CENTRAL BUSINESS DISTRICT (CBD) TOLLING PROGRAM

# Appendix 4E, Transportation: Supporting Documentation for Pedestrian Analyses

August 2022

# Contents

# 4E.1, Methodologies and Adverse Effect Criteria

## SCREENING CRITERIA

The *City Environmental Quality Review (CEQR) Technical Manual* recommends a screening procedure to determine if quantified analyses of pedestrian facilities (corners, crosswalks, and sidewalks) are warranted. If a project would result in 200 or more peak-hour pedestrian trips, detailed trip assignments (a Level 2 screening assessment) should be conducted before undertaking a quantified pedestrian analysis. If the Level 2 assessment shows that 200 or more peak-hour pedestrian trips would traverse a specific pedestrian element, then quantified analysis of that element is warranted.

## DETAILED ANALYSIS OF PEDESTRIAN OPERATIONS

For locations where the screening assessment indicates that detailed analysis is warranted, the *CEQR Technical Manual* calls for evaluation of the adequacy of the study area's sidewalk, crosswalk, and corner capacities in relation to the demand imposed on them using the methodologies presented in the 2010 *Highway Capacity Manual (HCM)*.

Using this methodology, 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 pedestrians' average walking speed. The SFP forms the basis for a sidewalk Level of Service (LOS) analysis. The determination of sidewalk LOS also reflects 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 substantially 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.

Crosswalks and street corners are not easily measured in terms of free pedestrian flow, because they are influenced by the effects of traffic signals. Street corners must be able to provide sufficient space for a mix of standing pedestrians (queued to cross a street) and circulating pedestrians (crossing the street or moving around the corner). The HCM methodologies apply a measure of time and space availability based on the area of the corner, the timing of the intersection signal, and the estimated space used by circulating pedestrians. The total "time-space" available for these activities, expressed in square feet per second, is calculated by multiplying the net area of the corner (in square feet) by the traffic signal's cycle length. The analysis then determines the total circulation time for all pedestrian movements at the corner per signal cycle (expressed as pedestrians per second). The ratio of net time per space divided by the total pedestrian circulation volume per signal cycle provides the LOS measurement of available SFP.

Crosswalk LOS is also a function of time and space. Similar to the street corner analysis, crosswalk conditions are first expressed as a measurement of the available area (the crosswalk width multiplied by the width of the street) and the permitted crossing time. This measure is expressed in square feet per second. The

average time required for a pedestrian to cross the street is calculated based on the width of the street and an assumed walking speed. The ratio of time per space available in the crosswalk to the total crosswalk pedestrian occupancy time is the LOS measurement of available SFP. The LOS analysis also accounts for vehicular turning movements that traverse the crosswalk.

Table 4E.1-1 summarizes the LOS standards for sidewalks, crosswalks, and corner reservoirs. The *CEQR Technical Manual* states that pedestrian facilities should operate at mid-LOS D or better (minimum of 31.5 SFP platoon flows for sidewalks; minimum of 19.5 SFP for crosswalks and corners) in CBD settings, which applies to all of the analysis locations for this assessment.

Table 4E.1-1. *CEQR Technical Manual* Level of Service Criteria for Pedestrian Elements

| LOS | SIDEWALKS | | CORNER RESERVOIRS AND CROSSWALKS |
|---|---|---|---|
| | Non-Platoon Flow | Platoon Flow | |
| A | > 60 SFP | > 530 SFP | > 60 SFP |
| B | > 40 and ≤ 60 SFP | > 90 and ≤ 530 SFP | > 40 and ≤ 60 SFP |
| C | > 24 and ≤ 40 SFP | > 40 and ≤ 90 SFP | > 24 and ≤ 40 SFP |
| D | > 15 and ≤ 24 SFP | > 23 and ≤ 40 SFP | > 15 and ≤ 24 SFP |
| E | > 8 and ≤ 15 SFP | > 11 and ≤ 23 SFP | > 8 and ≤ 15 SFP |
| F | ≤ 8 SFP | ≤ 11 SFP | ≤ 8 SFP |

Source: New York City Mayor's Office of Environmental Coordination, 2020 *CEQR Technical Manual*.
SFP = square feet per pedestrian.

## ADVERSE EFFECT CRITERIA

Using the *CEQR Technical Manual* methodology, the determination of pedestrian effects considers the level of predicted change in pedestrian space between the No Action Alternative and CBD Tolling Alternative. For different pedestrian elements, flow conditions, and area types, the *CEQR Technical Manual* guidelines for effect determination correspond with various sliding-scale formulas:

- Sidewalks. Two sliding-scale formulas determine sidewalk effects—one for non-platoon flow and one for platoon flow. Since a decrease in pedestrian space within acceptable levels would not constitute an adverse effect, these criteria apply only if pedestrian space falls short of LOS C in non-CBD areas or mid-LOS D in CBD areas. Table 4E.1-2 summarizes the sliding-scale guidance provided by the *CEQR Technical Manual* for determining potential sidewalk effects.
- Corner Reservoirs and Crosswalks. The determination of corner and crosswalk effects is also based on a sliding-scale, summarized in Table 4E.1-3. Since a decrease in pedestrian space within acceptable levels would not constitute an adverse effect, this scale applies only if pedestrian space falls short of LOS C in non-CBD areas or mid-LOS D in CBD areas.

## VEHICULAR AND PEDESTRIAN SAFETY EVALUATION

An evaluation of vehicular and pedestrian safety was prepared for locations in the pedestrian study areas that were identified as high-crash 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. For these locations, accident trends were identified to determine whether projected vehicular and pedestrian traffic would further deteriorate safety. The determination of potential safety effects depends on the type of area, traffic volumes, accident types and severity, and other contributing factors.

Table 4E.1-2. *CEQR Technical Manual* Effect Guidance for Sidewalks

| **NON-PLATOON FLOW** | | | | **PLATOON FLOW** | | | |
|---|---|---|---|---|---|---|---|
| **Sliding-Scale Formula:** ***Y ≥ X/9.0 – 0.31*** | | | | **Sliding-Scale Formula:** ***Y ≥ X/(9.5 – 0.321)*** | | | |
| **NON-MANHATTAN CBD AREAS** | | **MANHATTAN CBD AREAS** | | **NON-MANHATTAN CBD AREAS** | | **MANHATTAN 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 |

Table 4E.1-2. *CEQR Technical Manual* Effect Guidance for Sidewalks (continued)

| 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-MANHATTAN CBD AREAS | | MANHATTAN CBD AREAS | | NON-MANHATTAN CBD AREAS | | MANHATTAN 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) |
| 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 |

Sources: New York City Mayor's Office of Environmental Coordination, 2020 CEQR Technical Manual.
SFP = square feet per pedestrian; Y = decrease in pedestrian space in SFP; X = No Action pedestrian space in SFP; - = not applicable.

Table 4E.1-3. Effect Guidance for Corners and Crosswalks

| Sliding-Scale Formula: $Y \geq X/9.0 - 0.31$ | | | |
|---|---|---|---|
| **NON-MANHATTAN CBD AREAS** | | **MANHATTAN CBD AREAS** | |
| **No Action Pedestrian Space (X, SFP)** | **With Action Pedestrian Space Reduction (Y, SFP)** | **No Action Pedestrian Space (X, SFP)** | **With Action Pedestrian Space Reduction (Y, SFP)** |
| 25.8 to 26.6 | ≥ 2.6 | – | – |
| 24.9 to 25.7 | ≥ 2.5 | – | – |
| 24.0 to 24.8 | ≥ 2.4 | – | – |
| 23.1 to 23.9 | ≥ 2.3 | – | – |
| 22.2 to 23.0 | ≥ 2.2 | – | – |
| 21.3 to 22.1 | ≥ 2.1 | 21.3 to 21.5 | ≥ 2.1 |
| 20.4 to 21.2 | ≥ 2.0 | 20.4 to 21.2 | ≥ 2.0 |
| 19.5 to 20.3 | ≥ 1.9 | 19.5 to 20.3 | ≥ 1.9 |
| 18.6 to 19.4 | ≥ 1.8 | 18.6 to 19.4 | ≥ 1.8 |
| 17.7 to 18.5 | ≥ 1.7 | 17.7 to 18.5 | ≥ 1.7 |
| 16.8 to 17.6 | ≥ 1.6 | 16.8 to 17.6 | ≥ 1.6 |
| 15.9 to 16.7 | ≥ 1.5 | 15.9 to 16.7 | ≥ 1.5 |
| 15.0 to 15.8 | ≥ 1.4 | 15.0 to 15.8 | ≥ 1.4 |
| 14.1 to 14.9 | ≥ 1.3 | 14.1 to 14.9 | ≥ 1.3 |
| 13.2 to 14.0 | ≥ 1.2 | 13.2 to 14.0 | ≥ 1.2 |
| 12.3 to 13.1 | ≥ 1.1 | 12.3 to 13.1 | ≥ 1.1 |
| 11.4 to 12.2 | ≥ 1.0 | 11.4 to 12.2 | ≥ 1.0 |
| 10.5 to 11.3 | ≥ 0.9 | 10.5 to 11.3 | ≥ 0.9 |
| 9.6 to 10.4 | ≥ 0.8 | 9.6 to 10.4 | ≥ 0.8 |
| 8.7 to 9.5 | ≥ 0.7 | 8.7 to 9.5 | ≥ 0.7 |
| 7.8 to 8.6 | ≥ 0.6 | 7.8 to 8.6 | ≥ 0.6 |
| 6.9 to 7.7 | ≥ 0.5 | 6.9 to 7.7 | ≥ 0.5 |
| 6.0 to 6.8 | ≥ 0.4 | 6.0 to 6.8 | ≥ 0.4 |
| 5.1 to 5.9 | ≥ 0.3 | 5.1 to 5.9 | ≥ 0.3 |
| < 5.1 | ≥ 0.2 | < 5.1 | ≥ 0.2 |

**Sources:** New York City Mayor's Office of Environmental Coordination, 2020 *CEQR Technical Manual*.
SFP = square feet per pedestrian; Y = decrease in pedestrian space in SFP; X = No Action pedestrian space in SF, - = not applicable.

# 4E.2, Pedestrian Analysis LOS Tables

Table 4E.2-1. Herald Square/Penn Station Study Area – Existing Conditions: Sidewalk Analysis

| INTERSECTION | LOCATION | SIDEWALK | EFFECTIVE WIDTH (feet) | 1-HR TWO-WAY VOLUME | PHF | SFP | PLATOON LOS |
|---|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | | |
| Eighth Avenue and 34th Street | 34th Street between Eighth Avenue and Seventh Avenue | North | 4.5* | 878 | 0.80 | 64.1 | C |
| | Eighth Avenue between 35th Street and 34th Street | West | 5.0 | 2155 | 0.91 | 31.8 | D |
| Seventh Avenue and 34th Street | 34th Street between Seventh Avenue and Broadway | North | 9.5 | 2582 | 0.94 | 53.8 | C |
| Broadway and 34th Street | 34th Street between Broadway and Seventh Avenue | North | 11.0 | 2186 | 0.75 | 58.9 | C |
| Sixth Avenue and 34th Street | 34th Street between Sixth Avenue and Fifth Avenue | North | 9.5* | 1603 | 0.89 | 82.9 | C |
| Seventh Avenue and 32nd Street | 32nd Street between Seventh Avenue and Sixth Avenue | North | 5.5 | 1824 | 0.91 | 42.2 | C |
| **Weekday PM Peak Hour** | | | | | | | |
| Eighth Avenue and 34th Street | 34th Street between Eighth Avenue and Seventh Avenue | North | 4.5* | 1054 | 0.94 | 62.7 | C |
| | Eighth Avenue between 35th Street and 34th Street | West | 5.0 | 2092 | 0.81 | 28.9 | D |
| Seventh Avenue and 34th Street | 34th Street between Seventh Avenue and Broadway | North | 9.5 | 2462 | 0.87 | 52.2 | C |
| Broadway and 34th Street | 34th Street between Broadway and Seventh Avenue | North | 11.0 | 1508 | 0.82 | 94.2 | B |
| Sixth Avenue and 34th Street | 34th Street between Sixth Avenue and Fifth Avenue | North | 9.5* | 1355 | 0.86 | 94.9 | B |
| Seventh Avenue and 32nd Street | 32nd Street between Seventh Avenue and Sixth Avenue | North | 5.5 | 1503 | 0.93 | 52.9 | C |

**Note:** SFP = square feet per pedestrian
PHF = peak hour factor
* Denotes that the width is constrained by scaffolding

Table 4E.2-2. Herald Square/Penn Station Study Area –Existing Conditions: Corner Analysis

| LOCATION | CORNER | WEEKDAY AM PEAK HOUR | | WEEKDAY PM PEAK HOUR | |
|---|---|---|---|---|---|
| | | SFP | LOS | SFP | LOS |
| Eighth Avenue and 34th Street | Northwest | 68.0 | A | 58.6 | B |
| | Northeast | 59.8 | B | 60.4 | A |
| | Southwest | 40.6 | B | 44.9 | B |
| Sixth Avenue and 34th Street | Northeast | 83.3 | A | 38.9 | C |
| Seventh Avenue and 32nd Street | Northeast | 64.4 | A | 34.8 | C |

**Note:** SFP = square foot per pedestrian

Table 4E.2-3. Herald Square/Penn Station Study Area – Existing Conditions: Crosswalk Analysis

| LOCATION | CROSSWALK | CROSSWALK LENGTH (feet) | CROSSWALK WIDTH (feet) | TWO-WAY PEAK HOUR VOLUME | SFP | LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| Eighth Avenue and 34th Street | North | 70.5 | 22.0 | 963 | 53.3 | B |
| Sixth Avenue and 34th Street | North | 56.5 | 20.0 | 1472 | 12.9 | E |
| Seventh Avenue and 32nd Street | North | 73.0 | 20.0 | 2168 | 12.9 | E |
| **Weekday PM Peak Hour** | | | | | | |
| Eighth Avenue and 34th Street | North | 70.5 | 22.0 | 1144 | 48.3 | B |
| Sixth Avenue and 34th Street | North | 56.5 | 20.0 | 2665 | 6.8 | F |
| Seventh Avenue and 32nd Street | North | 73.0 | 20.0 | 2352 | 12.6 | E |

**Note:** SFP = square feet per pedestrian

Table 4E.2-4. World Trade Center/Fulton Street Study Area– Existing Conditions: Sidewalk Analysis

| LOCATION | SIDEWALK | EFFECTIVE WIDTH (feet) | 1-HR TWO-WAY VOLUME | PHF | SFP | PLATOON LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| Broadway Between Liberty Street and Cortlandt Street | **West** | 14.0 | 1149 | 0.88 | 170.3 | B |
| **Weekday PM Peak Hour** | | | | | | |
| Broadway Between Liberty Street and Cortlandt Street | **West** | 14.0 | 1312 | 0.92 | 155.4 | B |

**Note:** SFP = square feet per pedestrian
PHF = peak hour factor

Table 4E.2-5. World Trade Center/Fulton Street Study Area – Existing Conditions: Corner Analysis

| LOCATION | CORNER | WEEKDAY AM PEAK HOUR | | WEEKDAY PM PEAK HOUR | |
|---|---|---|---|---|---|
| | | SFP | LOS | SFP | LOS |
| Broadway and Liberty Street | Northwest | 25.3 | C | 44.5 | B |

**Note:** SFP = square foot per pedestrian

Table 4E.2-6. Herald Square/Penn Station Study Area – No Action Conditions: Sidewalk Analysis

| LOCATION | SIDEWALK | EFFECTIVE WIDTH (feet) | 1-HR TWO-WAY VOLUME | PHF | SFP | PLATOON LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| 34th Street between Eighth Avenue and Seventh Avenue | North | 9.5 | 887 | 0.80 | 135.3 | B |
| Eighth Avenue between 35th Street and 34th Street | West | 5.0 | 2176 | 0.91 | 31.5 | D |
| 34th Street between Seventh Avenue and Broadway | North | 9.5 | 2608 | 0.94 | 53.2 | C |
| 34th Street between Broadway and Seventh Avenue | North | 11.0 | 2208 | 0.75 | 58.3 | C |
| 34th Street between Sixth Avenue and Fifth Avenue | North | 14.5 | 1619 | 0.89 | 125.8 | B |
| 32nd Street between Seventh Avenue and Sixth Avenue | North | 5.5 | 1842 | 0.91 | 41.8 | C |
| **Weekday PM Peak Hour** | | | | | | |
| 34th Street between Eighth Avenue and Seventh Avenue | North | 9.5 | 1065 | 0.94 | 132.4 | B |
| Eighth Avenue between 35th Street and 34th Street | West | 5.0 | 2113 | 0.81 | 28.6 | D |
| 34th Street between Seventh Avenue and Broadway | North | 9.5 | 2487 | 0.87 | 51.6 | C |
| 34th Street between Broadway and Seventh Avenue | North | 11.0 | 1523 | 0.82 | 93.2 | B |
| 34th Street between Sixth Avenue and Fifth Avenue | North | 14.5 | 1369 | 0.86 | 143.9 | B |
| 32nd Street between Seventh Avenue and Sixth Avenue | North | 5.5 | 1518 | 0.93 | 52.4 | C |

**Note:** SFP = square feet per pedestrian
PHF = peak hour factor

Table 4E.2-7. Herald Square/Penn Station Study Area – No Action Conditions: Corner Analysis

| LOCATION | CORNER | WEEKDAY AM PEAK HOUR | | WEEKDAY PM PEAK HOUR | |
|---|---|---|---|---|---|
| | | SFP | LOS | SFP | LOS |
| Eighth Avenue and 34th Street | Northwest | 67.2 | A | 57.9 | B |
| | Northeast | 59.1 | B | 59.7 | B |
| | Southwest | 40.1 | B | 44.3 | B |
| Sixth Avenue and 34th Street | Northeast | 82.4 | A | 38.3 | C |
| Seventh Avenue and 32nd Street | Northeast | 63.6 | A | 34.2 | C |

**Note:** SFP = square foot per pedestrian

Table 4E.2-8. Herald Square/Penn Station Study Area – No Action Conditions: Crosswalk Analysis

| LOCATION | CROSSWALK | CROSSWALK LENGTH (feet) | CROSSWALK WIDTH (feet) | TWO-WAY PEAK HOUR VOLUME | SFP | LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| Eighth Avenue and 34th Street | North | 70.5 | 22.0 | 973 | 52.7 | B |
| Sixth Avenue and 34th Street | North | 56.5 | 20.0 | 1487 | 12.8 | E |
| Seventh Avenue and 32nd Street | North | 73.0 | 20.0 | 2189 | 12.7 | E |
| **Weekday PM Peak Hour** | | | | | | |
| Eighth Avenue and 34th Street | North | 70.5 | 22.0 | 1155 | 47.8 | B |
| Sixth Avenue and 34th Street | North | 56.5 | 20.0 | 2692 | 6.8 | F |
| Seventh Avenue and 32nd Street | North | 73.0 | 20.0 | 2375 | 12.5 | E |

**Note:** SFP = square feet per pedestrian

Table 4E.2-9. World Trade Center/Fulton Street Study Area – No Action Conditions: Sidewalk Analysis

| LOCATION | SIDEWALK | EFFECTIVE WIDTH (feet) | 1-HR TWO-WAY Volume | PHF | SFP | PLATOON LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| Broadway Between Liberty Street and Cortlandt Street | West | 14.0 | 1161 | 0.88 | 168.5 | B |
| **Weekday PM Peak Hour** | | | | | | |
| Broadway Between Liberty Street and Cortlandt Street | West | 14.0 | 1325 | 0.92 | 153.8 | B |

**Note:** SFP = square feet per pedestrian
PHF = peak hour factor

Table 4E.2-10. World Trade Center/Fulton Street Study Area – No Action Conditions: Corner Analysis

| LOCATION | CORNER | WEEKDAY AM PEAK HOUR | | WEEKDAY PM PEAK HOUR | |
|---|---|---|---|---|---|
| | | SFP | LOS | SFP | LOS |
| Broadway and Liberty Street | Northwest | 24.9 | C | 44.0 | B |

**Note:** SFP = square foot per pedestrian

Table 4E.2-11. Pedestrian Level 2 Screening Analysis Results – WTC/Fulton Street Study Area

| PEDESTRIAN ELEMENTS | INCREMENTAL PEDESTRIAN TRIPS | | | SELECTED ANALYSIS LOCATION |
|---|---|---|---|---|
| | AM | Midday | PM | |
| **Church Street and Fulton Street** | | | | |
| East Sidewalk along Church Street between Fulton Street and Vesey Street | 121 | 26 | 90 | |
| North Sidewalk along Fulton Street between Broadway and Church Street | 125 | 32 | 135 | |
| **Broadway and Fulton Street** | | | | |
| Northwest Corner | 125 | 32 | 134 | |
| **Church Street and Liberty Street** | | | | |
| Southeast Corner | 82 | 25 | 119 | |
| Northwest Corner | 108 | 20 | 55 | |
| South Sidewalk along Liberty Street between Broadway and Church Street | 83 | 24 | 119 | |
| **Broadway and Liberty Street** | | | | |
| West Crosswalk | 128 | 36 | 168 | |
| Northeast Corner | 115 | 29 | 132 | |
| Southwest Corner | 128 | 36 | 168 | |
| Northwest Corner | 205 | 52 | 220 | ✓ |
| East Sidewalk along Broadway Between Liberty Street and Cortland Street | 160 | 42 | 183 | |
| West Sidewalk along Broadway Between Liberty Street and Cortlandt Street | 204 | 52 | 220 | ✓ |

**Notes:** ✓ denotes pedestrian elements selected for detailed analysis (AM/PM only).
Pedestrian elements with fewer than 100 project-generated pedestrian trips in a peak hour are not presented in this table.

Table 4E.2-12. Pedestrian Level 2 Screening Analysis Results – Union Square Study Area

| PEDESTRIAN ELEMENTS | INCREMENTAL PEDESTRIAN TRIPS | | | SELECTED ANALYSIS LOCATION |
|---|---|---|---|---|
| | AM | Midday | PM | |
| **Broadway and 14th Street** | | | | |
| South sidewalk along 14th Street between University Place and Broadway | 108 | 28 | 114 | |

**Notes:** ✓ denotes pedestrian elements selected for detailed analysis (AM/PM only).
Pedestrian elements with fewer than 100 project-generated pedestrian trips in a peak hour are not presented in this table.

Table 4E.2-13. Pedestrian Level 2 Screening Analysis Results – Times Square/PABT Study Area

| PEDESTRIAN ELEMENTS | INCREMENTAL PEDESTRIAN TRIPS | | | SELECTED ANALYSIS LOCATION |
|---|---|---|---|---|
| | AM | MIDDAY | PM | |
| **Broadway and West 42nd Street** | | | | |
| East Crosswalk | 32 | 16 | 104 | |

**Notes:** ✓ denotes pedestrian elements selected for detailed analysis (AM/PM only).
Pedestrian elements with fewer than 100 project-generated pedestrian trips in a peak hour are not presented in this table.

Table 4E.2-14. Pedestrian Level 2 Screening Analysis Results – Herald Square/Penn Station Study Area

| PEDESTRIAN ELEMENTS | INCREMENTAL PEDESTRIAN TRIPS | | | SELECTED ANALYSIS LOCATION |
|---|---|---|---|---|
| | AM | Midday | PM | |
| **Eighth Avenue and 34th Street** | | | | |
| North sidewalk along 34th Street between Eighth Avenue and Seventh Avenue | 319 | 64 | 193 | ✓ |
| South sidewalk along 34th Street between Eighth Avenue and Seventh Avenue | 62 | 30 | 173 | |
| West sidewalk along Eighth Avenue between 35th Street and 34th Street | 221 | 53 | 204 | ✓ |
| Northeast corner | 319 | 65 | 193 | ✓ |
| Southeast corner | 62 | 30 | 173 | |
| Southwest corner | 64 | 44 | 284 | ✓ |
| Northwest corner | 261 | 63 | 242 | ✓ |
| North crosswalk | 259 | 49 | 131 | ✓ |
| South crosswalk | 62 | 30 | 173 | |
| **Eighth Avenue and 31st Street** | | | | |
| West sidewalk along Eighth Avenue between 32nd Street and 31st Street | 192 | 46 | 179 | |
| Southwest corner | 172 | 42 | 159 | |
| Northwest corner | 200 | 48 | 188 | |
| West crosswalk | 160 | 38 | 146 | |
| **Seventh Avenue and 34th Street** | | | | |
| East sidewalk along Seventh Avenue between 35th Street and 34th Street | 59 | 21 | 105 | |
| North sidewalk along 34th Street between Seventh Avenue and Broadway | 500 | 128 | 532 | ✓ |
| Northeast corner | 131 | 35 | 143 | |
| Northwest corner | 104 | 22 | 71 | |
| **Seventh Avenue and 32nd Street** | | | | |
| North sidewalk along 32nd Street between Seventh Avenue and Sixth Avenue | 399 | 82 | 262 | ✓ |
| West sidewalk along Seventh Avenue between 32nd Street and 31st Street | 34 | 22 | 144 | |
| Northeast corner | 252 | 40 | 70 | ✓ |
| North crosswalk | 221 | 36 | 69 | ✓ |
| **Broadway and 34th Street** | | | | |
| North sidewalk along 34th Street between Seventh Avenue and Broadway | 460 | 121 | 518 | ✓ |
| **Sixth Avenue and 34th Street** | | | | |
| East sidewalk along Sixth Avenue between 35th Street and 34th Street | 131 | 31 | 118 | |
| North sidewalk along 34th Street between Sixth Avenue and Fifth Avenue | 241 | 57 | 220 | ✓ |
| South sidewalk along 34th Street between Sixth Avenue and Fifth Avenue | 100 | 18 | 43 | |
| Northeast corner | 313 | 72 | 268 | ✓ |
| North crosswalk | 265 | 65 | 259 | ✓ |

**Notes:** ✓ denotes pedestrian elements selected for detailed analysis (AM/PM only).
Pedestrian elements with fewer than 100 project-generated pedestrian trips in a peak hour are not presented in this table.

Table 4E.2-15. Pedestrian Level 2 Screening Analysis Results – Grand Central Terminal Study Area

| PEDESTRIAN ELEMENTS | INCREMENTAL PEDESTRIAN TRIPS | | | SELECTED ANALYSIS LOCATION |
|---|---|---|---|---|
| | AM | Midday | PM | |
| **Madison Avenue and East 44th Street** | | | | |
| Southwest Corner | 50 | 22 | 129 | |
| **Vanderbilt Avenue and East 42nd Street** | | | | |
| East Crosswalk | 126 | 26 | 87 | |
| Northeast Corner* | 163 | 40 | 169 | |
| East sidewalk along Vanderbilt Avenue between East 42nd Street and East 43rd Street* | 163 | 40 | 169 | |
| South sidewalk along East 42nd Street between Madison Avenue and Park Avenue | 126 | 26 | 87 | |
| **Park Avenue and East 42nd Street** | | | | |
| East Crosswalk | 83 | 26 | 130 | |
| **Lexington Avenue and East 43rd Street** | | | | |
| West sidewalk along Lexington Avenue between East 43rd Street and East 42nd Street | 117 | 31 | 132 | |
| **Madison Avenue and East 42nd Street** | | | | |
| Northwest Corner | 39 | 20 | 128 | |
| Southeast Corner | 125 | 26 | 87 | |
| **Lexington Avenue and East 44th Street** | | | | |
| West sidewalk along Lexington Avenue between East 44th Street and East 45th Street | 173 | 40 | 147 | |
| **Lexington Avenue and East 42nd Street** | | | | |
| Northeast Corner | 116 | 31 | 133 | |
| Northwest Corner | 138 | 34 | 134 | |

**Notes:** ✓ denotes pedestrian elements selected for detailed analysis (AM/PM only).
* denotes the area will be converted to a pedestrian plaza under With Action conditions.
Pedestrian elements with fewer than 100 project-generated pedestrian trips in a peak hour are not presented in this table.

Table 4E.2-16. Herald Square/Penn Station Study Area – With Action Conditions: Sidewalk Analysis

| LOCATION | SIDEWALK | EFFECTIVE WIDTH (feet) | 1-HR TWO-WAY VOLUME | PHF | SFP | PLATOON LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| 34th Street between Eighth Avenue and Seventh Avenue | North | 9.5 | 1206 | 0.80 | 99.3 | B |
| Eighth Avenue between 35th Street and 34th Street | West | 5.0 | 2397 | 0.91 | 28.3 | D |
| 34th Street between Seventh Avenue and Broadway | North | 9.5 | 3108 | 0.94 | 44.3 | C |
| 34th Street between Broadway and Seventh Avenue | North | 11.0 | 2668 | 0.75 | 47.9 | C |
| 34th Street between Sixth Avenue and Fifth Avenue | North | 14.5 | 1860 | 0.89 | 109.4 | B |
| 32nd Street between Seventh Avenue and Sixth Avenue | North | 5.5 | 2241 | 0.91 | 33.8 | D |
| **Weekday PM Peak Hour** | | | | | | |
| 34th Street between Eighth Avenue and Seventh Avenue | North | 9.5 | 1258 | 0.94 | 112.0 | B |
| Eighth Avenue between 35th Street and 34th Street | West | 5.0 | 2317 | 0.81 | 25.7 | D |
| 34th Street between Seventh Avenue and Broadway | North | 9.5 | 3019 | 0.87 | 42.1 | C |
| 34th Street between Broadway and Seventh Avenue | North | 11.0 | 2041 | 0.82 | 69.2 | C |
| 34th Street between Sixth Avenue and Fifth Avenue | North | 14.5 | 1589 | 0.86 | 123.9 | B |
| 32nd Street between Seventh Avenue and Sixth Avenue | North | 5.5 | 1780 | 0.93 | 44.3 | C |

**Note:** SFP = square feet per pedestrian
PHF = peak hour factor

Table 4E.2-17. Herald Square/Penn Station Study Area – With Action Conditions: Corner Analysis

| LOCATION | CORNER | WEEKDAY AM PEAK HOUR | | WEEKDAY PM PEAK HOUR | |
|---|---|---|---|---|---|
| | | SFP | LOS | SFP | LOS |
| Eighth Avenue and 34th Street | Northwest | 61.8 | A | 52.2 | B |
| | Northeast | 52.4 | B | 56.6 | B |
| | Southwest | 39.6 | C | 40.9 | B |
| Sixth Avenue and 34th Street | Northeast | 75.0 | A | 34.8 | C |
| Seventh Avenue and 32nd Street | Northeast | 58.7 | B | 33.2 | C |

**Note:** SFP = square foot per pedestrian

Table 4E.2-18. Herald Square/Penn Station Study Area – With Action Conditions: Crosswalk Analysis

| LOCATION | CROSSWALK | CROSSWALK LENGTH (feet) | CROSSWALK WIDTH (feet) | TWO-WAY PEAK HOUR VOLUME | SFP | LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| Eighth Avenue and 34th Street | North | 70.5 | 22.0 | 1232 | 41.2 | B |
| Sixth Avenue and 34th Street | North | 56.5 | 20.0 | 1752 | 10.6 | E |
| Seventh Avenue and 32nd Street | North | 73.0 | 20.0 | 2410 | 11.4 | E |
| **Weekday PM Peak Hour** | | | | | | |
| Eighth Avenue and 34th Street | North | 70.5 | 22.0 | 1286 | 42.6 | B |
| Sixth Avenue and 34th Street | North | 56.5 | 20.0 | 2951 | 6.0 | F |
| Seventh Avenue and 32nd Street | North | 73.0 | 20.0 | 2444 | 12.1 | E |

**Note:** SFP = square feet per pedestrian

Table 4E.2-19. World Trade Center/Fulton Street Study Area – With Action Conditions: Sidewalk Analysis

| LOCATION | SIDEWALK | EFFECTIVE WIDTH (feet) | 1-HR TWO-WAY Volume | PHF | SFP | PLATOON LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| Broadway Between Liberty Street and Cortlandt Street | West | 14.0 | 1365 | 0.88 | 143.2 | B |
| **Weekday PM Peak Hour** | | | | | | |
| Broadway Between Liberty Street and Cortlandt Street | West | 14.0 | 1545 | 0.92 | 131.8 | B |

**Note:** SFP = square feet per pedestrian
PHF = Peak Hour Factor

Table 20. World Trade Center/Fulton Street Study Area – With Action Conditions: Corner Analysis

| LOCATION | CORNER | WEEKDAY AM PEAK HOUR | | WEEKDAY PM PEAK HOUR | |
|---|---|---|---|---|---|
| | | SFP | LOS | SFP | LOS |
| Broadway and Liberty Street | Northwest | 23.0 | D | 40.6 | B |

**Note:** SFP = square foot per pedestrian

# 4E.3, Pedestrian Analysis Figures

Figure 4E.3-1. 2019 Existing Pedestrian Volumes - Herald Square/Penn Station Study Area: Weekday AM Peak Hour

## Figure 4E.3-2. 2019 Existing Pedestrian Volumes - Herald Square/Penn Station Study Area: Weekday PM Peak Hour

Figure 4E.3-3. 2019 Existing Pedestrian Volumes - World Trade Center/Fulton Street Study Area: Weekday AM Peak Hour

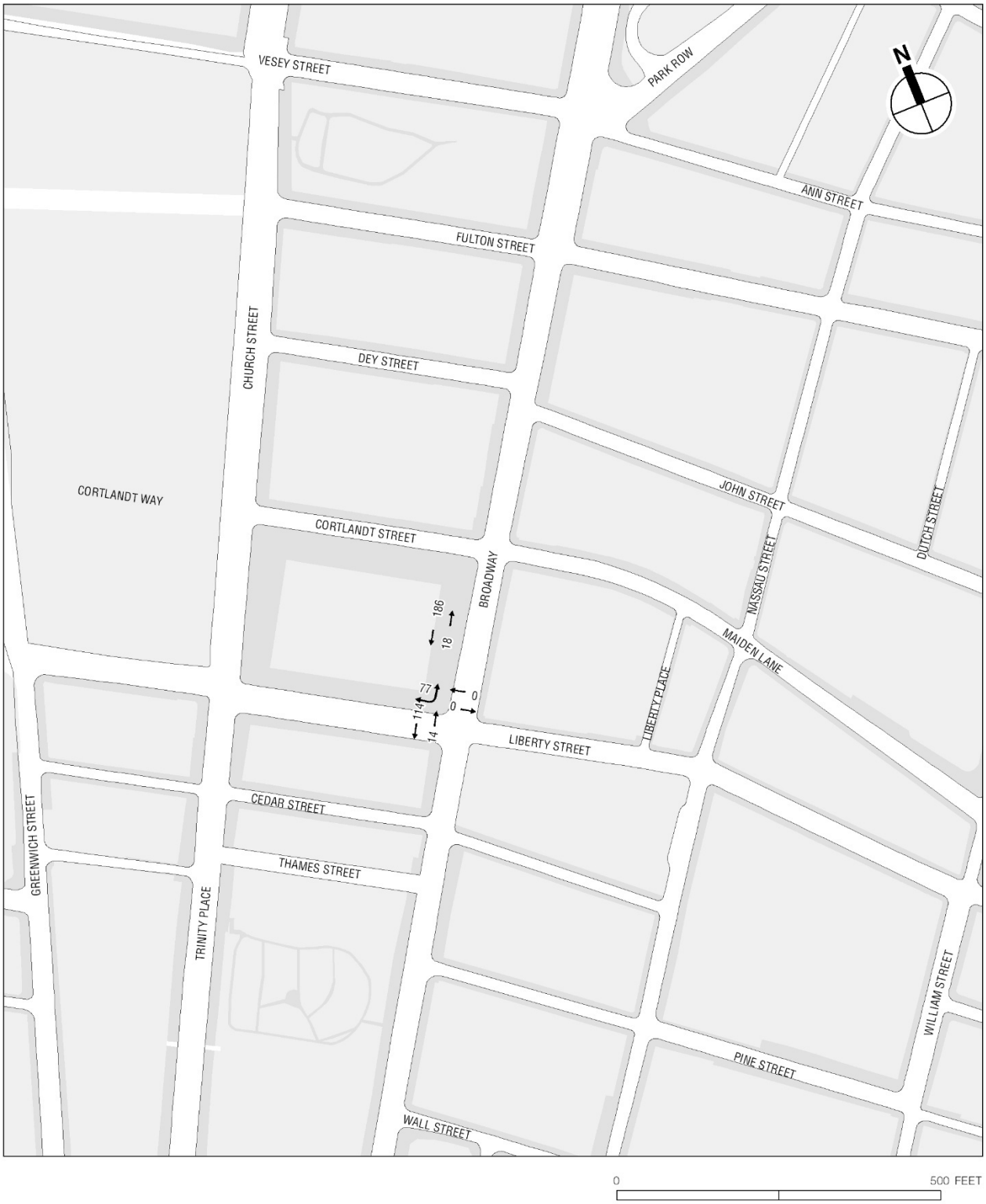


Figure 4E.3-4. 2019 Existing Pedestrian Volumes - World Trade Center/Fulton Street Study Area: Weekday PM Peak Hour

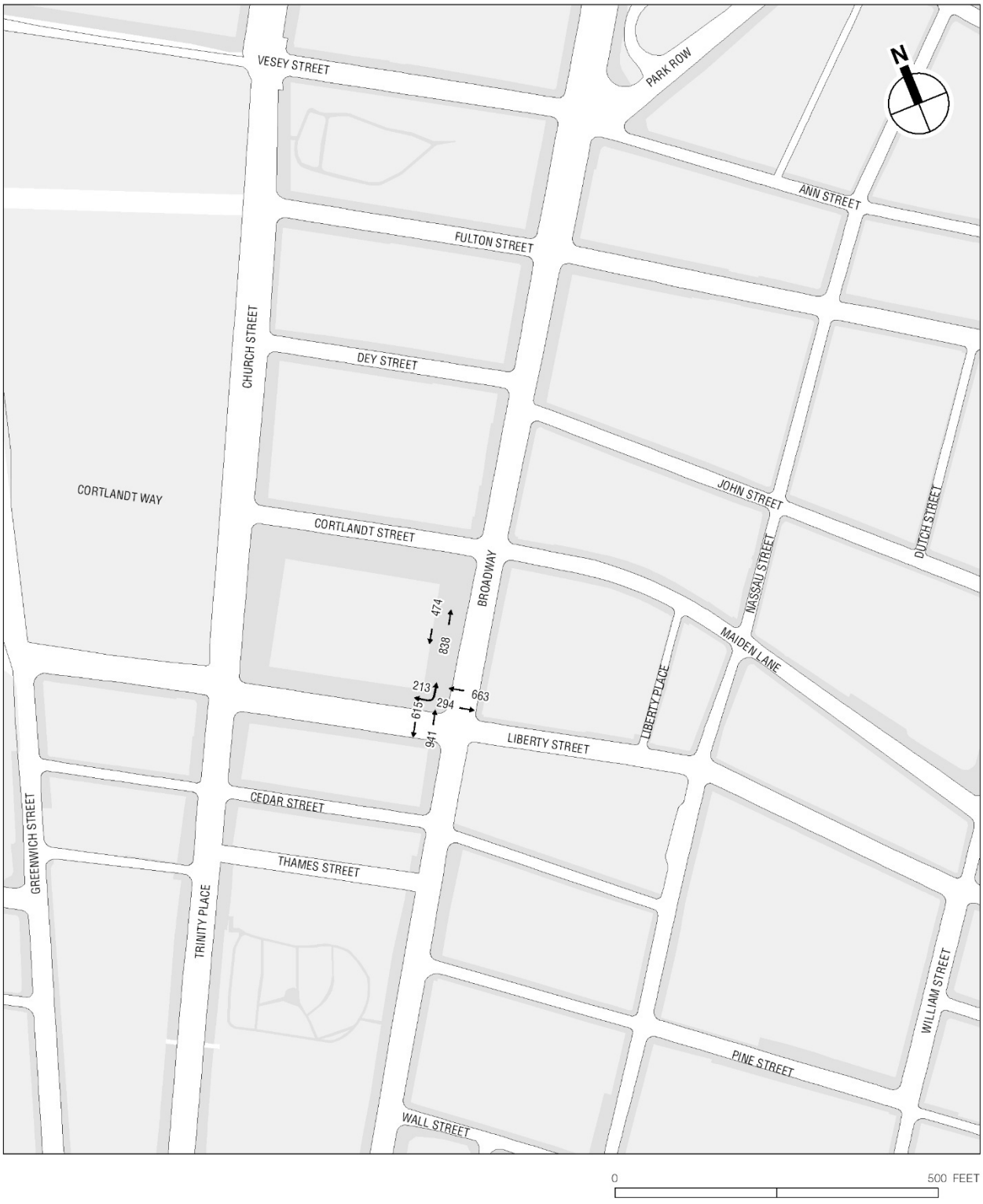


Figure 4E.3-5. No Action Pedestrian Volumes - Herald Square/Penn Station Study Area: Weekday AM Peak Hour

## Figure 4E.3-6. No Action Pedestrian Volumes - Herald Square/Penn Station Study Area: Weekday PM Peak Hour

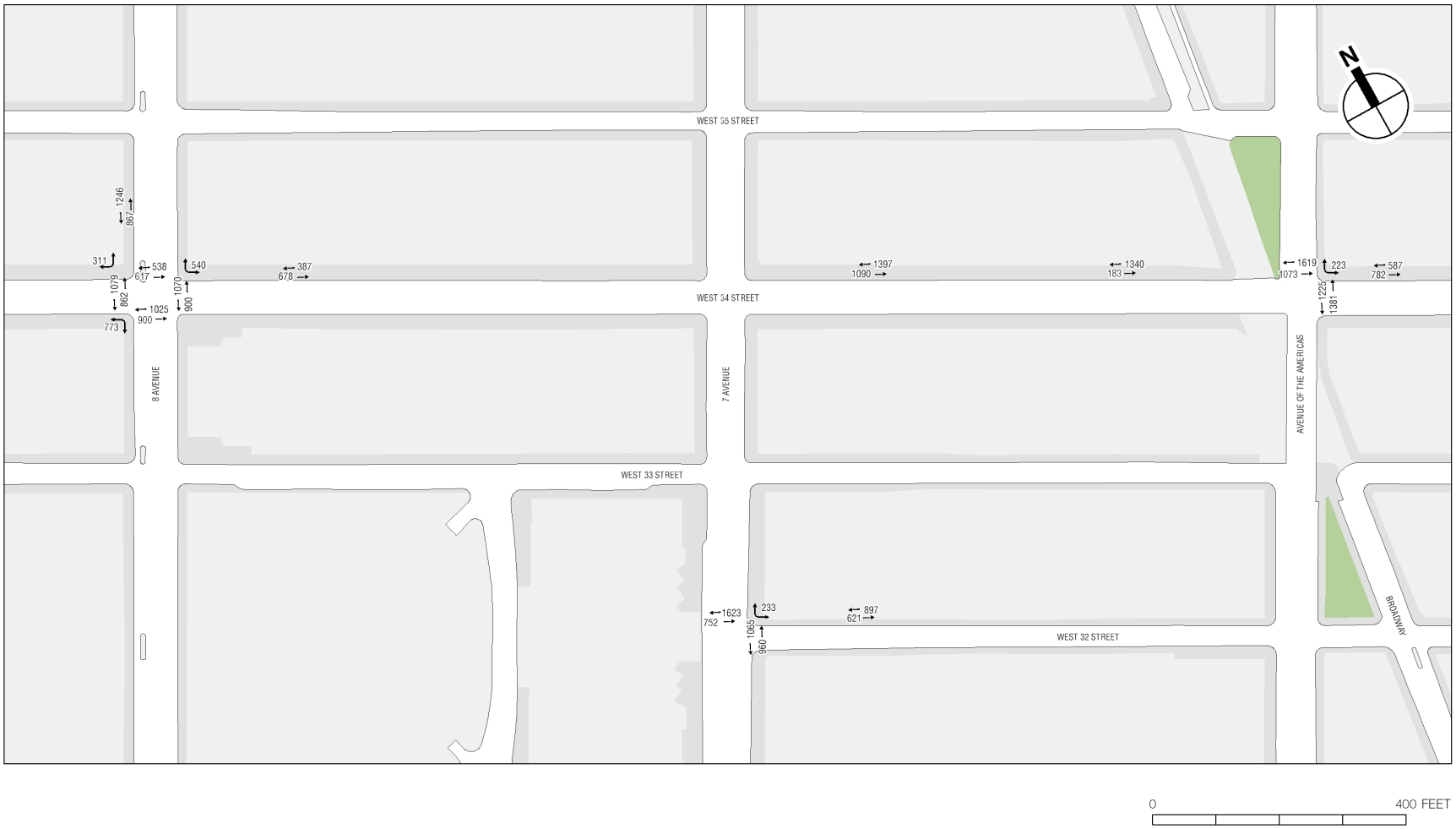


Figure 4E.3-7. No Action Pedestrian Volumes – World Trade Center/Fulton Street Study Area: Weekday AM Peak Hour

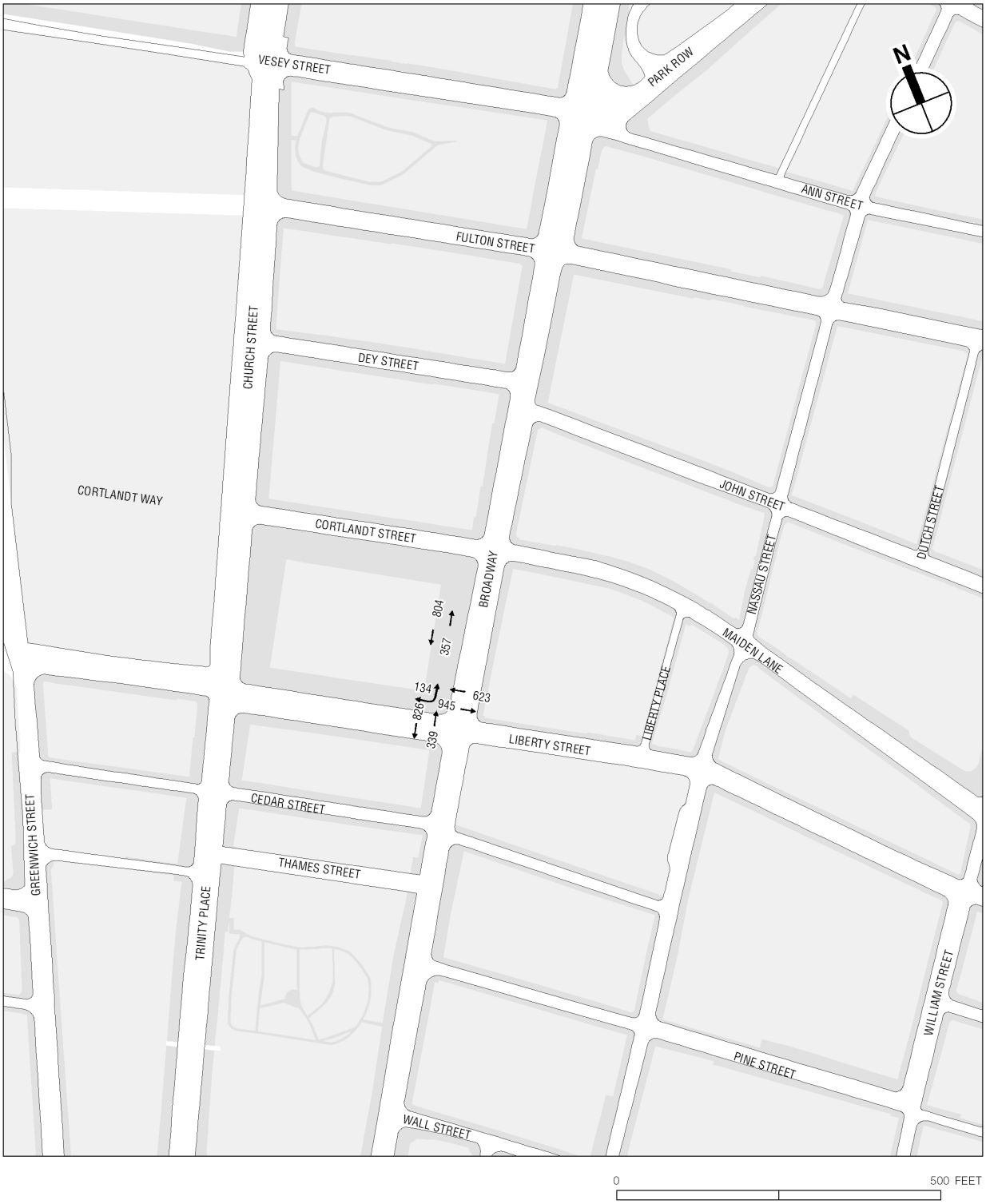


Figure 4E.3-8. No Action Pedestrian Volumes – World Trade Center/Fulton Street Study Area: Weekday PM Peak Hour

Figure 4E.3-9. Project Generated Pedestrian Trips – Herald Square/Penn Station Study Area: Weekday AM Peak Hour

## Figure 4E.3-10. Project Generated Pedestrian Trips – Herald Square/Penn Station Study Area: Weekday PM Peak Hour

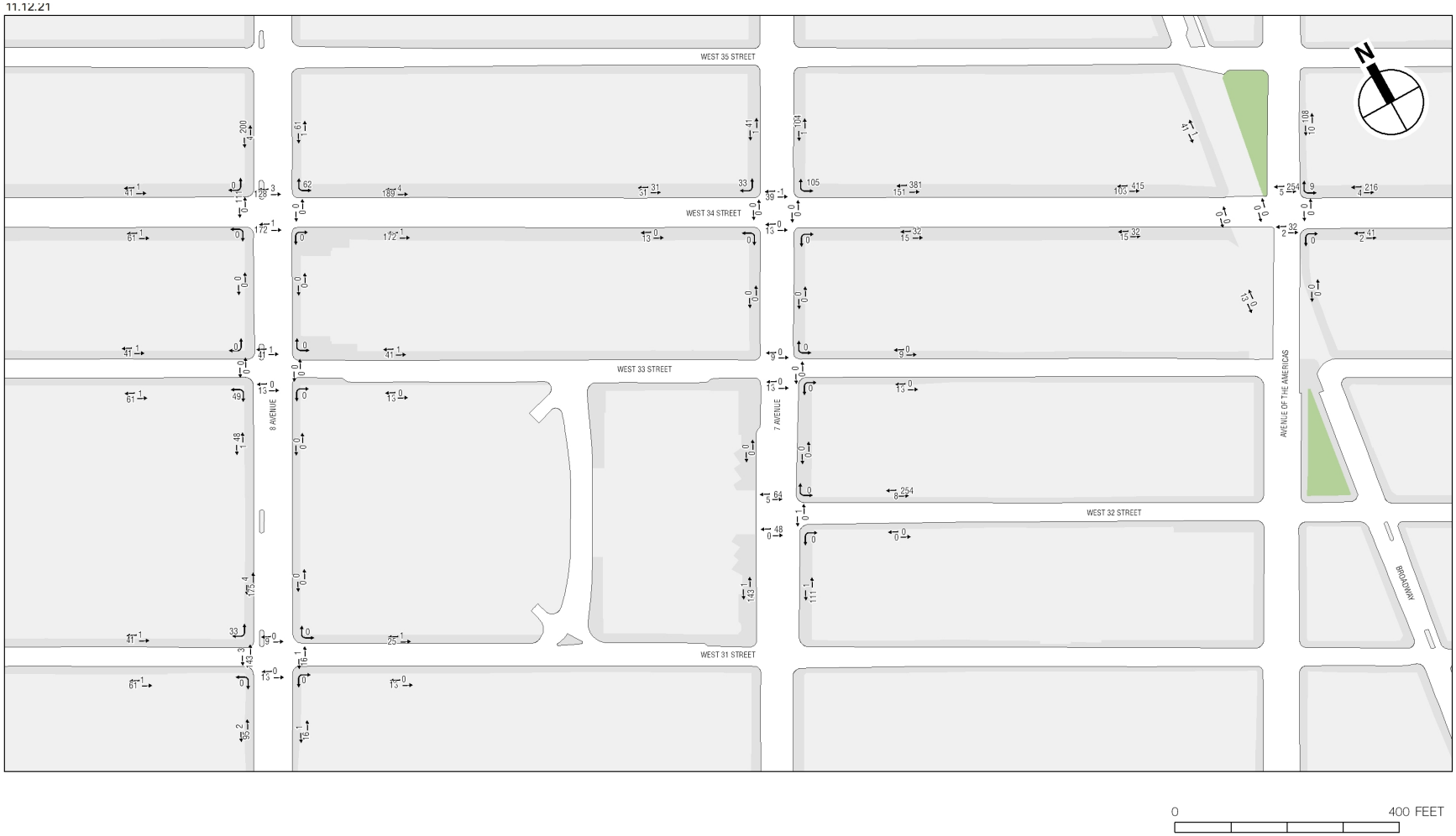
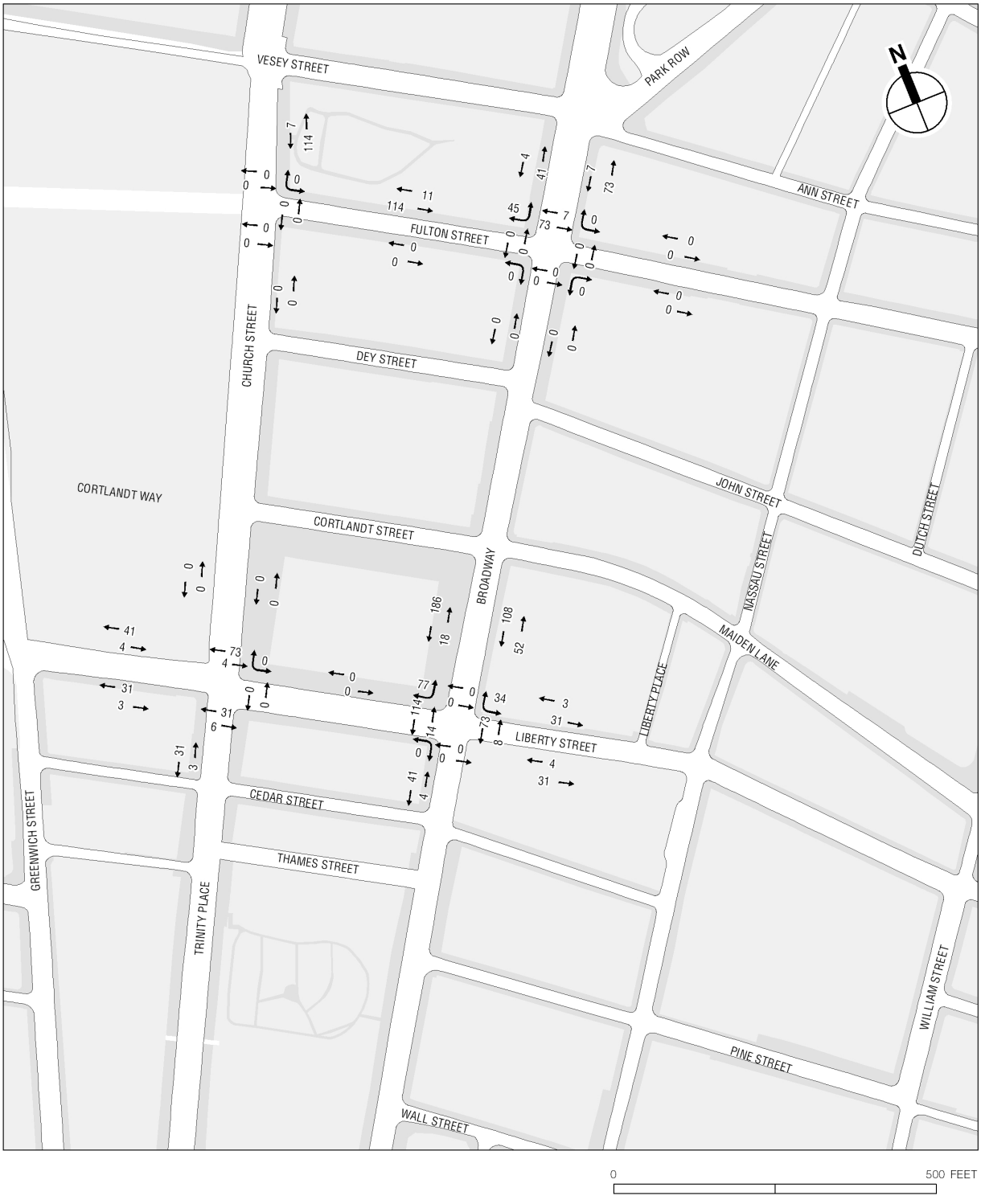


Figure 4E.3-11. Project Generated Pedestrian Trips – World Trade Center/Fulton Street Study Area: Weekday AM Peak Hour



## Figure 4E.3-12. Project Generated Pedestrian Trips – World Trade Center/Fulton Street Study Area: Weekday PM Peak Hour

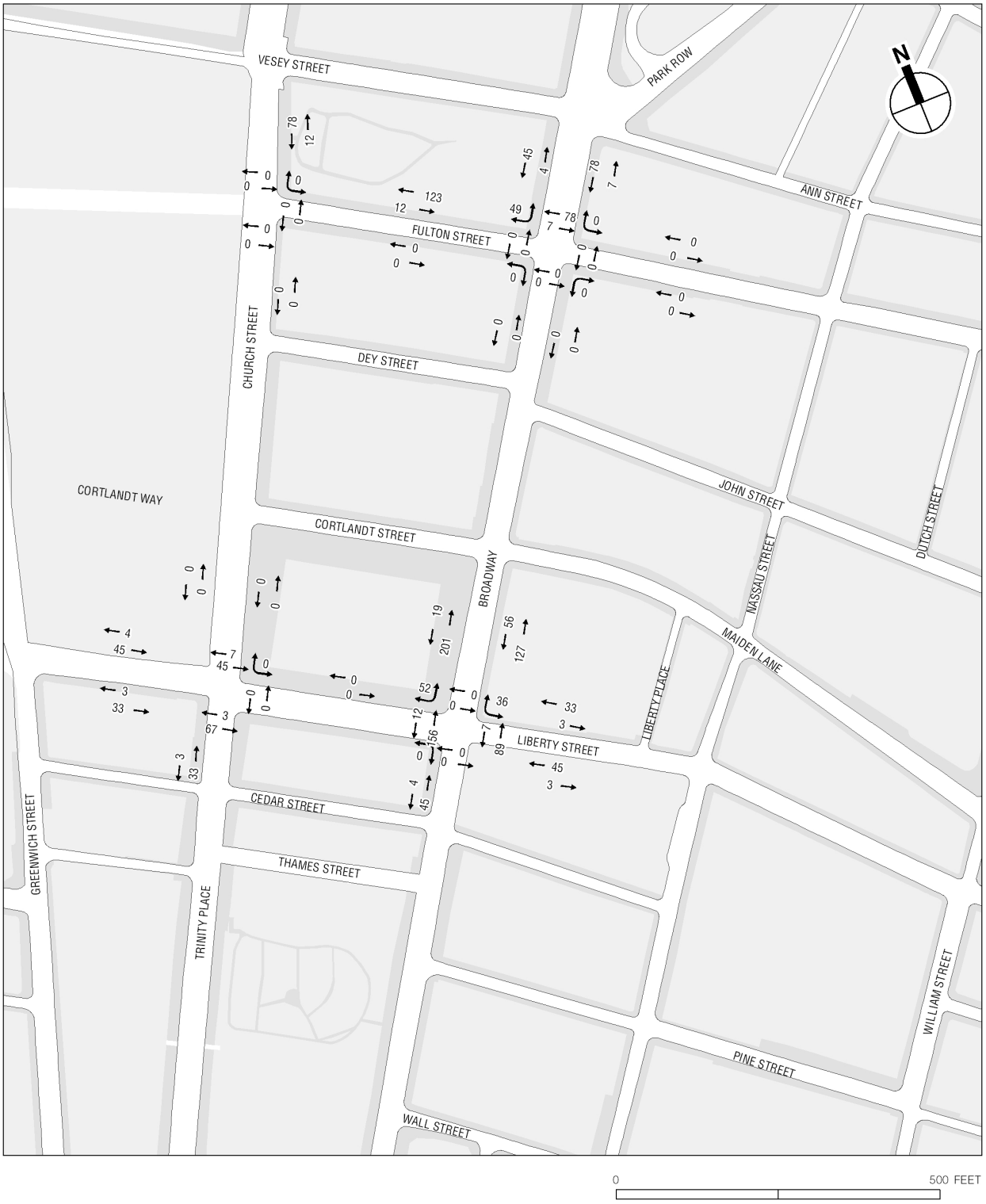
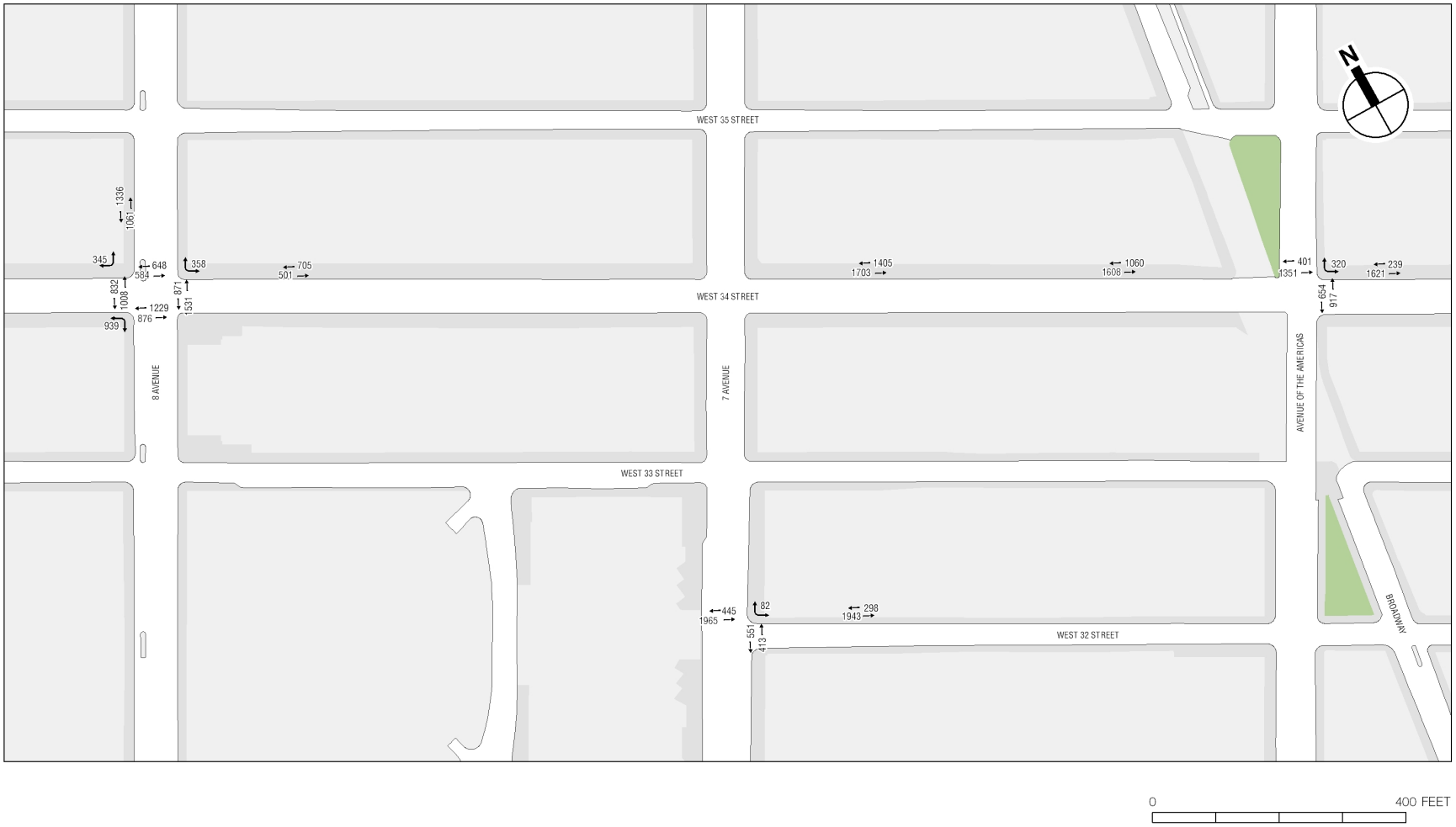


Figure 4E.3-13. With Action Pedestrian Volumes – Herald Square/Penn Station Study Area: Weekday AM Peak Hour



## Figure 4E.3-14. With Action Pedestrian Volumes – Herald Square/Penn Station Study Area: Weekday PM Peak Hour

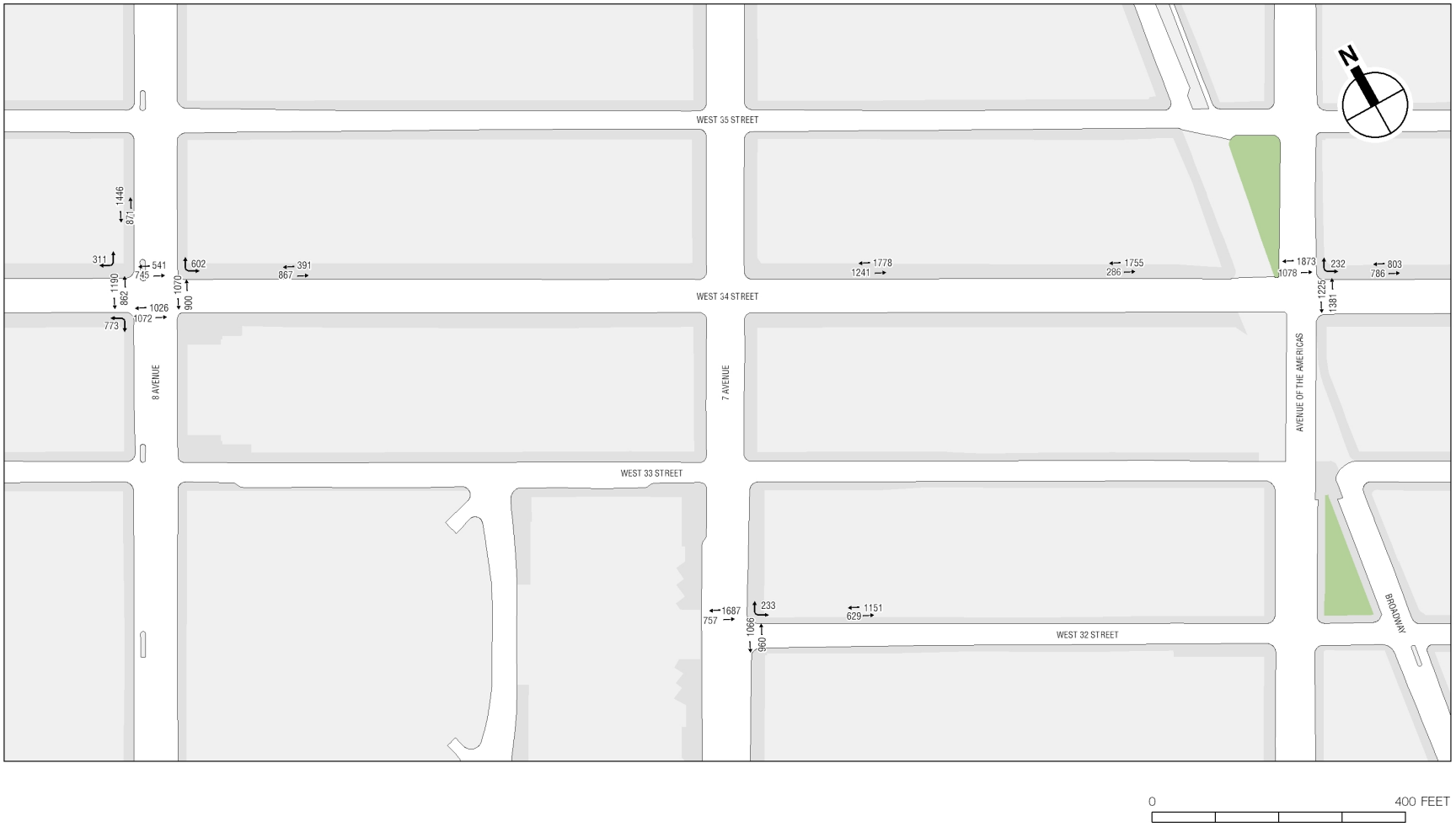


Figure 4E.3-15. With Action Pedestrian Volumes – World Trade Center/Fulton Street Station Study Area: Weekday AM Peak Hour

## Figure 4E.3-16. With Action Pedestrian Volumes – World Trade Center/Fulton Street Station Study Area: Weekday PM Peak Hour

# 4E.4, Vehicular and Pedestrian Safety Evaluation

August 2022

## METHODOLOGY

An evaluation of vehicular and pedestrian safety is necessary for locations within the pedestrian study areas that have been identified as high crash 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. NYCDOT crash data do not contain non-reportable crashes, which make up a negligible portion of intersection crashes, since nearly all involve property damage exceeding $1,000 or an injury or fatality. Therefore, only reportable crashes have been used to identify high-crash locations. For these locations, crash trends are identified to determine whether projected vehicular and pedestrian traffic would further adversely affect safety at these locations. The determination of potential effects depends on the type of area where the project site is located, traffic volumes, crash types and severity, and other contributing factors. Where appropriate, measures to improve traffic and pedestrian safety are identified and coordinated with NYCDOT.

Additionally, the curb pedestrian ramps at the corners selected for detailed analysis were assessed based on the Americans with Disabilities Act (ADA) regulations. The direction, location, and type of the corner pedestrian ramps were evaluated to identify if the ramps meet minimum ADA compliance.

## CRASH DATA

Crash data for the study area intersections were obtained from NYCDOT for the time period between January 1, 2015 and December 31, 2017. 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, 2015 and December 31, 2017 three-year period, a total of 167 reportable crashes, consisting of one fatality, 116 injuries, and 63 pedestrian/bicyclist-related crashes occurred at the study area intersections. A rolling total of crash data identifies three high crash locations in the 2015 to 2017 period: 34th Street at Eighth Avenue, Seventh Avenue and Sixth Avenue/Broadway. **Table 4E.4-1** depicts total crash characteristics by intersection during the study period, as well as a breakdown of pedestrian and bicycle crashes by year and location.

**Table 4E.4-2** shows a detailed description of each pedestrian/bicyclist-related crash at the high crash locations listed above during the three year period. As detailed below for each high crash location, most incidents were attributed to inattentiveness and failure to yield by motorists, as well as pedestrians and bicyclists. In recent years, the City's Vision Zero initiatives have led to the implementation of many safety interventions across the five boroughs and within the Manhattan CBD. These include separated bike lanes, high-visibility crosswalks, narrowed travel lanes, changes in signal timing to curb speeding, and addition of pedestrian signal countdown timers. Based on the review performed for each of the high-crash locations, additional safety measures were recommended where available to further enhance safety at these locations.

Table 4E.4-1. Crash Summary

| INTERSECTION | | STUDY PERIOD | | | | | | CRASHES BY YEAR | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | All Crashes by Year | | | All Crashes Highest 12-Month Rolling | Total Fatalities | Total Injuries | Pedestrian | | | Bicycle | | | Ped + Bike 12 consecutive month maximum |
| North-South Roadway | East-West Roadway | 2015 | 2016 | 2017 | | | | 2015 | 2016 | 2017 | 2015 | 2016 | 2017 | |
| Church Street | Fulton Street | 2 | 2 | 2 | 3 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Church Street | Liberty Street | 0 | 0 | 4 | 4 | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Broadway | Fulton Street | 2 | 0 | 4 | 4 | 0 | 7 | 0 | 0 | 2 | 1 | 0 | 0 | 2 |
| Broadway | Liberty Street | 2 | 0 | 3 | 3 | 0 | 11 | 1 | 0 | 2 | 1 | 0 | 0 | 2 |
| Whitehall Street | State/Water Street | 1 | 3 | 5 | 6 | 1 | 5 | 1 | 2 | 3 | 0 | 0 | 0 | 4 |
| Eighth Avenue | 31st Street | 3 | 5 | 11 | 11 | 0 | 7 | 0 | 2 | 0 | 0 | 1 | 0 | 3 |
| Eighth Avenue | 33rd Street | 4 | 13 | 4 | 13 | 0 | 10 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| Seventh Avenue | 32nd Street | 6 | 5 | 10 | 10 | 0 | 13 | 1 | 1 | 1 | 0 | 1 | 2 | 3 |
| **Eighth Avenue** | **34th Street** | **5** | **15** | **6** | **15** | **0** | **21** | **3** | **8** | **2** | **0** | **1** | **0** | **9** |
| **Seventh Avenue** | **34th Street** | **7** | **7** | **11** | **11** | **0** | **20** | **2** | **4** | **3** | **2** | **0** | **2** | **5** |
| Seventh Avenue | 33rd Street | 2 | 3 | 1 | 3 | 0 | 3 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |
| **Broadway/Sixth Ave** | **34th Street** | **5** | **5** | **9** | **9** | **0** | **11** | **1** | **1** | **3** | **1** | **2** | **0** | **5** |

**Source:** NYCDOT January 1, 2015, and December 31, 201,7 crash data.
**Note:** Bold intersections are high crash locations

Table 4E.4-2. Vehicle and Pedestrian Crash Details

| INTERSECTION | YEAR | DATE | TIME | CRASH CLASS | | ACTION OF VEHICLE | ACTION OF PEDESTRIAN | CAUSE OF CRASH | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Injured | Killed | | | Left/Right Turns | Pedestrian Error/ Confusion | Driver Inattention | Other |
| Eighth Avenue and 34th Street | 2015 | 3/11 | 18:31 | X | | Making left turn – northwest | Crossing with signal | X | | | Turning improper, Traffic control devices disregarded |
| | | 4/20 | 11:20 | X | | Making left turn – west | Crossing with signal | X | | | Failure to yield R.O.W. |
| | | 8/20 | 3:30 | X | | Going straight – north | Crossing, no signal, marked crosswalk | | X | | |
| | 2016 | 1/12 | 12:00 | X | | Going straight – west | Not in roadway | | | | Unknown |
| | | 1/13 | 12:45 | X | | Going straight – north | Crossing with signal | | | | Unknown |
| | | 4/20 | 7:03 | X | | Slowed or stopping – northwest | Crossing with signal | | | | Unknown |
| | | 8/19 | 13:35 | X | | Going straight – east | Crossing with signal | | | | Cell phone (handheld) |
| | | 8/28 | 21:40 | X | | Going straight – west | Making right turn – west | X | | X | |
| | | 8/29 | 20:05 | X | | Making left turn – west | Crossing against signal | X | X | | |
| | | 9/16 | 17:05 | X | | Making right turn – east | Unknown | X | X | | |
| | | 10/12 | 12:00 | X | | Going straight – east | Not in roadway | | | | Oversized vehicle |
| | | 11/18 | 6:10 | X | | Making right turn – north | Crossing with signal | X | | | |
| | 2017 | 5/3 | 12:04 | X | | Making right turn – north | Unknown | X | | | |
| | | 6/17 | 19:54 | X | | Going straight – west | Crossing against signal | | X | | |

| INTERSECTION | YEAR | DATE | TIME | CRASH CLASS | | ACTION OF VEHICLE | ACTION OF PEDESTRIAN | CAUSE OF CRASH | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Injured | Killed | | | Left/Right Turns | Pedestrian Error/ Confusion | Driver Inattention | Other |
| Seventh Avenue and 34th Street | 2015 | 2/4 | 23:14 | X | | Making right turn-southeast | Crossing with signal | X | | | |
| | | 3/12 | 21:20 | X | | Starting from parking – south | Crossing, no signal or crosswalk | | | X | Driver inexperience |
| | | 8/25 | 12:03 | X | | Making U-turn – west | Along highway with traffic | X | | | Drugs (Illegal), Unsafe lane changing |
| | | 12/4 | 17:30 | X | | Going straight – west | Crossing with signal | | | | Unsafe lane changing |
| | 2016 | 4/10 | 18:40 | X | | Going straight – south | Emerge from behind parked vehicle | | | | Unknown |
| | | 4/17 | 14:50 | X | | Going straight – south | Crossing with signal | | | | Unknown |
| | | 4/27 | 17:30 | X | | Going straight – west | Crossing with signal | | | | Unknown |
| | | 9/20 | 14:45 | X | | Going straight – west | Crossing, no signal or crosswalk | | X | X | |
| | 2017 | 6/2 | 9:25 | X | | Going straight – east | Crossing against signal | | X | | |
| | | 6/25 | 19:28 | X | | Going straight – east | Going straight – west | | | | Alcohol involvement, Passing or lane change improperly |
| | | 7/12 | 21:45 | X | | Going straight – east | Crossing against signal | | X | | |
| | | 9/29 | 15:20 | X | | Unknown – south | Unknown | | | | Unknown |
| | | 12/8 | 13:00 | X | | Starting in traffic – south | Going straight – south | | | X | |
| Broadway/ Sixth Avenue and 34th Street | 2015 | 5/22 | 20:10 | X | | Going straight – east | Crossing, no signal or crosswalk | | | X | |
| | | 10/23 | 15:15 | X | | Going straight – north | Along highway with traffic | | | | View obstructed/ limited |
| | 2016 | 3/21 | 10:15 | X | | Going straight – east | Along highway with traffic | | | | Unknown |
| | | 7/27 | 17:00 | X | | Going straight – west | Crossing against signal | | X | X | Passenger distraction |
| | | 8/4 | 23:15 | X | | Going straight – west | Going straight – north | | | | Failure to yield R.O.W., Traffic control devices disregarded |
| | 2017 | 10/14 | 18:41 | X | | Going straight – west | Emerge from behind parked vehicle | | X | | Passing or lane usage improperly |
| | | 10/23 | 22:30 | X | | Going straight – west | Unknown | | | | Unknown |
| | | 12/14 | 18:20 | X | | Going straight – west | Crossing with signal | | X | | |

**Source:** NYCDOT January 1, 2015 and December 31, 2017 crash data

## EIGHTH AVENUE AND WEST 34TH STREET

Based on the review of the crash history at the intersection of Eighth Avenue and West 34th Street, no prevailing trends with regard to geometric deficiencies were identified as the primary causes of recorded crashes. However, it is worth noting that half of the recorded pedestrian/bicycle crashes involve a left or right turning movement conflict. The intersection is signalized and provides four high visibility crosswalks. In addition, countdown timers are present on all four crosswalks. There is also a northbound protected bike lane on Eighth Avenue with a vehicular left turn bay and mixing zone to allow turning vehicles to cross over through bicyclists. North of the intersection, Eighth Avenue has a wide pedestrian island adjacent to the curbside bike lane to provide pedestrian refuge space. In terms of project-generated activity, this intersection would experience incremental peak hour volume increases of 260 or fewer pedestrian trips at any crosswalk during either of the two analysis peak hours. This level of increase represents a small percentage (five percent) of existing and future background pedestrian volumes at the intersection and would have imperceptible effects to the intersection's operations and safety conditions. Therefore, the proposed project is not anticipated to exacerbate any of the current causes of pedestrian-related crashes. Nonetheless, additional safety measures, such as the implementation of a leading pedestrian interval for the east and west crosswalks, or restriction of some or all turning movements conflicting with pedestrians and bicycles, can be considered to further improve pedestrian and bicycle safety at this intersection.

## SEVENTH AVENUE AND WEST 34TH STREET

Based on the review of the crash history at the intersection of Seventh Avenue and West 34th Street, no prevailing trends with regard to geometric deficiencies were identified as the primary causes of recorded crashes. The intersection is signalized and provides four high visibility crosswalks. In addition, countdown timers are present on all four crosswalks. In terms of project-generated activity, this intersection would experience incremental peak hour volume increases of 70 or fewer pedestrian trips at any crosswalk during either of the two analysis peak hours. This level of increase represents a small percentage (one percent) of existing and future background pedestrian volumes at the intersection and would have imperceptible effects to the intersection's operations and safety conditions. Therefore, the proposed project is not anticipated to exacerbate any of the current causes of pedestrian-related crashes. Nonetheless, additional safety measures, such as the restriping of the south and west crosswalks, can be considered to further improve pedestrian and bicycle safety at this intersection.

## SIXTH AVENUE/BROADWAY AND WEST 34TH STREET

Based on the review of the crash history at the intersection of Sixth Avenue/Broadway and West 34th Street, no prevailing trends with regard to geometric deficiencies were identified as the primary causes of recorded crashes. The intersection is signalized and provides four high visibility crosswalks. In addition, countdown timers are present on the north, east, and south crosswalks. A regular pedestrian timer serves the west crosswalk. There is also a northbound protected bike lane on Sixth Avenue and a southbound

protected bike lane within the Broadway pedestrian plaza. In terms of project-generated activity, this intersection would experience incremental peak hour volume increases of 265 or fewer pedestrian trips at any crosswalk during either of the two analysis peak hours. This level of increase represents a small percentage (three percent) of existing and future background pedestrian volumes at the intersection. The CBD Tolling Alternative would result in an adverse pedestrian effect at the north crosswalk of this intersection, which will be fully mitigated using standard measures. Therefore the proposed project would not exacerbate any of the current causes of pedestrian-related crashes at this location. Nonetheless, additional safety measures, such as the installation of countdown timers on the west crosswalk, and bicycle signal heads on the north and south crosswalk, can be considered to further improve pedestrian and bicycle safety at this intersection.

## ADA COMPLIANCE ASSESSMENT

An assessment of corner ramps was conducted in December 2021 for locations selected for detailed pedestrian analysis using street view images captured in July and August 2021. As summarized in Table 4E.4-3, all the corners in the study area are equipped with one or more pedestrian ramps. Tactile warning strips are available where individual curb ramps for each crosswalk are installed; however, they are not provided in contrasting colors. Therefore, these corner ramps do not meet the minimum ADA compliance.

Table 4E.4-3. CBD Tolling Program Corner Pedestrian Ramp Analysis Locations: Minimum ADA Compliance Assessment

| INTERSECTION | CORNER | INDIVIDUAL CURB RAMPS FOR EACH CROSSWALK | TACTILE WARNING STRIP WITHIN CURB RAMP THAT IS OF A CONTRASTING COLOR | MINIMUM ADA COMPLIANCE? |
|---|---|---|---|---|
| Eighth Avenue and West 34th Street | Northwest | Yes | No | No |
| | Northeast | No; only one Ramp facing the intersection center | No | No |
| | Southwest | No; only one Ramp facing the intersection center | Yes | No |
| Sixth Avenue and West 34th Street | Northeast | No; only one Ramp facing the intersection center | No | No |
| Seventh Avenue and West 32nd Street | Northeast | No; only one Ramp facing the intersection center | No | No |
| Broadway and Liberty Street | Northwest | Yes | No | No |

# 4E.5, Pedestrian Analysis at Commuter Rail Stations in the Regional Study Area including the East Side Access Project

August 2022

# INTRODUCTION

This appendix follows the format and methodologies of **Subchapter 4E, "Transportation: Pedestrians and Bicycles"** to describe the potential effects of the CBD Tolling Program (the Project) on pedestrian circulation; bicycle routes and bicycle infrastructure; and vehicular, pedestrian, and bicycle safety, assuming the completion and operation of the East Side Access (ESA) Project under 2023 No Action and With Action conditions. This appendix provides revised analysis results where they differ from those without the ESA Project to evaluate lesser or greater effects of the Project with the ESA Project. Additionally, this appendix includes comparisons of the potential effects of the Project with the ESA Project to those without the ESA Project. In general, the analysis results presented in **Subchapter 4E, "Transportation: Pedestrians and Bicycles"** without the ESA Project for pedestrian circulation are more conservative, since three pedestrian elements with the potential for adverse effects with the Project are identified, as compared to one pedestrian element with the potential for adverse effects with the Project with the ESA Project, as identified in this appendix. According to the analysis of bicycles and street user safety under the alternative with the ESA Project presented herein, there would not be adverse effects, which were the same conclusions presented in **Subchapter 4E, "Transportation: Pedestrians and Bicycles"** without the ESA Project.

# PEDESTRIAN CIRCULATION

## Methodology

The analysis of pedestrian circulation in this appendix was conducted using the same *CEQR Technical Manual* methodologies and effects criteria and analysis steps outlined in **Subchapter 4E, "Transportation: Pedestrians and Bicycles."** An abbreviated summary of the analysis steps is provided:

- Based on the New York Metropolitan Transportation Council (NYMTC) Best Practice Manual (BPM) results for the Project including ESA in No Action and With Action 2023 conditions, the analysis identified all transit stations where the CBD Tolling Alternative would result in 200 or more new pedestrian trips in the busiest hour for any tolling scenario.
- For transit stations where the CBD Tolling Alternative would result in 200 or more new pedestrian trips in the peak hour for any tolling scenario, the analysis identified any specific location—such as at a particular intersection—that would have an increase of 200 or more new pedestrian trips in the peak hour.
- For transit stations where the CBD Tolling Alternative would result in 200 or more new pedestrian trips at a specific location in the peak hour for any tolling scenario, the analysis involved assigning those trips along the most direct and logical routes to workplaces, residences, and other key destinations to identify individual pedestrian elements that would experience an increase in pedestrian activity in the peak hour. Pedestrian elements are defined as the street components used by people walking,

including sidewalks, crosswalks, and street corners (called "corner reservoirs"[1]). This quantified analysis used the methodologies presented in the 2010 *Highway Capacity Manual*. Using these methodologies, the primary performance measure for pedestrian circulation is pedestrian space, expressed as square feet per pedestrian (SFP), which indicates the quality of pedestrian movement and comfort. The calculation of SFP was based on the pedestrian volumes by direction, the effective sidewalk or walkway width, and pedestrians' average walking speeds. The SFP formed the basis for a sidewalk Level of Service (LOS) analysis.[2]

- At transit stations where the increase in pedestrians would be fewer than 200 people in the peak hour at any specific location, no adverse effect would occur to pedestrian conditions for any tolling scenario, based on the *CEQR Technical Manual* guidance.

### *Tolling Scenario Selected for this Pedestrian Analysis*

Similar to **Subchapter 4E, "Transportation: Pedestrians and Bicycles"**, the tolling scenario that would result in the greatest increase in new pedestrian trips at transit stations within the Manhattan CBD, Tolling Scenario E, was used for quantified analysis of the 2023 With Action condition including ESA.

### *Locations for Pedestrian Analysis*

The CBD Tolling Alternative without the ESA Project identified 16 transit stations—both within and outside the Manhattan CBD—that would result in more than 200 new peak-hour pedestrian trips (refer to **Figure 4E-1** and **Table 4E-1**). Fifteen of those transit stations would similarly result in more than 200 new peak-hour pedestrian trips with the ESA Project, with only the Secaucus NJ TRANSIT station being excluded. The CBD Tolling Alternative with the ESA Project would not result in any additional transit stations that would exceed more than 200 new peak-hour pedestrian trips. **Figure 4E.5-1 and Table 4E.5-1** shows the pedestrian analysis study area with the ESA Project.

Following the steps described in the discussion of methodology, three areas (**Table 4E.5-1 and Figure 4E.5-1**) would have more than 200 new pedestrians in the peak hour at an individual pedestrian element (i.e., crosswalk, sidewalk, or corner reservoir). Those areas are as follows:

- Herald Square/Penn Station New York
- Grand Central Terminal
- World Trade Center/Fulton Street

Two of these areas, Herald Square/Penn Station New York and World Trade Center/Fulton Street similarly exceeded 200 new pedestrians in the peak hour at one or more individual pedestrian elements without the ESA Project. Grand Central Terminal would also exceed 200 new pedestrians in the peak hour at one or

[1] As described in **Appendix 4E.1, "Transportation: Methodologies and Adverse Effect Criteria,"** corner reservoirs are the corner areas of sidewalks, serving both standing pedestrians (queued to cross a street) and circulating pedestrians (crossing the street or moving around the corner).

[2] As described in **Appendix 4E.1**, LOS is a scale used to describe the operations of traffic, transit, or pedestrian facilities based on quantified information. LOS ranges from A (uncongested) to F (substantially congested/poor operation). The specific parameters used to define LOS vary by the type of analysis.

more individual pedestrian elements with the ESA Project. There would be imperceptible volume differences (fewer than 20 pedestrians per peak hour) at World Trade Center/Fulton Street with the ESA Project, such that the conclusions presented without the ESA Project (in **Subchapter 4E, "Transportation: Pedestrians and Bicycles"**) would not change and the CBD Tolling Alternative would similarly not result in any adverse pedestrian effects at pedestrian elements near World Trade Center/Fulton Street. Hence, revised analyses for the World Trade Center/Fulton Street area are not presented in this appendix. The pedestrian trips at Herald Square/Penn Station New York with the ESA Project would be approximately 18-percent lower than without the ESA Project. Since adverse effects and project improvement measures were previously disclosed at Herald Square/Penn Station New York, revised analyses are presented within this appendix. New analyses are presented for Grand Central Terminal within this appendix.

## Affected Environment

The existing pedestrian circulation conditions are presented in this section to characterize the affected environment for the Project. For the two station areas where the CBD Tolling Alternative would result in 200 or more new pedestrians in the peak hour at any pedestrian element where revised quantified analyses were performed under the alternative with the ESA Project—Herald Square/Penn Station New York and Grand Central Terminal—the next step was to identify specific locations that would experience this level of new pedestrian trips because of the Project. Pedestrian trips generated by the Project were distributed among different station entrances to the street network, and pedestrian elements which would incur 200 or more trips in the peak hour were selected for detailed analysis, as presented following the existing conditions summary. At these locations, the analysis used detailed information on existing pedestrian volumes and physical layout of the intersection (e.g., sidewalk and crosswalk widths, the presence of street furniture) to evaluate conditions in the affected environment. There have been no major changes in the geometric layouts of the locations analyzed since 2019.

## Figure 4E.5-1. Pedestrian Analysis Study Area


Sources: ArcGIS Online, https://www.arcgis.com/index.html.

Table 4E.5-1. Transit Station Pedestrian Trip Assessment with the ESA Project

| TRANSIT STATIONS THAT WOULD HAVE MORE THAN 200 NEW PEDESTRIANS PER HOUR | INDIVIDUAL PEDESTRIAN ELEMENT THAT WOULD HAVE MORE THAN 200 NEW PEDESTRIANS PER HOUR |
|---|---|
| 1. 14 Street–Union Square, Manhattan CBD (Nos. 4/5/6, and L/N/R/Q/W subway lines) | No |
| 2. Herald Square/Penn Station New York, Manhattan CBD, includes the following:<br>a. 34 Street–Herald Square subway station (B/D/F/ M/N/Q/R/W subway lines)<br>b. 34 Street–Penn Station subway station (Nos. 1/2/3 subway lines)<br>c. 34 Street–Penn Station subway station (A/C/E subway lines)<br>d. 33rd Street Port Authority Trans-Hudson (PATH) Station<br>e. New York Pennsylvania Station (Amtrak, Long Island Rail Road [LIRR], NJ TRANSIT) | Yes |
| 3. 42 Street–Bryant Park, Manhattan CBD (B/D/F/M subway lines and connection to Fifth Avenue [No. 7 subway line]) | No |
| 4. 47-50 Streets-Rockefeller Center, Manhattan CBD (B/D/F/M subway lines) | No |
| 5. Broadway–Lafayette Street, Manhattan CBD (B/D/F/M and No. 6 subway lines) | No |
| 6. Canal Street, Manhattan CBD (J/N/Q/R/W/Z and No. 6 subway lines) | No |
| 7. Canal Street, Manhattan CBD (A/C/E subway lines) | No |
| 8. World Trade Center/Fulton Street, Manhattan CBD, includes the following:<br>a. Fulton Street subway stations (Nos. 2/3/4/5 and A/C/J/Z subway lines)<br>b. World Trade Center Station (PATH)<br>c. Cortlandt Street Station (R/W subway lines) | Yes |
| 9. Flushing Main Street, Queens County, New York (No. 7 subway line) | No |
| 10. Atlantic Terminal, Kings County (Brooklyn), New York, includes the following:<br>a. Atlantic Avenue-Barclays Center subway station (Nos. 2/3/4/5 and B/D/N/Q/R/W subway lines)<br>b. Atlantic Terminal (LIRR) | No |
| 11. Grand Central Terminal, Manhattan CBD, includes the following:<br>a. 42 Street–Grand Central subway station (Nos. 4/5/6/7 and S subway lines)<br>b. Grand Central Terminal (Metro-North Railroad) | Yes |
| 12. Lexington Avenue/53 Street, Manhattan CBD (E/M subway lines and connection to 51 Street [No. 6 subway line]) | No |
| 13. Second Avenue, Manhattan CBD (F/M subway lines) | No |
| 14. Wall Street, Manhattan CBD (Nos. 2/3 subway lines) | No |
| 15. Hoboken Terminal, Hudson County, New Jersey (PATH and NJ TRANSIT) | No |

Existing pedestrian and traffic data were collected in June and October 2019 at the analysis locations adjacent to Herald Square/Penn Station New York and Grand Central Terminal using the methodologies presented in Subchapter 4E, "Transportation: Pedestrians and Bicycles" to establish the peak hours of activity that would be affected by the Project. Using the methodology presented for pedestrian circulation, this section summarizes and Table 4E.5-2 presents the LOS analysis results for the study area pedestrian elements near the two transit station areas that were evaluated for differences under the alternative with the ESA Project (as previously stated, there would be no change in the analysis results or conclusions at the pedestrian elements analyzed at the World Trade Center/Fulton Street station area, and

the analysis results for that station area are not repeated in this appendix). The locations of all pedestrian elements considered in the analysis of the alternative with the ESA Project (including World Trade Center/Fulton Street pedestrian elements) are presented in Figure 4E.5-2. Existing pedestrian LOS tables and peak-hour pedestrian volume figures are presented at the end of this appendix (Tables 4E.5-5 through 4E.5-8 and Figures 4E.5-3 through 4E.5-6.

Table 4E.5-2. Existing Conditions Pedestrian Analysis Results with the ESA Project (2019)

| TRANSIT STATION AREA | PEAK HOUR | PEDESTRIAN ELEMENT | NUMBER OF ANALYSIS LOCATIONS | NUMBER OF LOCATIONS THAT OPERATE AT | | | |
|---|---|---|---|---|---|---|---|
| | | | | LOS C or Better | LOS D | LOS E | LOS F |
| Herald Square/Penn Station New York | AM | Sidewalks | 4 | 4 | 0 | 0 | 0 |
| | | Corner Reservoirs | 4 | 4 | 0 | 0 | 0 |
| | | Crosswalks | 2 | 1 | 0 | 1 | 0 |
| | PM | Sidewalks | 4 | 4 | 0 | 0 | 0 |
| | | Corner Reservoirs | 4 | 4 | 0 | 0 | 0 |
| | | Crosswalks | 2 | 1 | 0 | 0 | 1 |
| Grand Central Terminal | AM | Sidewalks | 1 | 0 | 0 | 1 | 0 |
| | PM | Sidewalks | 1 | 0 | 0 | 1 | 0 |

Figure 4E.5-2. Pedestrian Analysis Locations and Adverse Effects


Sources: ArcGIS Online, https://www.arcgis.com/index.html.

The following two sections provide further detail on the pedestrian elements and results presented in the above table, and briefly describe the process by which the pedestrian elements were selected for detailed analysis using the previously presented methodology.

### *Herald Square/Penn Station New York*

The detailed assignment of pedestrian trips near Herald Square/Penn Station New York resulted in a maximum of 1,695 new pedestrian trips in either peak hour with the ESA Project (2,051 without the ESA Project), which would result in 200 or more peak-hour pedestrian trips at the following 10 pedestrian elements:

- North sidewalk of West 34th Street between Seventh and Eighth Avenues
- North sidewalk of West 34th Street between Broadway and Seventh Avenue
- North sidewalk of West 34th Street between Seventh Avenue and Broadway
- North sidewalk of West 32nd Street between Sixth and Seventh Avenues
- Northwest corner of Eighth Avenue and West 34th Street
- Southwest corner of Eighth Avenue and West 34th Street
- Northeast corner of Eighth Avenue and West 34th Street
- Northeast corner of Sixth Avenue and West 34th Street
- North crosswalk of Eighth Avenue and West 34th Street
- North crosswalk of Sixth Avenue and West 34th Street

All of these 10 pedestrian elements were previously analyzed in Subchapter 4E, "Transportation: Pedestrians and Bicycles". Most of these pedestrian elements operate at LOS D (which is considered marginally acceptable) operations or better. The following location operates at congested LOS E or LOS F conditions:

The north crosswalk of Sixth Avenue and West 34th Street operates at LOS E in the AM peak hour and LOS F in the PM peak hour.

The following four pedestrian elements that were previously analyzed would no longer exceed the analysis threshold of 200 or more peak-hour pedestrian trips with the ESA Project:

- West sidewalk of Eighth Avenue between West 35th and West 34th Streets
- North sidewalk along West 34th Street between Sixth and Fifth Avenues
- Northeast corner of Seventh Avenue and West 32nd Street
- North crosswalk of Seventh Avenue and West 32nd Street

Furthermore, at two of these pedestrian elements (the west sidewalk of Eighth Avenue between 35th and West 34th Streets and the north crosswalk of Seventh Avenue and West 32nd Street), there would not be the potential for adverse pedestrian effects under the alternative with the ESA Project, and project improvements would not be necessary.

### *Grand Central Terminal*

Based on the detailed assignment of pedestrian trips near Grand Central Terminal (1,407 new pedestrian trips in the peak hour with the ESA Project compared to 1,205 without the ESA Project), the CBD Tolling Alternative would result in 200 or more peak-hour pedestrian trips at the following pedestrian element:

- West sidewalk of Lexington Avenue between East 44th and East 45th Streets

This pedestrian element operates at LOS E during both peak hours.

## Environmental Consequences

### *No Action Alternative*

Under the No Action Alternative, the Project Sponsors would not implement a vehicular tolling program. Pedestrian volumes would be similar to pre-pandemic levels as described above. No Action Alternative pedestrian volumes for all analysis locations were increased by 0.5 percent to reflect potential growth from new development in the area. Additionally, for the Grand Central Terminal area, pedestrian trips from the One Vanderbilt project—which is a very large commercial office building that was completed after existing pedestrian counts were collected in 2019—were also included in the pedestrian volume projections for the No Action Alternative. According to the latest ESA Project passenger flow projections, the specific pedestrian element being analyzed for the CBD Tolling Alternative with the ESA Project in the Grand Central Terminal area (the west sidewalk of Lexington Avenue between East 45th and East 45th Streets) would not have additional pedestrian volumes from the ESA Project; therefore, only the background growth rate and any applicable One Vanderbilt project trips were added in the No Action. For the Herald Square/Penn Station New York station area, to be conservative, the benefits of the reduced activity from the ESA Project were not reflected in the No Action. In the No Action Alternative, all the analysis locations would continue to operate at the same LOS as existing conditions. No Action Alternative pedestrian LOS tables and peak-hour pedestrian volume figures are presented at the end of this appendix (Tables 4E.5-9 through 4E.5-12 and Figures 4E.5-7 through 4E.5-10).

### *CBD Tolling Alternative*

This section describes the effects of the CBD Tolling Alternative on future pedestrian conditions at the Herald Square/Penn Station New York and Grand Central Terminal station areas. As previously stated, future pedestrian conditions would not change with the ESA Project at the World Trade Center/Fulton Street station area, and the results are not repeated in this appendix.

At the other transit stations presented in Table 4E.5-1 aside from the three identified as having one or more pedestrian elements with greater than 200 pedestrians per hour, the volume of pedestrian trips would be distributed among different station entrances and different locations around the station, and the CBD Tolling Alternative would not result in adverse effects on pedestrian conditions with the ESA Project. Additionally, because the additional volume of pedestrian trips generated by the Project adjacent to all other transit facilities in the regional study area would be even lower than at commuter rail and subway

stations presented in Table 4E.5-1, the CBD Tolling Alternative would not result in adverse effects on pedestrian conditions at other transit facilities.

For the Herald Square/Penn Station New York and Grand Central Terminal areas, the revised projected increments for Tolling Scenario E, based on the BPM results, were added to the No Action Alternative volumes to determine the CBD Tolling Alternative volumes (Table 4E.5-3). With Action pedestrian LOS tables and peak-hour pedestrian volume figures are presented at the end of this appendix (Tables 4E.5-13 through 4E.5-21 and Figures 4E.5-11 through 4E.5-18).

Table 4E.5-3. CBD Tolling Alternative Pedestrian Analysis Results with the ESA Project

| TRANSIT STATION AREA | PEAK HOUR | PEDESTRIAN ELEMENT | NUMBER OF ANALYSIS LOCATIONS | NUMBER OF LOCATIONS THAT OPERATE AT | | | |
|---|---|---|---|---|---|---|---|
| | | | | LOS C or Better | LOS D | LOS E | LOS F |
| Herald Square/Penn Station New York | AM | Sidewalks | 4 | 3 | 1 | 0 | 0 |
| | | Corner Reservoirs | 4 | 4 | 0 | 0 | 0 |
| | | Crosswalks | 2 | 1 | 0 | 1 | 0 |
| | PM | Sidewalks | 4 | 4 | 0 | 0 | 0 |
| | | Corner Reservoirs | 4 | 4 | 0 | 0 | 0 |
| | | Crosswalks | 2 | 1 | 0 | 0 | 1 |
| Grand Central Terminal | AM | Sidewalks | 1 | 0 | 0 | 1 | 0 |
| | PM | Sidewalks | 1 | 0 | 0 | 1 | 0 |

## Herald Square/Penn Station New York

As under existing and No Action Alternative conditions, with implementation of the CBD Tolling Alternative, all analysis locations near Herald Square/Penn Station New York would operate at marginally acceptable LOS D or better except for the following:

- The north crosswalk of Sixth Avenue and West 34th Street would operate at LOS E in the AM peak hour and LOS F in the PM peak hour.

Although there would be no change in the number of congested LOS E or LOS F pedestrian elements with or without the Project, there would be slight deteriorations in SFP values. Based on the *CEQR Technical Manual* adverse effects criteria presented in Appendix 4E.1, the CBD Tolling Alternative would result in adverse pedestrian effects near Herald Square/Penn Station New York, as follows:

- The Sixth Avenue and West 34th Street north crosswalk would operate at LOS E with a decrease of 1.8 SFP in the AM peak hour and at LOS F with a decrease of 0.6 SFP in the PM peak hour compared to the No Action Alternative.

The potential adverse effects at this location can be resolved through standard measures that will be implemented as part of the Project. This measure would not affect existing bicycle infrastructure in the street. Increased pedestrian space on the crosswalk can be achieved via physical widening. Table 4E.5-4 shows the recommended measure and predicted conditions with the implementation. This measure will

be developed in coordination with NYCDOT prior to its implementation. Table 4E.5-4 also notes the relative ease of implementation of the recommended measure.

Table 4E.5-4. No Action Alternative, CBD Tolling Alternative, and CBD Tolling Alternative with Improvement Measures with the ESA Project—Pedestrian Level of Service Analysis—Herald Square/Penn Station New York

| LOCATION | PROJECT IMPROVEMENT MEASURES | NO ACTION | | CBD TOLLING | | CBD TOLLING (IMPROVED) | |
|---|---|---|---|---|---|---|---|
| | | SFP | LOS | SFP | LOS | SFP | LOS |
| **Weekday AM Peak Hour** | | | | | | | |
| Sixth Avenue and West 34th Street: north crosswalk | Widen the crosswalk by 1.5 feet (easy to implement). Crosswalk widening of 2.0 feet needed without the ESA Project. | 12.8 | E | 11.0 | E | 12.0 | E |
| **Weekday PM Peak Hour** | | | | | | | |
| Sixth Avenue and West 34th Street: north crosswalk | Widen the crosswalk by 1.5 feet (easy to implement). Crosswalk widening of 2.0 feet needed without the ESA Project. | 6.8 | F | 6.2 | F | 6.8 | F |

As discussed above, the adverse effects and project improvement measures presented in Subchapter 4E, "Transportation: Pedestrians and Bicycles" on the west sidewalk of Eighth Avenue between 35th and West 34th Streets and the north crosswalk of Seventh Avenue and West 32nd Street without the ESA Project would not occur with the ESA Project.

### Grand Central Terminal

With implementation of the CBD Tolling Alternative, the west sidewalk of Lexington Avenue between East 44th and East 45th Streets during the AM and PM peak hours would continue to operate at LOS E, with decreases of 1.0 SFP in both peak hours compared to the No Action Alternative. Based on the expected LOS and the *CEQR Technical Manual* adverse effects criteria, the CBD Tolling Alternative would not result in any adverse pedestrian effects at this or any other pedestrian elements near Grand Central Terminal.

## BICYCLES

## Methodology

Similar to Subchapter 4E, "Transportation: Pedestrians and Bicycles", the expected increase in bicycle trips at Herald Square/Penn Station New York and Grand Central Terminal, was prepared for the alternative with the ESA Project. There would be imperceptible volume differences (fewer than 20 pedestrians per peak hour) at the World Trade Center/Fulton Street station area; therefore, an assessment of bicycles with the ESA Project is not repeated herein since there would be no change in conclusions as compared to the Project without the ESA Project. The qualitative assessment compares the inventory of existing and

proposed bicycle facilities surrounding station areas that would generate the highest volume of bicycle trips from the Project to the estimated volume of peak-hour bicycle trips generated by the Project to determine the potential for adverse effects. Conditions with the ESA Project, and in comparison to results without the ESA Project presented in **Subchapter 4E, "Transportation: Pedestrians and Bicycles"** are described below.

## Affected Environment

An abbreviated summary of the Affected Environment presented in **Subchapter 4E, "Transportation: Pedestrians and Bicycles"** has been included to describe conditions with the ESA Project near the aforementioned station areas. In the Manhattan CBD, several north–south avenues and many cross-streets have bicycle lanes that provide delineated bicycle travel adjacent to or separated from vehicular traffic. The bicycle network also connects to dedicated bicycle paths on the bridges to Brooklyn, Queens, and the Bronx, via the Staten Island Ferry to Staten Island, and across the George Washington Bridge to New Jersey. Encircling much of Manhattan, dedicated bikeways or shared-use paths extend through the length of most of Hudson River Park and the West Side Highway/Route 9A from the southern tip of Manhattan to the island's northern boundary with few gaps. Dedicated bikeways or shared-use paths also extend along much of the East Side along the East River waterfront.[3] North–south avenues (First, Second, Sixth, Seventh, Eighth, and Ninth Avenues) have bicycle lanes, and crosstown (east–west) bicycle lanes through the Manhattan CBD generally run in pairs on adjacent one-way streets, with small intervals between pairs. A summary of recently completed and future plans by NYCDOT for expansion of bicycle facilities in the Manhattan CBD can be found in **Subchapter 4E, "Transportation: Pedestrians and Bicycles."**

New York City has the nation's largest bicycle-sharing program—Citi Bike. People can rent bicycles at a kiosk or use a mobile app to pick up and return bicycles at any Citi Bike station. Approximately 1,300 Citi Bike stations with 20,000 bicycles are in New York City and approximately 260 Citi Bike stations with 6,000 bicycles are in the Manhattan CBD.[4] NYCDOT and Lyft (the operator of Citi Bike) plan to expand the system to serve additional neighborhoods by 2024. Citi Bike's Phase 3 plan will double the size of the Citi Bike service area and triple the number of shared bicycles.

## Environmental Consequences

### *No Action Alternative*

In the No Action Alternative with the ESA Project, there would not be a vehicular tolling program, and any changes in bicycling would likely result from background growth, improvements in cycling infrastructure and Citi Bike service, or new development in an area.

### *CBD Tolling Alternative*

As described above, the CBD Tolling Alternative with the ESA Project would result in increases in peak-hour pedestrian volumes high enough to warrant detailed pedestrian analysis near the Herald Square/Penn

[3] https://www1.nyc.gov/html/dot/downloads/pdf/nyc-bike-map-2021.pdf.
[4] Citibike, https://www.citibikenyc.com/.

Station New York, Grand Central Terminal, and World Trade Center/Fulton Street transit hubs. Because expected higher bicycle use would be concentrated at transit hubs with the highest projected increases in pedestrian trips, these areas have been assessed for bicycle effects. As previously stated, there would be imperceptible volume differences (fewer than 20 pedestrians per peak hour) at the World Trade Center/Fulton Street station area with the ESA Project. Therefore, the same conclusion from **Subchapter 4E, "Transportation: Pedestrians and Bicycles"** can be drawn, which was that bicycle trip increases with the Project would be negligible compared to the magnitude of existing bicycle use adjacent to that transit station complex. Next, a comparison of pedestrian trips at the two other transit hubs with and without the ESA Project is presented. With up to 1,695 and 1,407 pedestrian trips, 34 and 28 new hourly bicycle trips would be generated by the Project at Herald Square/Penn Station New York and Grand Central Terminal with the ESA Project, assuming a 2 percent bike share, respectively. This is in comparison to 2,051 and 1,205 new pedestrian trips predicted in the peak hours, where 41 and 24 new hourly bicycle trips would be generated by the Project at Herald Square/Penn Station New York and Grand Central Terminal without the ESA Project, assuming a 2 percent bike share, respectively. With or without the ESA Project, because there would be an average of fewer than one new bicycle trip per minute, these increases would be negligible compared to the magnitude of existing bicycle use adjacent to the two transit station complexes.

Outside the Manhattan CBD under the alternative with the ESA Project, the shift to bicycle use because of the CBD Tolling Alternative would not be substantial, based on the predicted numbers of commuters who would shift from automobiles to transit for their daily trips (as well as the inefficiencies of switching from auto to bicycle as distances increase). Although the BPM cannot predict such activity, a small proportion of commuters would shift from automobiles to bicycles for their daily trips, depending on distance, available bicycle facilities, comfort, and other factors. Therefore, the CBD Tolling Alternative would not result in any adverse effects on bicycle operations.

## VEHICULAR AND PEDESTRIAN SAFETY

### Methodology

Conditions with the ESA Project, and in comparison to results without the ESA Project presented in **Subchapter 4E, "Transportation: Pedestrians and Bicycles"** are described below. The same methodologies have been used to evaluate the vehicular, bicycle, and vehicular safety conditions with the ESA Project.

### Affected Environment

**Subchapter 4E, "Transportation: Pedestrians and Bicycles"** identified high crash locations at pedestrian element analysis locations without the ESA Project. Three intersections were identified:

- West 34th Street at Eighth Avenue
- West 34th Street at Seventh Avenue
- West 34th Street at Sixth Avenue/Broadway

With ESA, one additional pedestrian element (the west sidewalk of Lexington Avenue between East 44th and East 45th Streets) has been added. The nearest intersection to that sidewalk, Lexington Avenue at East 44th Street is not a high crash location.

Without ESA, to assess minimum ADA compliance of curb pedestrian ramps in the affected environment, curb pedestrian ramp observations were conducted at analysis locations that included corner reservoir pedestrian elements. With ESA, no new corner reservoir pedestrian elements would be added to the study area.

## Environmental Consequences

### *No Action Alternative*

In the No Action Alternative with the ESA Project, there would not be a vehicular tolling program, and any changes in safety conditions at high-crash intersections or non-compliant ADA curb pedestrian ramps would likely result from changes in activity resulting from background growth or new development in an area.

### *CBD Tolling Alternative*

The CBD Tolling Alternative with the ESA Project would not result in substantial increases in pedestrian volumes or exacerbate safety concerns at the three identified high-crash locations, which experience high pedestrian volumes throughout the day. The CBD Tolling Alternative with the ESA Project would also not result in substantial increases in pedestrian volumes or exacerbate safety concerns at other locations in the Manhattan CBD that do not already experience high pedestrian volumes throughout the day. The CBD Tolling Alternative with the ESA Project would not result in substantially modified geometric or operational traffic, pedestrian, or bicycle conditions, with or without recommended improvement measures, which would therefore not exacerbate safety concerns. Also, because of fewer vehicular trips entering and exiting the Manhattan CBD, the CBD Tolling Alternative with the ESA Project would result in reduced traffic volumes at these locations. This would help to reduce vehicle-vehicle and vehicle-pedestrian conflicts, leading to an overall benefit to safety. Therefore, the CBD Tolling Alternative with the ESA Project would not result in any adverse effects on vehicular, pedestrian, and bicycle safety.

Figure 4E.5-3. 2019 Existing Pedestrian Volumes – Grand Central Terminal Study Area: Weekday AM Peak Hour

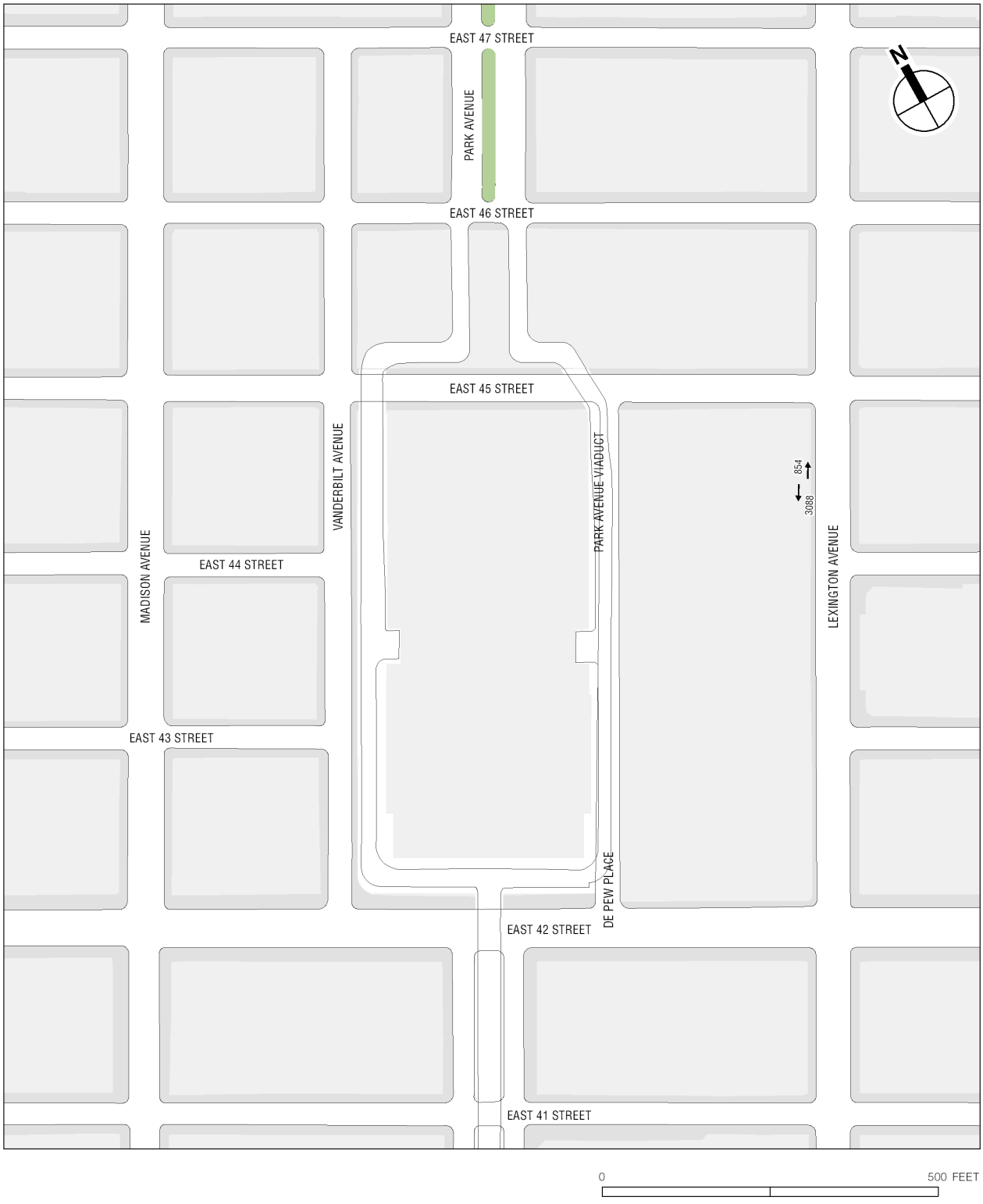


Figure 4E.5-4. 2019 Existing Pedestrian Volumes – Grand Central Terminal Study Area: Weekday PM Peak Hour

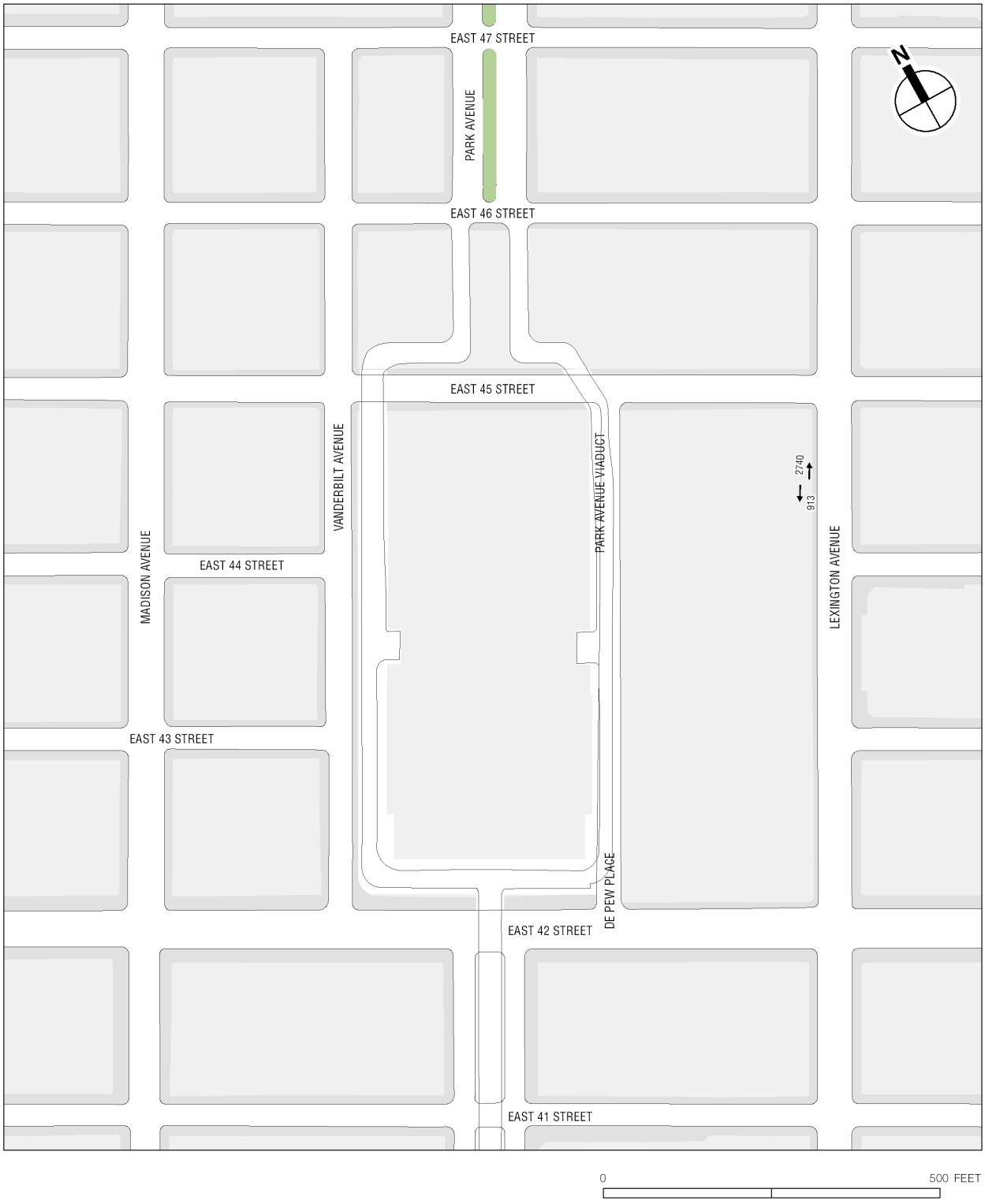


Figure 4E.5-5. 2019 Existing Pedestrian Volumes – Herald Square/Penn Station Study Area: Weekday AM Peak Hour

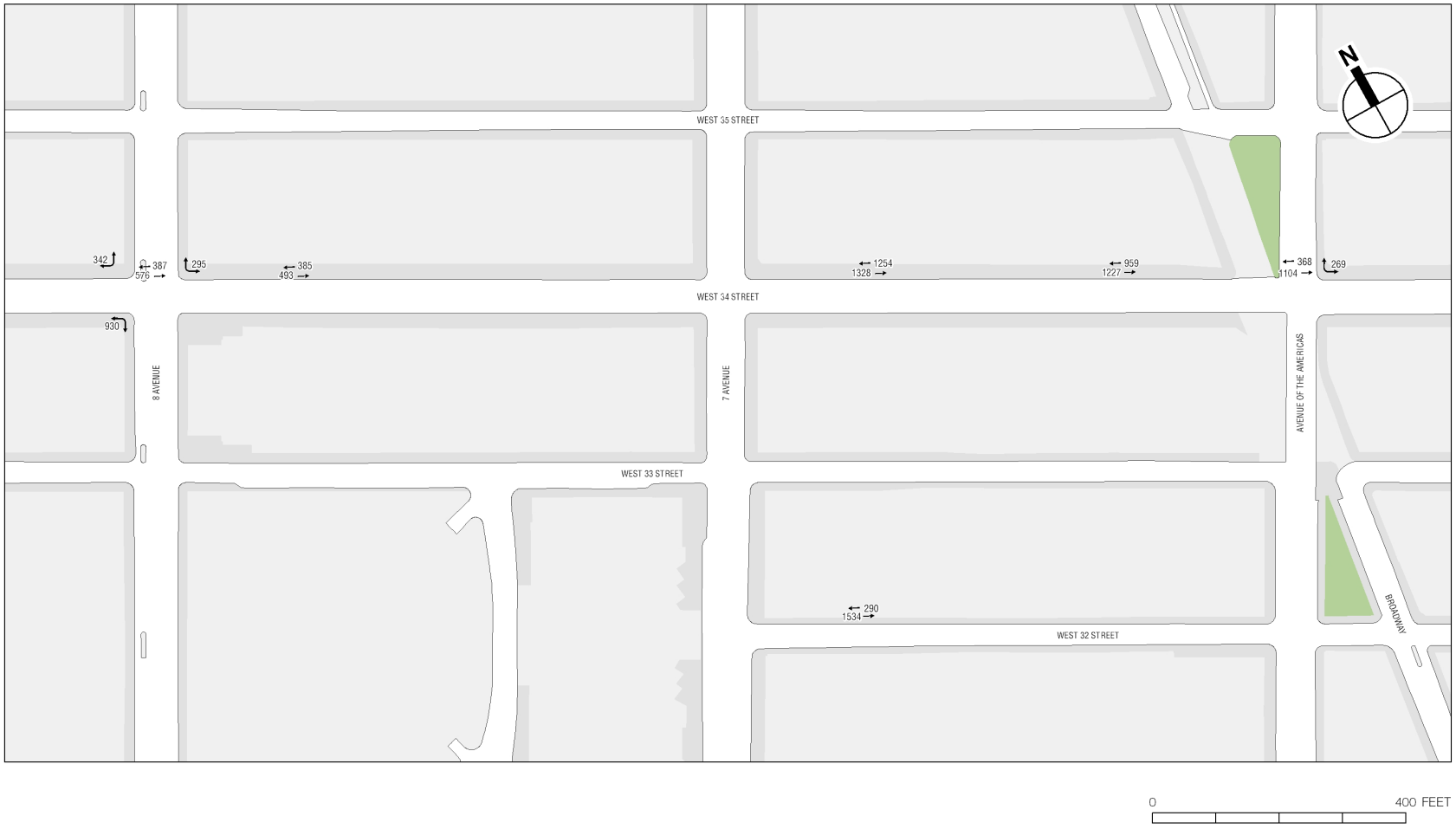


Figure 4E.5-6. 2019 Existing Pedestrian Volumes – Herald Square/Penn Station Study Area: Weekday PM Peak Hour

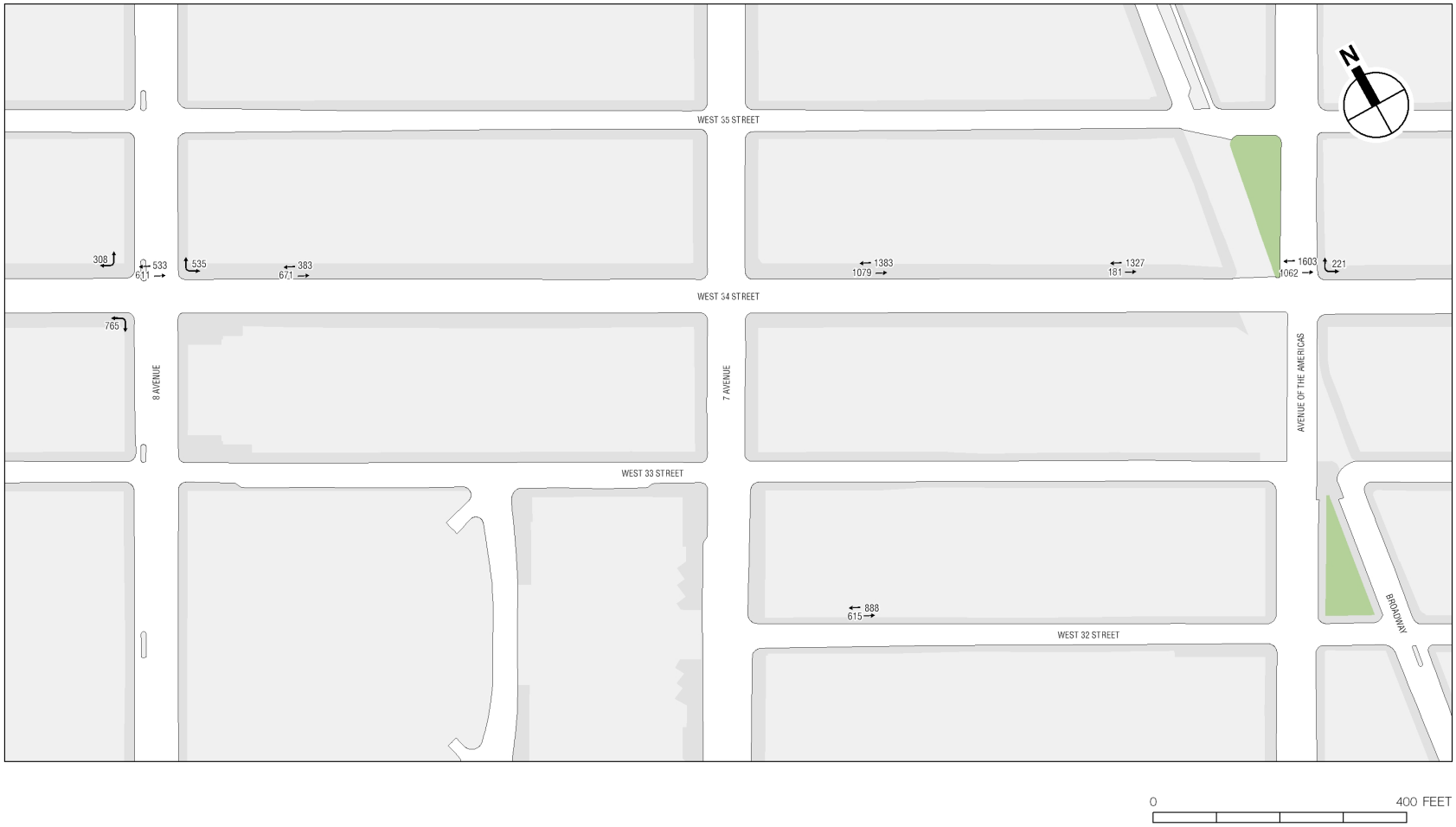
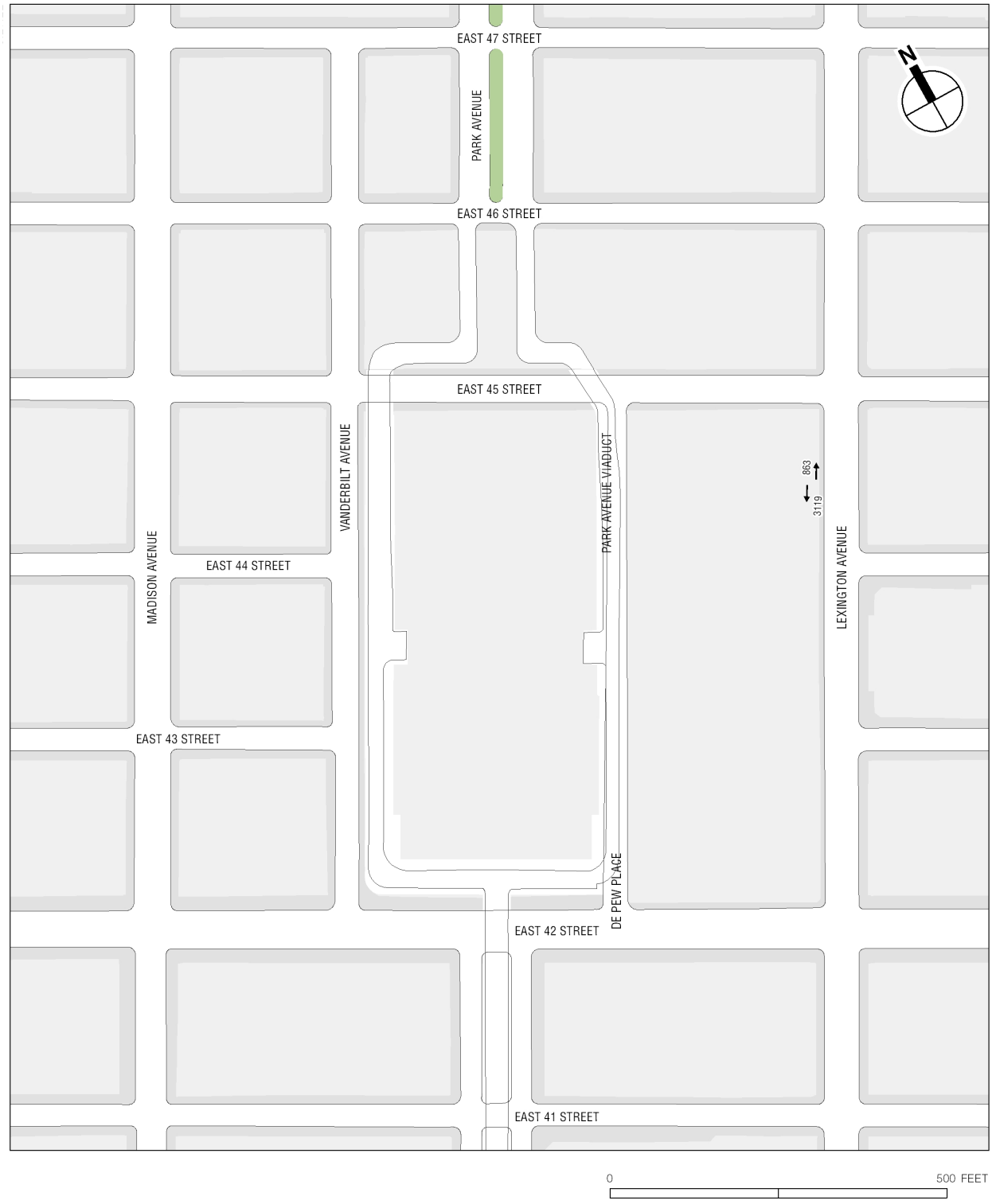


Figure 4E.5-7. No Action Alternative Pedestrian Volumes – Grand Central Terminal Study Area: Weekday AM Peak Hour



## Figure 4E.5-8. No Action Alternative Pedestrian Volumes – Grand Central Terminal Study Area: Weekday PM Peak Hour

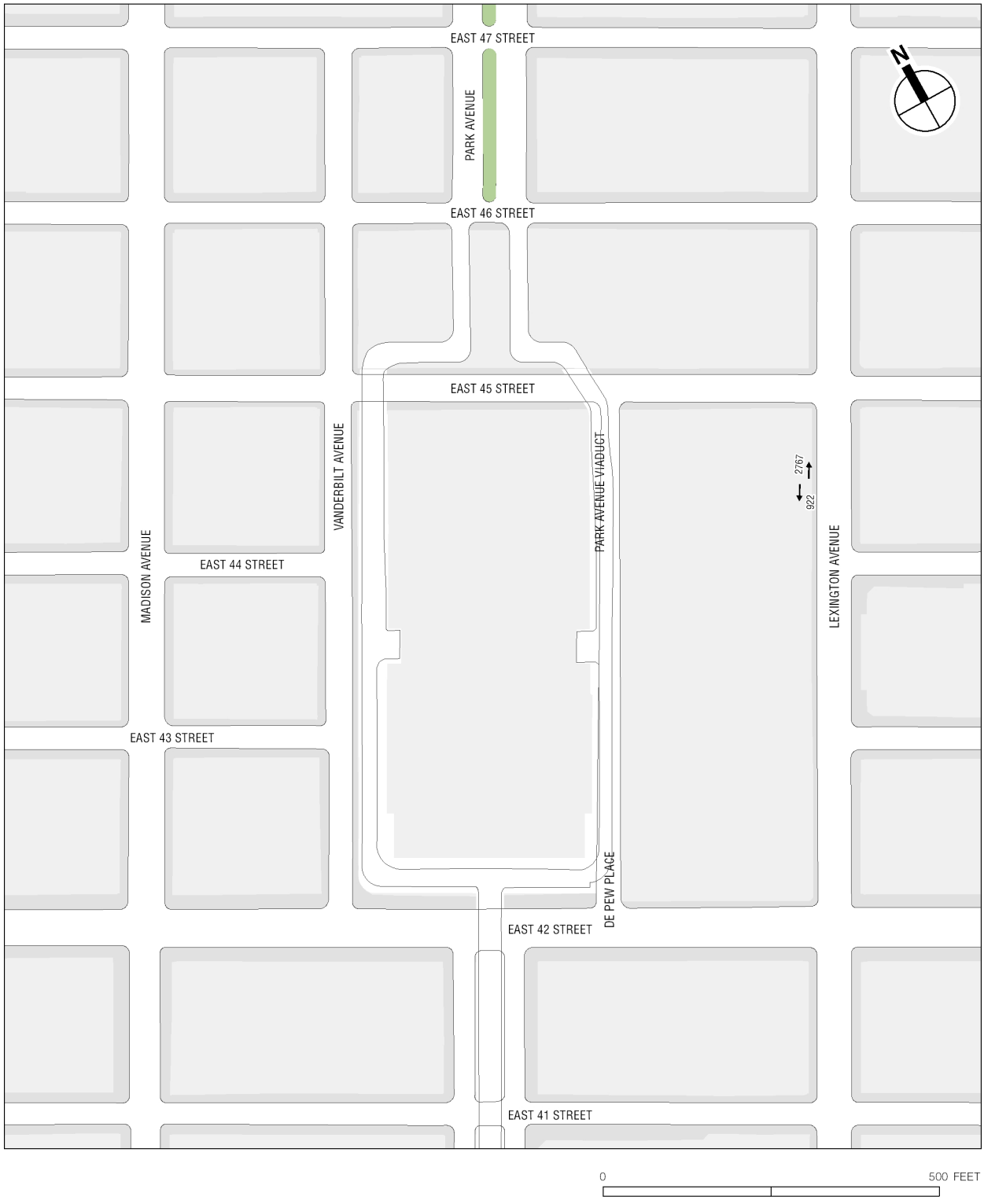
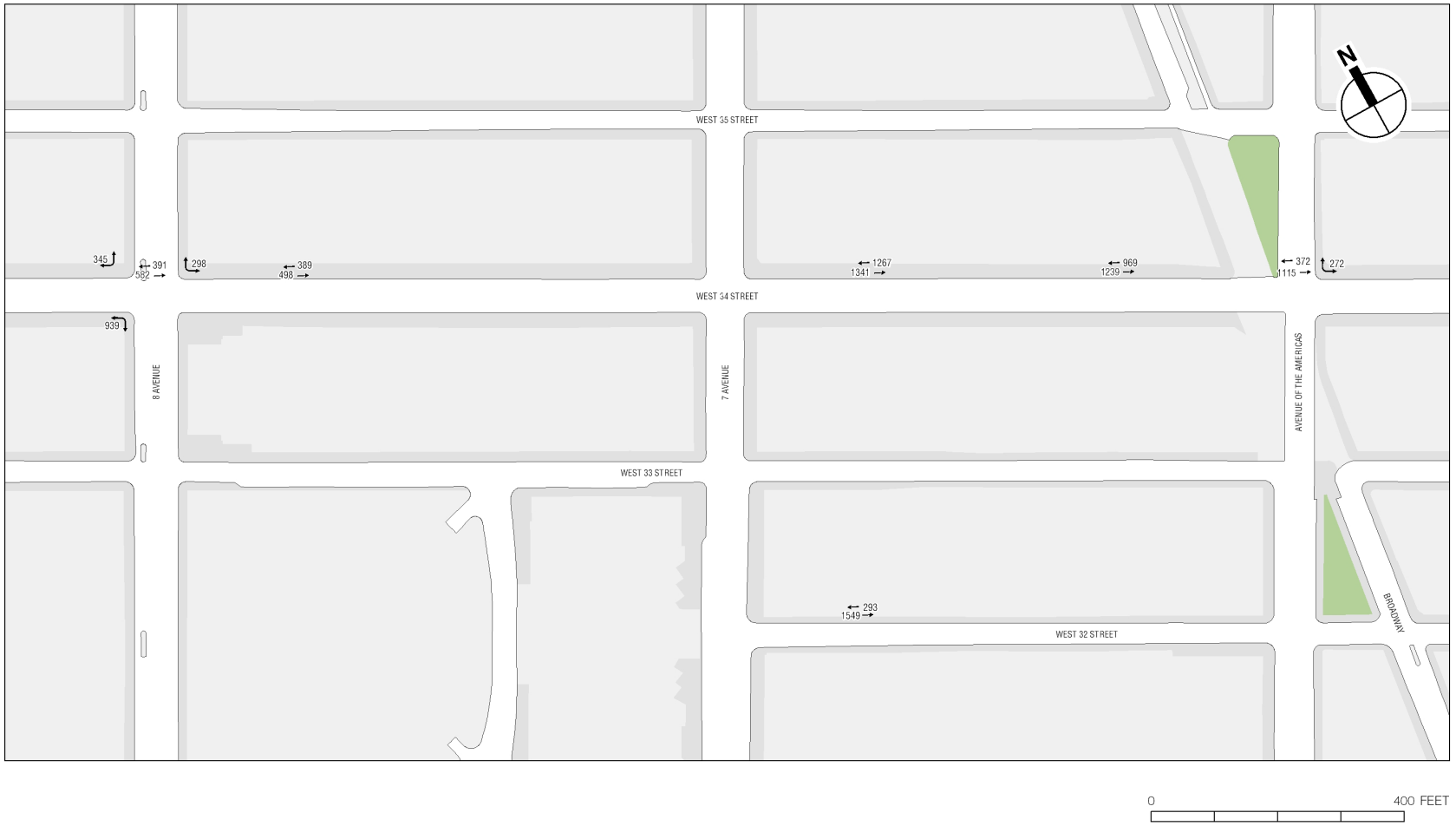


Figure 4E.5-9. No Action Alternative Pedestrian Volumes –Herald Square/Penn Station Study Area: Weekday AM Peak Hour



## Figure 4E.5-10. No Action Alternative Pedestrian Volumes –Herald Square/Penn Station Study Area: Weekday PM Peak Hour

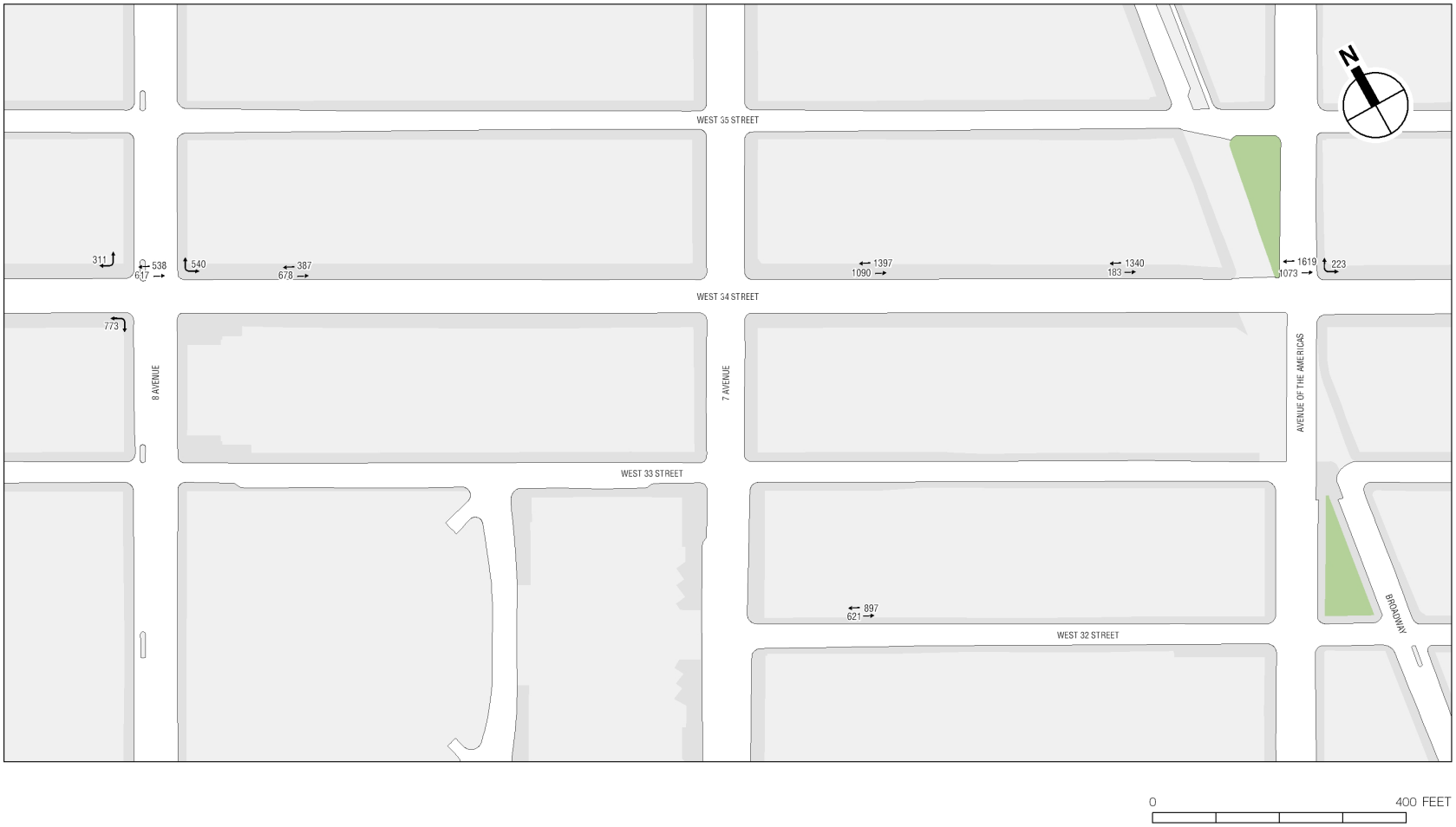
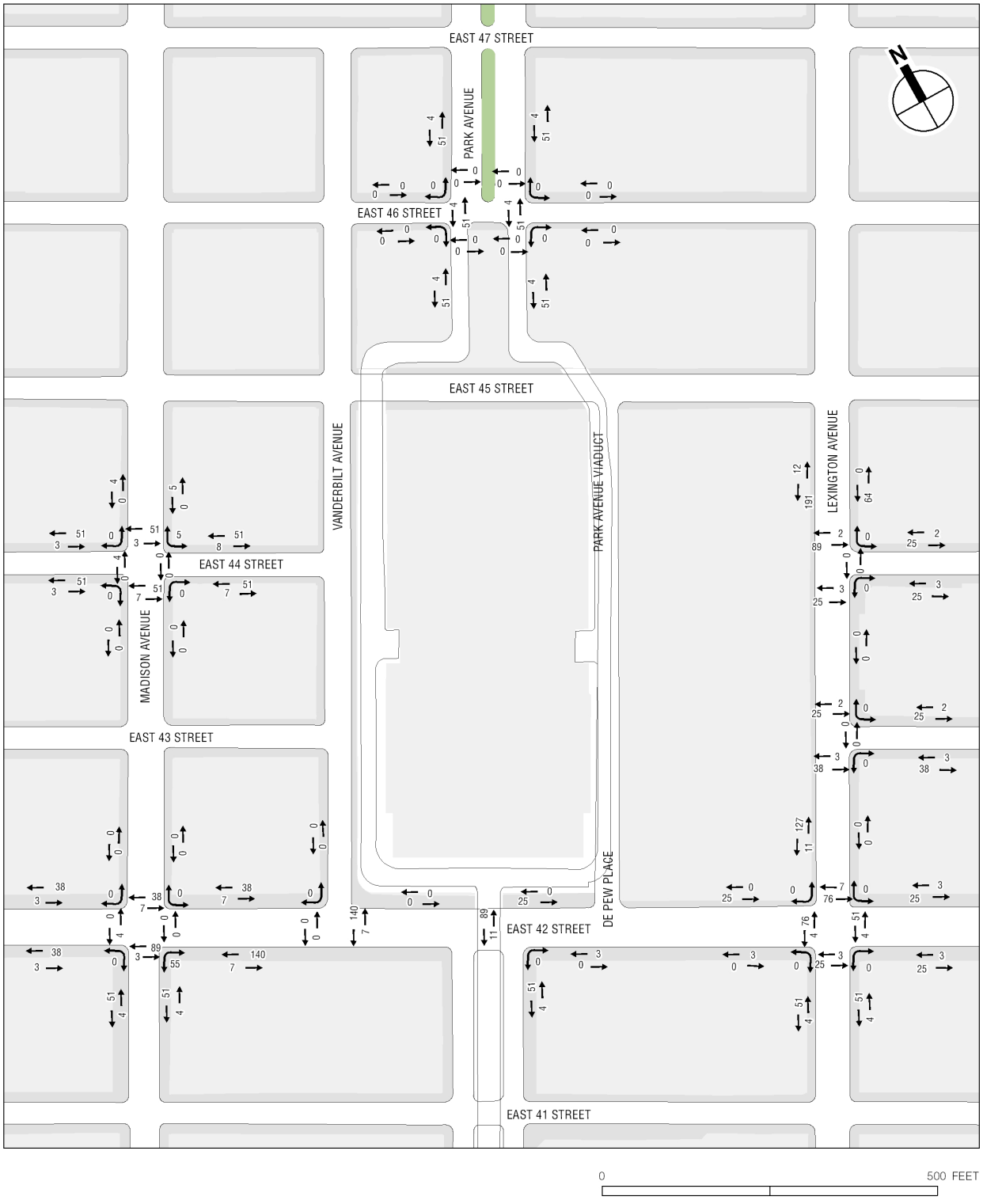


Figure 4E.5-11. Project-Generated Pedestrian Trips – Grand Central Terminal Study Area: Weekday AM Peak Hour



## Figure 4E.5-12. Project-Generated Pedestrian Trips – Grand Central Terminal Study Area: Weekday PM Peak Hour

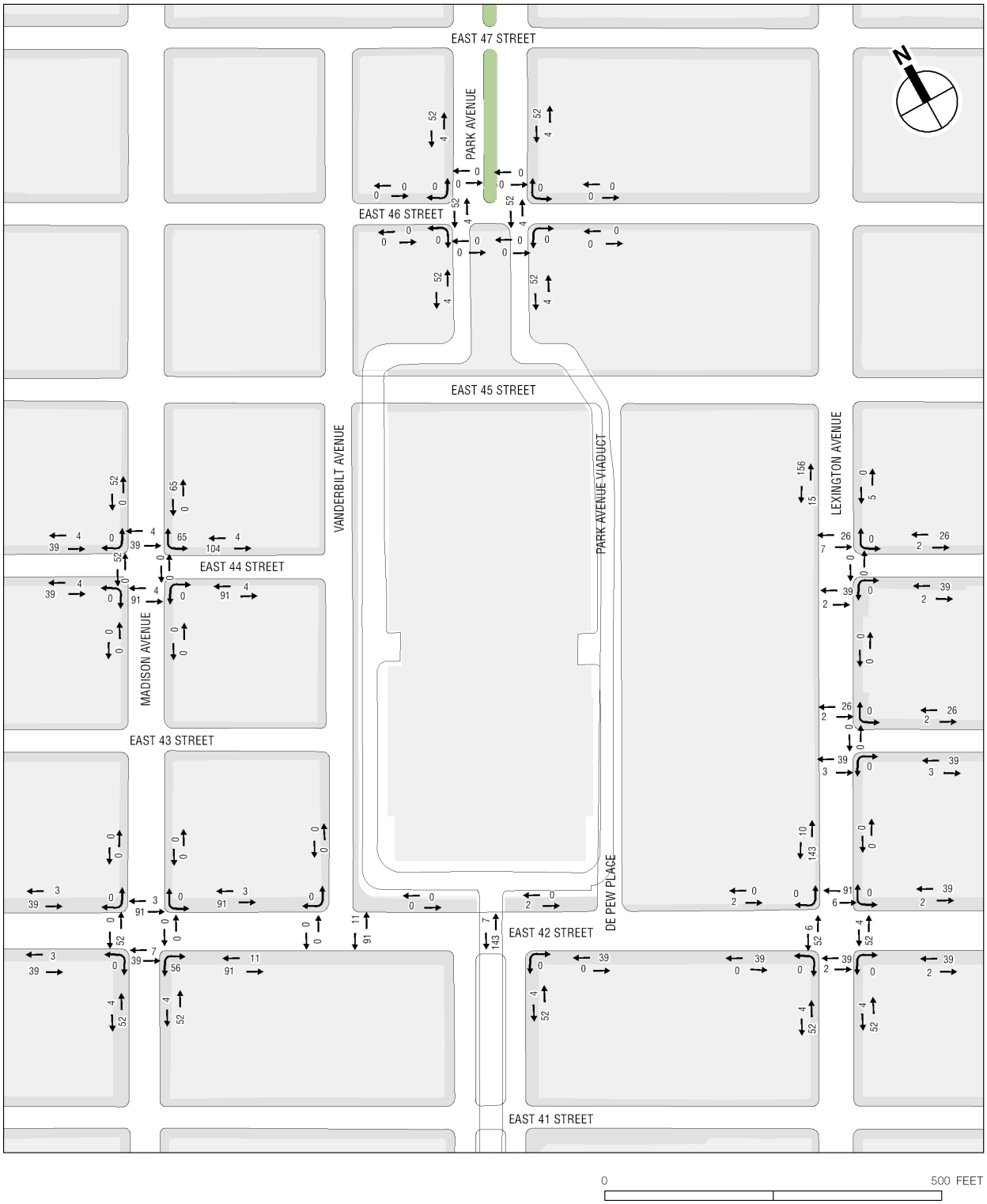
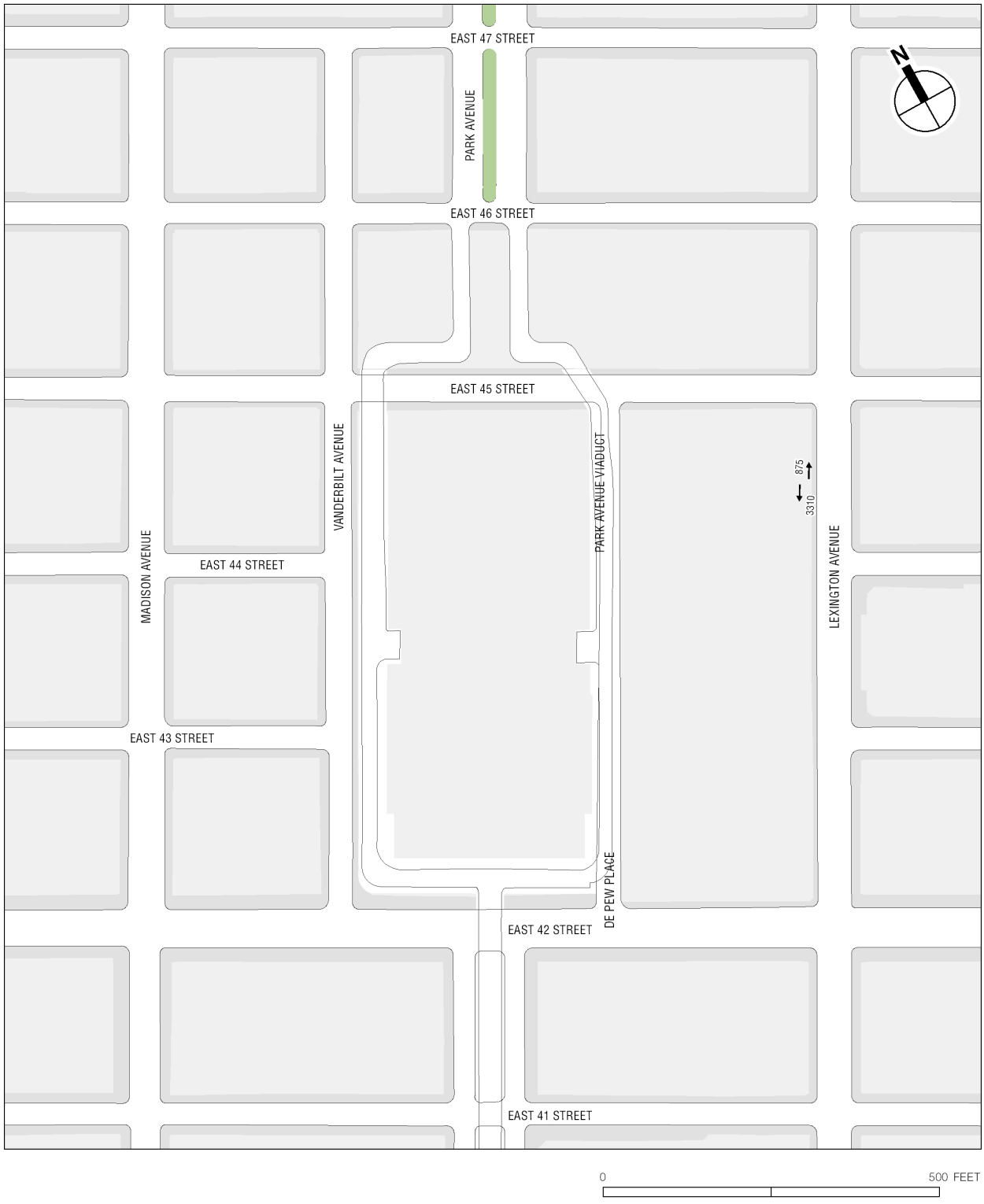


Figure 4E.5-13. Project-Generated Pedestrian Trips – Herald Square/Penn Station Study Area: Weekday AM Peak Hour

## Figure 4E.5-14. Project-Generated Pedestrian Trips – Herald Square/Penn Station Study Area: Weekday PM Peak Hour

Figure 4E.5-15. CBD Tolling Alternative Pedestrian Volumes – Grand Central Terminal Study Area: Weekday AM Peak Hour



## Figure 4E.5-16. CBD Tolling Alternative Pedestrian Volumes – Grand Central Terminal Study Area: Weekday PM Peak Hour

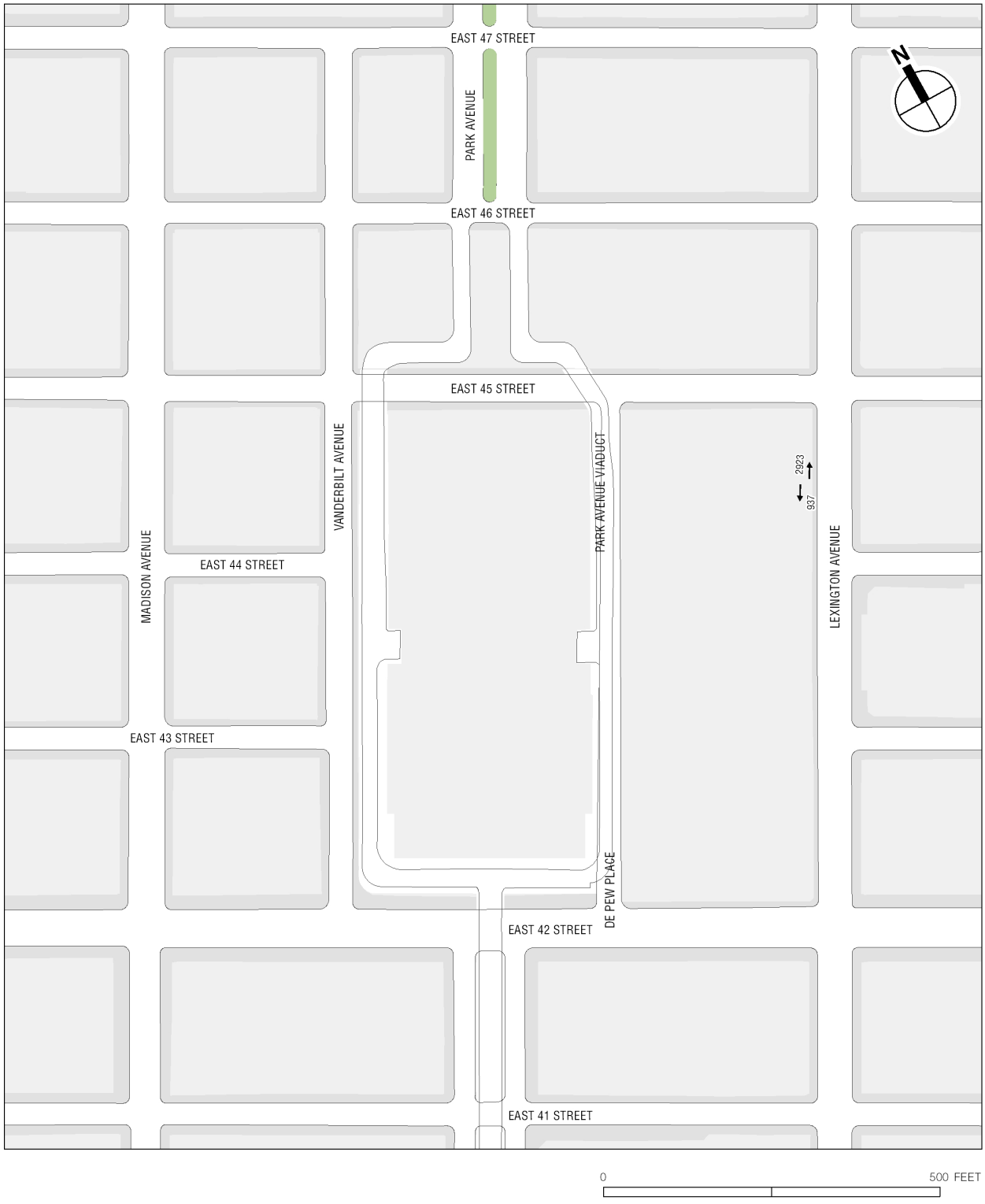


Figure 4E.5-17. CBD Tolling Alternative Pedestrian Volumes – Herald Square/Penn Station Study Area: Weekday AM Peak Hour

## Figure 4E.5-18. CBD Tolling Alternative Pedestrian Volumes – Herald Square/Penn Station Study Area: Weekday PM Peak Hour

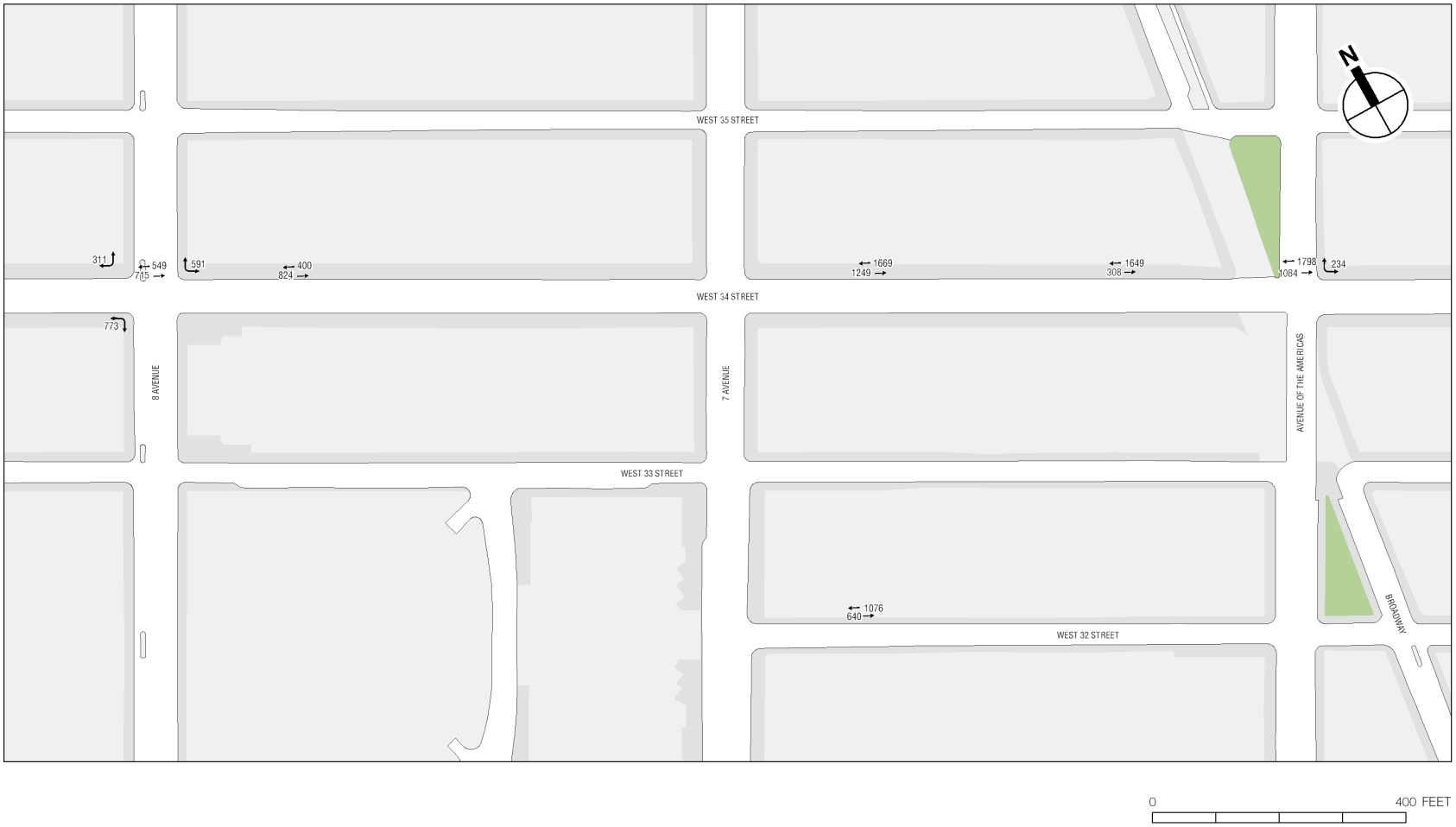


Table 4E.5-5. Herald Square/Penn Station Study Area – Existing Conditions: Sidewalk Analysis

| LOCATION | SIDEWALK | EFFECTIVE WIDTH (FEET) | 1-HR TWO-WAY VOLUME | PHF | SFP | PLATOON LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| 34th Street between Eighth Avenue and Seventh Avenue | North | 4.5* | 878 | 0.80 | 64.1 | C |
| 34th Street between Seventh Avenue and Broadway | North | 9.5 | 2582 | 0.94 | 53.8 | C |
| 34th Street between Broadway and Seventh Avenue | North | 11.0 | 2186 | 0.75 | 58.9 | C |
| 32nd Street between Seventh Avenue and Sixth Avenue | North | 5.5 | 1824 | 0.91 | 42.2 | C |
| **Weekday PM Peak Hour** | | | | | | |
| 34th Street between Eighth Avenue and Seventh Avenue | North | 4.5* | 1054 | 0.94 | 62.7 | C |
| 34th Street between Seventh Avenue and Broadway | North | 9.5 | 2462 | 0.87 | 52.2 | C |
| 34th Street between Broadway and Seventh Avenue | North | 11.0 | 1508 | 0.82 | 94.2 | B |
| 32nd Street between Seventh Avenue and Sixth Avenue | North | 5.5 | 1503 | 0.93 | 52.9 | C |

**Note:** SFP = square feet per pedestrian
PHF = peak hour factor
* Denotes that the width is constrained by scaffolding

Table 4E.5-6. Herald Square/Penn Station Study Area – Existing Conditions: Corner Analysis

| LOCATION | CORNER | WEEKDAY AM PEAK HOUR | | WEEKDAY PM PEAK HOUR | |
|---|---|---|---|---|---|
| | | SFP | LOS | SFP | LOS |
| Eighth Avenue and 34th Street | Northwest | 68.0 | A | 58.6 | B |
| | Northeast | 59.8 | B | 60.4 | A |
| | Southwest | 40.6 | B | 44.9 | B |
| Sixth Avenue and 34th Street | Northeast | 83.3 | A | 38.9 | C |

**Note:** SFP = square foot per pedestrian

Table 4E.5-7. Herald Square/Penn Station Study Area – Existing Conditions: Crosswalk Analysis

| LOCATION | CROSSWALK | CROSSWALK LENGTH (FEET) | CROSSWALK WIDTH (FEET) | TWO-WAY PEAK HOUR VOLUME | SFP | LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| Eighth Avenue and 34th Street | North | 70.5 | 22.0 | 963 | 53.3 | B |
| Sixth Avenue and 34th Street | North | 56.5 | 20.0 | 1472 | 12.9 | E |
| **Weekday PM Peak Hour** | | | | | | |
| Eighth Avenue and 34th Street | North | 70.5 | 22.0 | 1144 | 48.3 | B |
| Sixth Avenue and 34th Street | North | 56.5 | 20.0 | 2665 | 6.8 | F |

**Note:** SFP = square feet per pedestrian

Table 4E.5-8. Grand Central Terminal Study Area – Existing Conditions: Sidewalk Analysis

| LOCATION | SIDEWALK | EFFECTIVE WIDTH (FEET) | 1-HR TWO-WAY VOLUME | PHF | SFP | PLATOON LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| Lexington Avenue between East 44th Street and East 45th Street | West | 5.0 | 3942 | 0.88 | 14.6 | E |
| **Weekday PM Peak Hour** | | | | | | |
| Lexington Avenue between East 44th Street and East 45th Street | West | 5.0 | 3653 | 0.85 | 15.5 | E |

**Note:** SFP = square feet per pedestrian
PHF = peak hour factor

Table 4E.5-9. Herald Square/Penn Station Study Area – No Action Conditions: Sidewalk Analysis

| LOCATION | SIDEWALK | EFFECTIVE WIDTH (FEET) | 1-HR TWO-WAY VOLUME | PHF | SFP | PLATOON LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| 34th Street between Eighth Avenue and Seventh Avenue | North | 9.5 | 887 | 0.80 | 135.3 | B |
| 34th Street between Seventh Avenue and Broadway | North | 9.5 | 2608 | 0.94 | 53.2 | C |
| 34th Street between Broadway and Seventh Avenue | North | 11.0 | 2208 | 0.75 | 58.3 | C |
| 32nd Street between Seventh Avenue and Sixth Avenue | North | 5.5 | 1842 | 0.91 | 41.8 | C |
| **Weekday PM Peak Hour** | | | | | | |
| 34th Street between Eighth Avenue and Seventh Avenue | North | 9.5 | 1065 | 0.94 | 132.4 | B |
| 34th Street between Seventh Avenue and Broadway | North | 9.5 | 2487 | 0.87 | 51.6 | C |
| 34th Street between Broadway and Seventh Avenue | North | 11.0 | 1523 | 0.82 | 93.2 | B |
| 32nd Street between Seventh Avenue and Sixth Avenue | North | 5.5 | 1518 | 0.93 | 52.4 | C |

**Note:** SFP = square feet per pedestrian
PHF = peak hour factor

Table 4E.5-10. Herald Square/Penn Station Study Area – No Action Conditions: Corner Analysis

| LOCATION | CORNER | WEEKDAY AM PEAK HOUR | | WEEKDAY PM PEAK HOUR | |
|---|---|---|---|---|---|
| | | SFP | LOS | SFP | LOS |
| Eighth Avenue and 34th Street | Northwest | 67.2 | A | 57.9 | B |
| | Northeast | 59.1 | B | 59.7 | B |
| | Southwest | 40.1 | B | 44.3 | B |
| Sixth Avenue and 34th Street | Northeast | 82.4 | A | 38.3 | C |

**Note:** SFP = square foot per pedestrian

Table 4E.5-11. Herald Square/Penn Station Study Area – No Action Conditions: Crosswalk Analysis

| LOCATION | CROSSWALK | CROSSWALK LENGTH (FEET) | CROSSWALK WIDTH (FEET) | TWO-WAY PEAK HOUR VOLUME | SFP | LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| Eighth Avenue and 34th Street | North | 70.5 | 22.0 | 973 | 52.7 | B |
| Sixth Avenue and 34th Street | North | 56.5 | 20.0 | 1487 | 12.8 | E |
| **Weekday PM Peak Hour** | | | | | | |
| Eighth Avenue and 34th Street | North | 70.5 | 22.0 | 1155 | 47.8 | B |
| Sixth Avenue and 34th Street | North | 56.5 | 20.0 | 2692 | 6.8 | F |

**Note:** SFP = square feet per pedestrian

Table 4E.5-12. Grand Central Terminal Study Area – No Action Conditions: Sidewalk Analysis

| LOCATION | SIDEWALK | EFFECTIVE WIDTH (FEET) | 1-HR TWO-WAY VOLUME | PHF | SFP | PLATOON LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| Lexington Avenue between East 44th Street and East 45th Street | West | 5.0 | 3982 | 0.88 | 14.4 | E |
| **Weekday PM Peak Hour** | | | | | | |
| Lexington Avenue between East 44th Street and East 45th Street | West | 5.0 | 3689 | 0.85 | 15.3 | E |

**Note:** SFP = square feet per pedestrian
PHF = peak hour factor

Table 4E.5-13. Pedestrian Level 2 Screening Analysis Results—WTC/Fulton Street Study Area

| PEDESTRIAN ELEMENTS | INCREMENTAL PEDESTRIAN TRIPS | | | SELECTED ANALYSIS LOCATION |
|---|---|---|---|---|
| | AM | MIDDAY | PM | |
| **Church Street and Fulton Street** | | | | |
| East Sidewalk along Church Street between Fulton Street and Vesey Street | 118 | 25 | 90 | |
| North Sidewalk along Fulton Street between Broadway and Church Street | 123 | 30 | 133 | |
| **Broadway and Fulton Street** | | | | |
| Northwest Corner | 123 | 32 | 133 | |
| **Church Street and Liberty Street** | | | | |
| Southeast Corner | 82 | 24 | 117 | |
| Northwest Corner | 105 | 20 | 56 | |
| South Sidewalk along Liberty Street between Broadway and Church Street | 82 | 24 | 117 | |
| **Broadway and Liberty Street** | | | | |
| West Crosswalk | 127 | 35 | 165 | |
| Northeast Corner | 114 | 29 | 131 | |
| Southwest Corner | 127 | 35 | 165 | |
| Northwest Corner | 202 | 51 | 217 | ✓ |
| East Sidewalk along Broadway Between Liberty Street and Cortland Street | 158 | 41 | 180 | |
| West Sidewalk along Broadway Between Liberty Street and Cortlandt Street | 201 | 50 | 217 | ✓ |

**Notes:** ✓ denotes pedestrian elements selected for detailed analysis (AM/PM only).
Pedestrian elements with fewer than 100 project-generated pedestrian trips in a peak hour are not presented in this table.

Table 4E.5-14. Pedestrian Level 2 Screening Analysis Results—Union Square Study Area

| PEDESTRIAN ELEMENTS | INCREMENTAL PEDESTRIAN TRIPS | | | SELECTED ANALYSIS LOCATION |
|---|---|---|---|---|
| | AM | MIDDAY | PM | |
| **Broadway and 14th Street** | | | | |
| South sidewalk along 14th Street between University Place and Broadway | 100 | 25 | 106 | |

**Notes:** ✓ denotes pedestrian elements selected for detailed analysis (AM/PM only).
Pedestrian elements with fewer than 100 project-generated pedestrian trips in a peak hour are not presented in this table.

Table 4E.5-15. Pedestrian Level 2 Screening Analysis Results—Times Square/PABT Study Area

| PEDESTRIAN ELEMENTS | INCREMENTAL PEDESTRIAN TRIPS | | | SELECTED ANALYSIS LOCATION |
|---|---|---|---|---|
| | AM | MIDDAY | PM | |
| **Broadway and West 42nd Street** | | | | |
| East Crosswalk | 34 | 16 | 107 | |

**Notes:** ✓ denotes pedestrian elements selected for detailed analysis (AM/PM only).
Pedestrian elements with fewer than 100 project-generated pedestrian trips in a peak hour are not presented in this table.

Table 4E.5-16. Pedestrian Level 2 Screening Analysis Results—Herald Square/Penn Station Study Area

| PEDESTRIAN ELEMENTS | INCREMENTAL PEDESTRIAN TRIPS | | | SELECTED ANALYSIS LOCATION |
|---|---|---|---|---|
| | AM | MIDDAY | PM | |
| **Eighth Avenue and 34th Street** | | | | |
| North sidewalk along 34th Street between Eighth Avenue and Seventh Avenue | 257 | 52 | 159 | ✓ |
| South sidewalk along 34th Street between Eighth Avenue and Seventh Avenue | 54 | 23 | 129 | |
| West sidewalk along Eighth Avenue between 35th Street and 34th Street | 181 | 41 | 153 | |
| Northeast corner | 257 | 51 | 160 | ✓ |
| Southeast corner | 54 | 23 | 129 | |
| Southwest corner | 59 | 33 | 207 | ✓ |
| Northwest corner | 213 | 49 | 187 | ✓ |
| North crosswalk | 208 | 39 | 109 | ✓ |
| South crosswalk | 54 | 23 | 129 | |
| **Eighth Avenue and 31st Street** | | | | |
| West sidewalk along Eighth Avenue between 32nd Street and 31st Street | 141 | 34 | 132 | |
| Southwest corner | 132 | 32 | 124 | |
| Northwest corner | 150 | 36 | 143 | |
| West crosswalk | 118 | 28 | 109 | |
| **Seventh Avenue and 34th Street** | | | | |
| East sidewalk along Seventh Avenue between 35th Street and 34th Street | 50 | 18 | 100 | |
| North sidewalk along 34th Street between Seventh Avenue and Broadway | 404 | 103 | 431 | ✓ |
| Northeast corner | 133 | 33 | 145 | |
| Northwest corner | 106 | 21 | 69 | |
| **Seventh Avenue and 32nd Street** | | | | |
| North sidewalk along 32nd Street between Seventh Avenue and Sixth Avenue | 289 | 61 | 198 | ✓ |
| West sidewalk along Seventh Avenue between 32nd Street and 31st Street | 29 | 16 | 103 | |
| Northeast corner | 180 | 30 | 58 | |
| North crosswalk | 158 | 27 | 56 | |
| **Broadway and 34th Street** | | | | |
| North sidewalk along 34th Street between Seventh Avenue and Broadway | 378 | 101 | 434 | ✓ |
| **Sixth Avenue and 34th Street** | | | | |
| East sidewalk along Sixth Avenue between 35th Street and 34th Street | 132 | 29 | 116 | |
| North sidewalk along 34th Street between Sixth Avenue and Fifth Avenue | 198 | 45 | 166 | |
| Northeast corner | 260 | 57 | 201 | ✓ |
| North crosswalk | 205 | 49 | 190 | ✓ |

**Notes:** ✓ denotes pedestrian elements selected for detailed analysis (AM/PM only).
Pedestrian elements with fewer than 100 project-generated pedestrian trips in a peak hour are not presented in this table.

Table 4E.5-17. Pedestrian Level 2 Screening Analysis Results—Grand Central Terminal Study Area

| PEDESTRIAN ELEMENTS | INCREMENTAL PEDESTRIAN TRIPS | | | SELECTED ANALYSIS LOCATION |
|---|---|---|---|---|
| | AM | MID DAY | PM | |
| **Madison Avenue and East 44th Street** | | | | |
| Northeast Corner | 59 | 21 | 108 | |
| Southwest Corner | 62 | 26 | 147 | |
| North sidewalk along East 44th Street between Madison Avenue and Vanderbilt Avenue* | 59 | 21 | 108 | |
| **Vanderbilt Avenue and East 42nd Street** | | | | |
| East Crosswalk | 147 | 31 | 102 | |
| Northeast Corner | 192 | 48 | 196 | |
| Southeast Corner | 147 | 31 | 102 | |
| East sidewalk along Vanderbilt Avenue between East 42nd Street and East 43rd Street | 192 | 48 | 197 | |
| South sidewalk along East 42nd Street between Madison Avenue and Park Avenue | 147 | 31 | 102 | |
| **Park Avenue and East 42nd Street** | | | | |
| East Crosswalk | 100 | 31 | 150 | |
| **Lexington Avenue and East 43rd Street** | | | | |
| West sidewalk along Lexington Avenue between East 43rd Street and East 42nd Street | 138 | 36 | 153 | |
| **Madison Avenue and East 42nd Street** | | | | |
| Northwest Corner | 49 | 24 | 146 | |
| Southeast Corner | 147 | 31 | 102 | |
| **Lexington Avenue and East 44th Street** | | | | |
| West sidewalk along Lexington Avenue between East 44th Street and East 45th Street | 203 | 47 | 171 | ✓ |
| **Lexington Avenue and East 42nd Street** | | | | |
| Northeast Corner | 138 | 36 | 153 | |
| Northwest Corner | 163 | 39 | 155 | |
| Southwest Corner | 108 | 25 | 99 | |

**Notes:** ✓ denotes pedestrian elements selected for detailed analysis (AM/PM only).
* denotes the area will be converted to a pedestrian plaza under With Action conditions.
Pedestrian elements with fewer than 100 project-generated pedestrian trips in a peak hour are not presented in this table.

Table 4E.5-18. Herald Square/Penn Station Study Area – With Action Conditions: Sidewalk Analysis

| LOCATION | SIDEWALK | EFFECTIVE WIDTH (FEET) | 1-HR TWO-WAY VOLUME | PHF | SFP | PLATOON LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| 34th Street between Eighth Avenue and Seventh Avenue | North | 9.5 | 1144 | 0.80 | 104.7 | B |
| 34th Street between Seventh Avenue and Broadway | North | 9.5 | 3012 | 0.94 | 45.8 | C |
| 34th Street between Broadway and Seventh Avenue | North | 11.0 | 2586 | 0.75 | 49.5 | C |
| 32nd Street between Seventh Avenue and Sixth Avenue | North | 5.5 | 2131 | 0.91 | 35.7 | D |
| **Weekday PM Peak Hour** | | | | | | |
| 34th Street between Eighth Avenue and Seventh Avenue | North | 9.5 | 1224 | 0.94 | 115.1 | B |
| 34th Street between Seventh Avenue and Broadway | North | 9.5 | 2918 | 0.87 | 43.7 | C |
| 34th Street between Broadway and Seventh Avenue | North | 11.0 | 1957 | 0.82 | 72.3 | C |
| 32nd Street between Seventh Avenue and Sixth Avenue | North | 5.5 | 1716 | 0.93 | 46.1 | C |

**Note:** SFP = square feet per pedestrian
PHF = peak hour factor

Table 4E.5-19. Herald Square/Penn Station Study Area – With Action Conditions: Corner Analysis

| LOCATION | CORNER | WEEKDAY AM PEAK HOUR | | WEEKDAY PM PEAK HOUR | |
|---|---|---|---|---|---|
| | | SFP | LOS | SFP | LOS |
| Eighth Avenue and 34th Street | Northwest | 62.6 | A | 53.5 | B |
| | Northeast | 53.7 | B | 57.0 | B |
| | Southwest | 39.6 | C | 41.8 | B |
| Sixth Avenue and 34th Street | Northeast | 75.8 | A | 35.7 | C |

**Note:** SFP = square foot per pedestrian

Table 4E.5-20. Herald Square/Penn Station Study Area – With Action Conditions: Crosswalk Analysis

| LOCATION | CROSSWALK | CROSSWALK LENGTH (FEET) | CROSSWALK WIDTH (FEET) | TWO-WAY PEAK HOUR VOLUME | SFP | LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| Eighth Avenue and 34th Street | North | 70.5 | 22.0 | 1181 | 43.1 | B |
| Sixth Avenue and 34th Street | North | 56.5 | 20.0 | 1692 | 11.0 | E |
| **Weekday PM Peak Hour** | | | | | | |
| Eighth Avenue and 34th Street | North | 70.5 | 22.0 | 1264 | 43.4 | B |
| Sixth Avenue and 34th Street | North | 56.5 | 20.0 | 2882 | 6.2 | F |

**Note:** SFP = square feet per pedestrian

Table 4E.5-21. Grand Central Terminal Study Area – With Action Conditions: Sidewalk Analysis

| LOCATION | SIDEWALK | EFFECTIVE WIDTH (FEET) | 1-HR TWO-WAY VOLUME | PHF | SFP | PLATOON LOS |
|---|---|---|---|---|---|---|
| **Weekday AM Peak Hour** | | | | | | |
| Lexington Avenue between East 44th Street and East 45th Street | West | 5.0 | 4185 | 0.88 | 13.4 | E |
| **Weekday PM Peak Hour** | | | | | | |
| Lexington Avenue between East 44th Street and East 45th Street | West | 5.0 | 3860 | 0.85 | 14.3 | E |

**Note:** SFP = square feet per pedestrian
PHF = peak hour factor