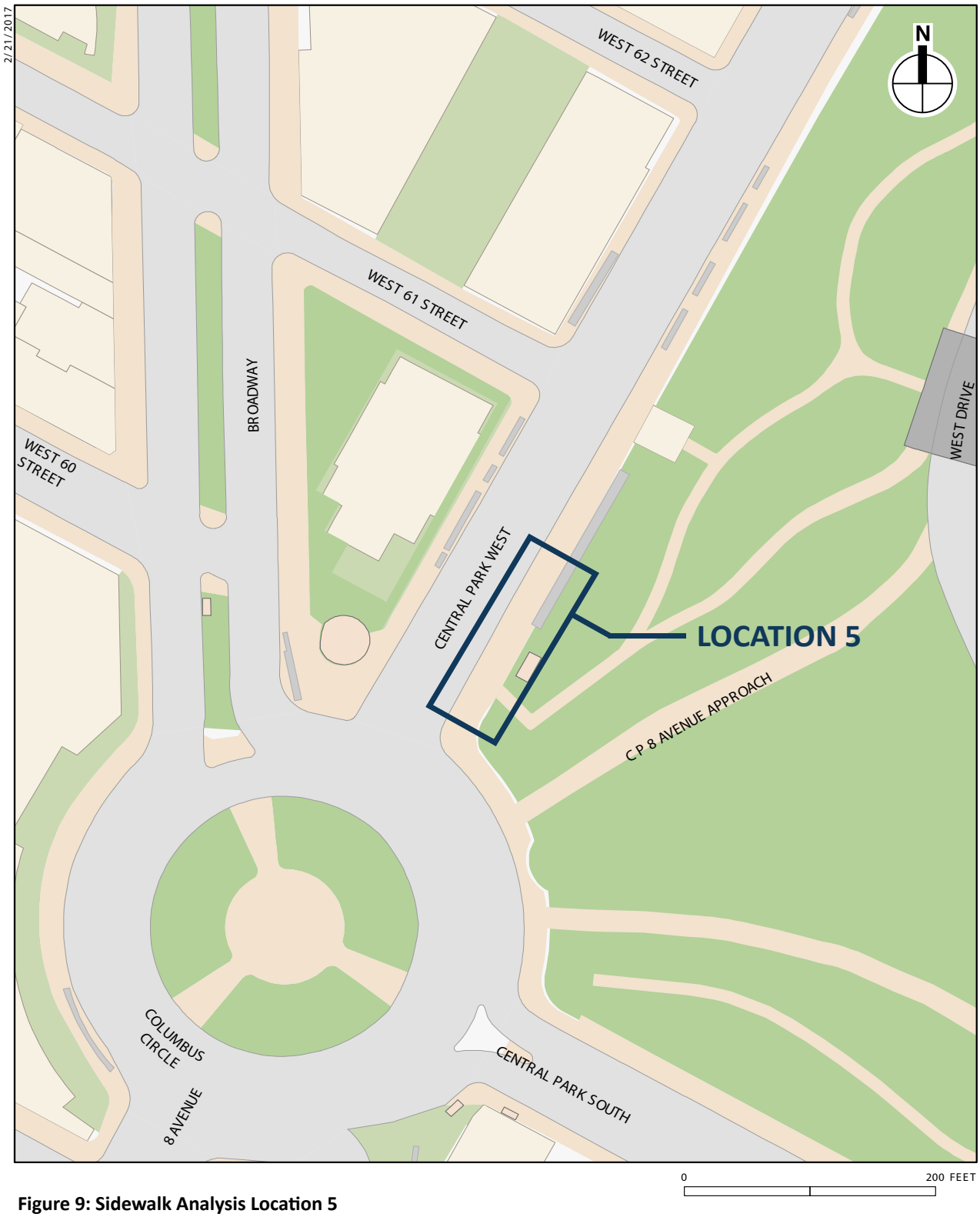


Figure 9: Sidewalk Analysis Location 5

Wednesday, December 21. 11:53 AM

Image 30: Weekday AM peak hour, tour bus queues partially block the sidewalk at narrowest point.

Wednesday, December 21. 11:36 AM

Image 31: Weekday AM peak hour, tour bus queues fully block the sidewalk at narrowest point.

Monday, December 26 (Christmas Day observed). 12:38 PM

Image 32: Weekend peak hour, tour bus queues fully block the sidewalk at narrowest point.

Wednesday, December 21. 4:37 PM

Image 33: Weekday PM peak hour, no queues or vendors present.

PEDESTRIAN LEVEL OF SERVICE ANALYSIS

EXISTING CONDITIONS WITHOUT TICKET VENDORS OR TOUR BUS QUEUING

In this baseline scenario, it is assumed that no ticket vendor activities or tour bus queuing takes place at the analyzed sidewalks. Therefore, this scenario analyzes the narrowest point of each sidewalk caused by physical obstructions that would be present on the sidewalk regardless of tour bus queuing or ticket vendor activities. Peak hours were determined by comparing rolling hourly averages and peak hour factors were calculated based on the highest 15-minute volumes within the selected analysis peak hours. It should be noted that the actual pedestrian volumes in this scenario could be lower than the total two-way sidewalk volumes collected at these locations, in the absence of ticket vending or tour bus queuing activities. **Table 5**: Summary of Pedestrian Analysis Results shows the analysis results without ticket vendors and without tour bus queuing compared to the scenarios with queueing and with ticket vendors. All sidewalk analysis locations would operate at favorable LOS A, B, and C without tour bus queues and ticket vending activities, except:

- Location 3b which operates at LOS E with 19.0 SFP in the weekend day peak hour of 4:00 PM to 5:00 PM, and
- Location 4b which operates at LOS D with 40.0 SFP in the weekend day peak hour of 5:00 PM to 6:00 PM.

EXISTING CONDITIONS WITH TOUR BUS QUEUING ONLY (NO VENDORS)

In this scenario, it is assumed that the observed tour bus queuing behavior is taking place without ticket vendor activities at the analyzed sidewalks. The approximate width of the sidewalk occupied by queuing bus passengers was accounted for in determining the effective width of each sidewalk.

Details on SFP and level-of-service are presented in **Table 6**: Detailed Summary of Pedestrian Analysis Results. The CEQR Technical Manual impact thresholds were applied to the SFP identified for sidewalks in this scenario compared to the baseline scenario without any ticket vendors and tour bus

	LOS Analysis of Sidewalks at Peak Hours				
	A/B/C	D	E	F	Total
Scenario	**Weekday Midday Peak Hour**				
No Vendors, No Queuing	7	0	0	0	7
With Vendors and No Queuing	6	1	0	0	7
With Vendors and With Queuing	3	3	1	0	7
	Weekday PM Peak Hour				
No Vendors, No Queuing	7	0	0	0	7
With Vendors and No Queuing	4	3	0	0	7
With Vendors and With Queuing	4	1	2	0	7
	Saturday Peak Hour				
No Vendors, No Queuing	5	1	1	0	7
With Vendors and No Queuing	2	2	3	0	7
With Vendors and With Queuing	1	2	4	0	7
Note: LOS = Level of Service					

Table 5: Summary of Pedestrian Analysis Results

queues. Based on the CEQR Technical Manual impact thresholds, a significant adverse pedestrian impact, as detailed below, was identified for two sidewalks during the weekday PM peak hour and three sidewalks during the weekend day peak hour in this scenario.

- At Location 2, when compared to conditions without tour bus queuing and ticket vendor activities, and due to an approximately 5.5-foot reduction in the sidewalk's effective width used for tour bus queuing, the flow as currently observed deteriorates to LOS D with 27.9 SFP in the weekday PM peak hour, and to LOS E with 14.1 SFP in the weekend day peak hour.

- At Location 4a, when compared to conditions without tour bus queuing and ticket vendor activities, and due to an approximately 7-foot reduction in the sidewalk's effective width used for tour bus queuing, the flow as currently observed deteriorates to LOS D with 29.6 SFP in the weekday PM peak hour of 6:00 PM to 7:00 PM, and to LOS E with 22.7 SFP in the weekend day peak hour of 5:00 PM to 6:00 PM, and

- At Location 5, when compared to conditions without tour bus queuing and ticket vendor activities, and due to an approximately 14-foot reduction in the sidewalk's effective width used for tour bus queuing, the flow as currently observed deteriorates to LOS D with 23.4 SFP in the weekend day peak hour of 1:15 PM to 2:15 PM, due to an approximately 14-foot reduction in the sidewalk's effective width used for tour bus queuing.

EXISTING CONDITIONS WITH TICKET VENDORS AND TOUR BUS QUEUING

In this scenario, it is assumed that the observed tour bus queuing behavior is taking place along with any observed ticket vendor activities that occupy additional sidewalk space at the narrowest points of the analyzed sidewalks. The approximate width of the sidewalk occupied by queuing bus passengers as well as ticket vendors was accounted for in determining the effective width of each sidewalk.

Details on SFP and level-of-service are presented in **Table 6**. The CEQR Technical Manual impact thresholds were applied to the SFP identified for sidewalks in this scenario compared to the baseline scenario without any ticket vendors and tour bus queues. Based on the CEQR Technical Manual

impact thresholds, significant adverse pedestrian impacts, as detailed below, was identified for one sidewalk in the weekday midday peak hour, three sidewalks in the weekday PM peak hour, and five sidewalks in the weekend day peak hour. Some of the impacts identified at the sidewalk locations in the scenario were attributed only to the reduction in sidewalk space due to the observed tour bus queuing behavior.

- At Location 2, when compared to conditions without tour bus queuing and ticket vendor activities, and due to an approximately 5.5-foot reduction in the sidewalk's effective width used for tour bus queuing only (ticket vendor activities were observed to relatively sparse and unobtrusive), the flow as currently observed deteriorates to LOS D with 27.9 SFP in the weekday PM peak hour, and to LOS E with 14.1 SFP in the weekend day peak hour.

- At Location 3a, when compared to conditions without tour bus queuing and ticket vendor activities, and due to an approximately 10-foot reduction in the sidewalk's effective width used for tour bus queuing and ticket vendor activities, the flow as currently observed deteriorates to LOS E with 20.4 SFP in the weekday midday peak hour, to LOS E with 11.7 SFP in the weekday PM peak hour, and to LOS E with 22.0 SFP.

- At Location 4a, when compared to conditions without tour bus queuing and ticket vendor activities, and due to an approximately 9-foot reduction in the sidewalk's effective width used for tour bus queuing and ticket vendor activities, the flow as currently observed deteriorates to LOS E with 21.2 SFP in the weekday PM peak hour of 6:00 PM to 7:00 PM, and to LOS E with 15.8 SFP in the weekend day peak hour of 5:00 PM to 6:00 PM.

- At Location 4b, when compared to conditions without tour bus queuing and ticket vendor activities, and due to an approximately 7-foot reduction in the sidewalk's effective width used for tour bus queuing and ticket vendor activities, the flow as currently observed deteriorates to LOS D with 26.0 SFP in the weekend day peak hour of 6:00 PM to 7:00 PM,

	Location 1		**Location 2**		**Location 3a**		**Location 3b**		**Location 4a**		**Location 4b**		**Location 5**	
	SFP	Platoon LOS	SFP	Platoon LOS	SFP	Platoon LOS	SFP	Platoon LOS	SFP	Platoon LOS	SFP	Platoon LOS	SFP	Platoon LOS
Scenario	**Weekday Midday Peak Hour**													
No Vendors, No Queuing	194.2	B	112.8	B	72.6	C	73.0	C	102.5	B	92.3	B	207.8	B
With Vendors and No Queuing	153.9	B	112.8	B	52.1	C	73.0	C	54.0	C	74.1	C	34.7	D
With Vendors and With Queuing	153.9	B	112.8	B	**20.4**	**E+**	36.5	D	39.9	D	62.0	C	34.7	D
	Weekday PM Peak Hour													
No Vendors, No Queuing	148.8	B	111.0	B	48.0	C	65.7	C	57.9	C	69.8	C	215.5	B
With Vendors and No Queuing	117.8	B	**27.9**	**D+**	34.0	D	65.7	C	**29.6**	**D+**	56.0	C	140.3	B
With Vendors and With Queuing	117.8	B	**27.9**	**D+**	**11.7**	**E+**	65.7	C	**21.2**	**E+**	46.7	C	140.3	B
	Weekend Peak Hour													
No Vendors, No Queuing	116.7	B	63.9	C	77.5	C	19.0	E	45.5	C	40.0	D	146.5	B
With Vendors and No Queuing	55.6	C	**14.1**	**E+**	55.7	C	19.0	E	**22.7**	**E+**	31.7	D	23.4	**D+**
With Vendors and With Queuing	55.6	C	**14.1**	**E+**	**22.0**	**E+**	19.0	E	**15.8**	**E+**	**26.0**	**D+**	**23.4**	**D+**

Note: SFP = square feet per pedestrian. LOS = level of service. + Denotes significant adverse pedestrian impact

Table 6: Detailed Summary of Pedestrian Analysis Results

- At Location 5, when compared to conditions without tour bus queuing and ticket vendor activities, and due to an approximately 14-foot reduction in the sidewalk's effective width used for tour bus queuing only (ticket vendors were not observed to occupy the space at the narrowest point of this sidewalk), the flow as currently observed deteriorates to LOS D with 23.4 SFP in the weekend day peak hour of 1:15 PM to 2:15 PM.

VEHICULAR AND PEDESTRIAN SAFETY EVALUATION

METHODOLOGY

Locations where 48 or more total reportable and non-reportable crashes or five or more pedestrian/bicyclist injury crashes occurred in any consecutive 12 months of the most recent 3-year period for which data are available are considered high crash locations according to the CEQR Technical Manual. For the purposes of this study, that metric has been applied to study area intersections to identify locations adjacent to ticket seller activities that have a history of higher than average crash totals.

CRASH DATA

Crash data for the intersections adjacent to the study area sidewalks were obtained from NYCDOT for the time period between January 1, 2013 and December 31, 2015. The data obtained quantify the total number of reportable crashes (involving fatality, injury, or more than $1,000 in property damage), fatalities, and injuries during the study period, as well as a yearly breakdown of vehicular crashes with pedestrians and bicycles at each location.

During the January 1, 2013 and December 31, 2015 three-year period, a total of 135 reportable and non-reportable crashes, zero fatalities, 120 injuries, and 57 pedestrian/bicyclist-related crashes occurred at the study area intersections. A rolling total of crash data identifies three study area intersections as high crash locations in the 2013 to 2015 period: Eighth Avenue and W. 42nd Street, Seventh Avenue and W. 48th Street, and Fifth Avenue and W. 34th Street. **Table 7**: Crash Data depicts total crash characteristics by intersection during the study period, as well as a breakdown of pedestrian and bicycle crashes by year and location.

Intersection		Study Period					Crashes by Year					
North-South	East-West	All Crashes by Year			Total	Total	Pedestrian			Bicycle		
Roadway	Roadway	2013	2014	2015	Fatalities	Injuries	2013	2014	2015	2013	2014	2015
State Street	Battery Place	1	1	3	0	4	0	1	0	0	0	0
Beekman Street	Park Row	1	1	2	0	3	1	1	1	0	0	0
Broadway	Park Row/ Barclay St	6	4	4	0	17	1	1	0	1	0	3
Fifth Avenue	**W. 34th Street**	**12**	**10**	**7**	**0**	**26**	**3**	**1**	**3**	**0**	**1**	**2**
Eighth Avenue	**W. 42nd Street**	**19**	**16**	**17**	**0**	**42**	**4**	**8**	**7**	**3**	**1**	**0**
Seventh Avenue	**W. 48th Street**	**5**	**3**	**10**	**0**	**19**	**3**	**1**	**4**	**0**	**0**	**1**
Seventh Avenue	W. 49th Street	3	3	5	0	9	2	1	2	0	0	0
Central Park West	Columbus Circle	1	1	0	0	0	0	0	0	0	0	0
Source: NYSDOT January 1, 2013 to December 31, 2015 crash data.												
Bold intersections are high pedestrian crash locations.												

Table 7: Crash Data

E. POLICY RECOMMENDATIONS

An urban sidewalk typically has four 'zones', as illustrated in **Figure 10**. Each is designated for separate but related functions: the edge zone (or curb zone), the furniture zone, the throughway (or pedestrian zone), and the frontage zone. The frontage zone is space provided for entrance to buildings and for street furniture such as covered entrances, planters, and tables and chairs associated with the use of the adjacent building. The pedestrian zone is for travel (walking) and should be kept free of obstacles. The furniture zone is an area adjacent to the curb for the placement of street furniture, trees, bollards, signs, utility poles, etc. The existence of a furniture zone allows space out the way of the area designated for pedestrian flow. It is also used for loading and unloading of people and goods into vehicles along the curb. The curb zone provides a buffer and cue to waiting pedestrians to stay back from the street.

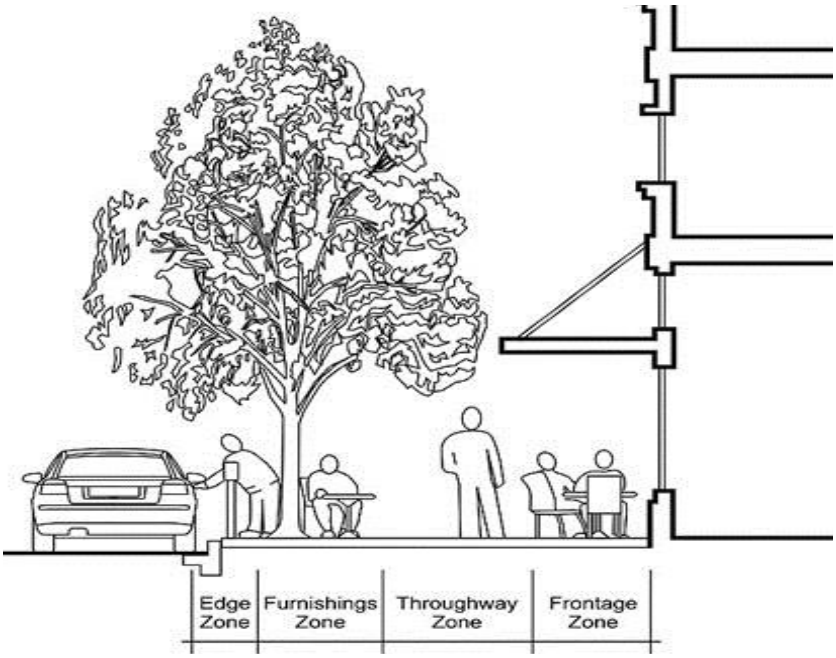


Figure 10: Sidewalk Zones (Source: Institute of Transportation Engineers)

In order to prevent disruption to pedestrian flow or other functions of the sidewalk it is generally preferred that tour bus related activities take place outside the pedestrian zone to maximize the effective width, which is the sidewalk width that is left over for travel after obstacles and shy distances are accounted for. The effective width of sidewalks in this study are reduced in some cases to a level as to induce significant adverse pedestrian level of service impacts. To mitigate these conditions, the following policy strategies are recommended.

The pedestrian LOS comparative analysis, the review of crash data and the direct observation of sidewalk conditions were presented to DCA, NYCDOT, and NYPD at a meeting held at DCA on January 24, 2017. The following policy recommendations were developed based on discussions with these agencies.

RECOMMENDATIONS

- □ Establish a licensing system to regulate tour bus companies' and other ticker sellers' use of pedestrian spaces. Regulations should be clear, simple and be easily enforceable by police.

- □ Establish parameters for acceptable quantity of tour bus related activity (buses stopping and queuing) and other ticket selling activities for each block or location based on sidewalks' capacity.

- □ Develop educational material and training requirements for tour bus companies, their employees, and other ticket sellers to inform them of expectations and requirements for licensure and to guide them on best practices for reducing sidewalk bottlenecks and assuring pedestrian/tourist safety.

- □ Identify locations where tour bus stops and ticket selling activity should be prohibited (i.e. at locations or blocks with narrow sidewalks).

- □ Regulate ticket selling activity (for tour buses and other industries).
  - Establish a seller-per-block-face density cap for all ticket seller activity.
  - Restrict vending activities to the furniture zone of sidewalks abutting active roadways. This area of the sidewalk, often reserved for street furniture, planters, and sign posts, would typically not be available for walking.

- □ Regulate bus queuing activity.
  - Designate locations where tour bus queuing is permitted which reflect existing regulations for minimum distance from subway station entrances and exits. These locations should be areas with wider sidewalks and minimal permanent obstacles.
  - Queuing should be oriented along the curbline (parallel to the flow of traffic at locations abutting active roadways). Examples of how this is implemented are shown in **Images 34 and 35,** which depict how bus queuing is organized at an intercity bus stop on West 30th Street between Seventh and Eighth Avenues. Queuing is organized along the curb and does not measurably disrupt sidewalk operations.

Image 34: Example of bus queuing organized in sidewalk furniture zone.

Image 35: Example of bus queuing organized in sidewalk furniture zone.