

4E. Pedestrians and Bicycles

4E.1 INTRODUCTION

This subchapter describes the potential effects of the CBD Tolling Alternative on pedestrian circulation; bicycle routes and bicycle infrastructure; and vehicular, pedestrian, and bicycle safety.

The regional study area for this subchapter includes commuter and intercity rail stations providing service along routes terminating within or near the Manhattan CBD, and bus stations, light rail and subway stations, ferry stops, and a tramway station (“transit stations”) in the 28-county regional study area. Transportation modeling predicts that increases in pedestrian and bicycle trips to/from public transit would be highest at and near commuter rail and subway stations with higher ridership and high occurrences of walk/bike mode share, and this subchapter examines the potential effects of implementing the CBD Tolling Alternative at such locations. The modeling shows that there would be lower increases in new trips on light rail, buses, ferries, and other modes of public transit with lower ridership and/or higher occurrences of vehicular mode share.

The first part of this subchapter summarizes potential changes in pedestrian circulation near transit stations in the regional study area that would result in an increase in passenger activity from the Project. The second part of this subchapter presents a qualitative assessment of the Project’s effects on existing and future bicycle facilities (i.e., on-street bicycle lanes or shared-lane routes), including bicycle trips generated by the Project’s forecast increased activity at and near transit stations. The final section of this subchapter is an assessment of vehicular, bicycle, and pedestrian safety for intersections where detailed pedestrian analyses were performed.

4E.2 PEDESTRIAN CIRCULATION

4E.2.1 Methodology

The analysis of pedestrian circulation in this subchapter considers the potential for increased crowding on sidewalks, corners, and crosswalks at or around transit stations where the CBD Tolling Alternative is predicted to increase the number of passengers. This would occur because of changes to travel patterns, where some people would no longer drive to the Manhattan CBD and instead use transit to travel there.

This analysis was conducted using the methodologies and effects criteria outlined in the City of New York’s *CEQR Technical Manual*. The FHWA and NYSDOT have design criteria for pedestrian facilities, but the guidance does not lay out procedures to identify potential adverse effects from project-generated increases in foot or bicycle traffic in dense urban areas such as New York City. It should be noted that *CEQR Technical Manual* guidance does not conflict with the Federal and state design criteria for pedestrian and bicycle facilities.

Using the *CEQR Technical Manual* methodologies, the analysis included the following steps:

- Based on the New York Metropolitan Transportation Council (NYMTC) Best Practice Manual (BPM) results for the Project (**Subchapter 4C, “Transportation: Transit”**), 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. (The busiest hour is the “peak hour,” and was based on observed pedestrian conditions; this was not necessarily the same peak hour that was used for the traffic analyses discussed in **Subchapter 4B, “Transportation: Highways and Local Intersections.”**)
- 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 specific locations—such as at a particular intersection—that would have an increase of 200 or more new pedestrian trips in the peak hour. Based on the *CEQR Technical Manual* methodology, this is the level of new pedestrian trips with the potential to result in an adverse effect on pedestrian flows. For these transit stations, additional analysis was conducted of the effects of additional pedestrians resulting from the Project.
- 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). Transit elements such as subway station control area, stairs, escalators, and platforms that are not considered pedestrian elements are described in **Subchapter 4C, “Transportation: Transit”**; therefore, these elements are excluded from the discussion below. 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.

As part of the analyses, data regarding existing pedestrian volumes as well as traffic operations and volumes (for turning vehicles that conflict with pedestrians within a crosswalk) were collected in June and October 2019 at locations identified later in this subchapter. These data were collected during the weekday AM,

¹ As described in **Appendix 4E, “Transportation: Supporting Documentation for Pedestrian Analyses,”** 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,** 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.

midday, and PM peak periods (7:00 a.m. to 10:00 a.m., 11:00 a.m. to 2:00 p.m., and 4:00 p.m. to 7:00 p.m., respectively). Inventories of total and effective widths, crosswalk lengths, street furniture, and other obstructions were conducted to provide appropriate inputs for the operational analyses. NYCDOT provided official traffic signal timings for the analysis locations.

An annual background growth rate of 0.50 percent was conservatively applied to estimate the No Action Alternative pedestrian volumes in the Manhattan CBD at the specific locations analyzed (to account for discrete trip-making from large development projects underway near the analysis locations). Note that this subchapter did apply a background growth factor while **Subchapter 4B, “Transportation: Highways and Local Intersections,”** and **Subchapter 4C, “Transportation: Transit,”** did not because, on a broader basis, the pre-COVID-19 pandemic traffic and transit conditions would be representative of the 2023 analysis year. MTA anticipates that transit ridership—and therefore pedestrian activity surrounding transit stations—will reach previous levels several years after the 2020 decline in ridership.³

Appendix 4E, “Transportation: Supporting Documentation for Pedestrian Analyses,” presents details on the *CEQR Technical Manual* analysis methodologies, including adverse effect criteria.

TOLLING SCENARIO SELECTED FOR THIS PEDESTRIAN ANALYSIS

The tolling scenario that would result in the greatest increase in new pedestrian trips at transit stations within the Manhattan CBD was used for quantified analysis.⁴ Based on the BPM results (**Subchapter 4C, “Transportation: Transit”**), the representative tolling scenario with the most effects is Tolling Scenario E, which is modeled to result in the largest number of new transit riders and therefore would add the highest pedestrian volumes on the sidewalks, street corners, and crosswalks adjacent to transit stations within the Manhattan CBD. Other tolling scenarios would generate fewer new pedestrian trips. (See **Chapter 2, “Project Alternatives,”** for a description of the tolling scenarios evaluated.)

LOCATIONS FOR PEDESTRIAN ANALYSIS

As discussed earlier in this subchapter, the first steps in the analysis were to identify transit stations throughout the 28-county region where the CBD Tolling Alternative would add 200 or more new pedestrian trips in the peak hour, and then to identify any of those transit stations where the CBD Tolling Alternative would add 200 or more new pedestrian trips on any individual pedestrian element. **Figure 4E-1** shows the pedestrian analysis study area. Most transit stations in the region—both within and outside the Manhattan CBD—would have an increase of fewer than 200 peak-hour pedestrian trips under the CBD Tolling Alternative. Based on the BPM results, the CBD Tolling Alternative (Tolling Scenario E) would result in more than 200 new peak-hour pedestrian trips at the 16 transit stations identified in **Table 4E-1**.

³ As described in **Subchapter 4C, “Transportation: Transit,”** public transit ridership may reach 80 to 92 percent of pre-pandemic levels by end of 2024 according to an MTA-commissioned analysis prepared by McKinsey & Company.

⁴ As described in **Chapter 2, “Project Alternatives,”** this document evaluates multiple tolling scenarios to identify the range of potential effects that could occur from implementing the Project. These tolling scenarios have a range of different toll amounts and toll structures, such as crossing credits, discounts, and/or exemptions. Ultimately, the TBTA Board would determine the toll amounts and toll structure to be implemented, which might differ from the tolling scenarios evaluated in this document.

Figure 4E-1. Pedestrian Analysis Study Area



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

Table 4E-1. Transit Station Pedestrian Trip Assessment

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: a. 34 Street–Herald Square subway station (B/D/F/ M/N/Q/R/W subway lines) b. 34 Street–Penn Station subway station (Nos. 1/2/3 subway lines) c. 34 Street–Penn Station subway station (A/C/E subway lines) d. 33rd Street Station (PATH) e. New York Pennsylvania Station (Amtrak, 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: a. Fulton Street subway stations (Nos. 2/3/4/5 and A/C/J/Z subway lines) b. World Trade Center Station (PATH) 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: a. Atlantic Avenue–Barclays Center subway station (Nos. 2/3/4/5 and B/D/N/Q/R/W subway lines) b. Atlantic Terminal (LIRR)	No
11. Grand Central Terminal, Manhattan CBD, includes the following: a. 42 Street–Grand Central subway station (Nos. 4/5/6/7 and S subway lines) b. Grand Central Terminal (Metro-North Railroad)	No
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. Secaucus, Hudson County, New Jersey (NJ TRANSIT)	No
16. Hoboken Terminal, Hudson County, New Jersey (PATH and NJ TRANSIT)	No

Source: BPM Results

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

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

Although 34 Street–Herald Square and 34 Street–Penn Station are separate stations, the effect of predicted pedestrian trips resulting from the CBD Tolling Alternative at these two stations were considered together, because the stations are in proximity to one another and many of the pedestrian routings to and from each

station would overlap. Similarly, pedestrian trips resulting from the CBD Tolling Alternative at the Cortland Street Station (R/W subway lines), WTC Cortland Street (1), and World Trade Center (PATH and E subway line) were considered together with Fulton Street because many of the pedestrian routings to and from each station would be in proximity and would share primary pedestrian routes. Therefore, Herald Square/Penn Station New York and World Trade Center/Fulton Street were considered as areas rather than stations in the pedestrian conditions analysis.

4E.2.2 Affected Environment

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 World Trade Center/Fulton Street. As previously described, the count data is conservative for characterizing existing (2021) pedestrian conditions. Peak-hour pedestrian volumes were tabulated from the peak-period pedestrian data collected in June 2019. Based on the collected data, the weekday AM and PM peak hours of pedestrian volumes at both analysis areas were 8:15 a.m. to 9:15 a.m. and 5:00 p.m. to 6:00 p.m., respectively, representing the peak work arrival and departure times in and around the transit facilities. (Midday pedestrian circulation would not vary because the predominant Project-generated change in activity would be during the weekday AM and PM peak hours when commuters would use transit in higher numbers. During the midday peak hour, commuters would mainly have the same pedestrian travel patterns irrespective of how the Project would change the mode shift in the AM and PM peak-hour work trip.) Using the methodology presented for pedestrian circulation, this section summarizes, and **Table 4E-2** presents, the LOS analysis results for the study area pedestrian elements near the two transit station areas. **Figure 4E-2** presents the locations of all analyzed pedestrian elements. (**Appendix 4E, “Transportation: Supporting Documentation for Pedestrian Analyses,”** presents the pedestrian LOS tables and peak-hour pedestrian volume figures.)

Table 4E-2. Existing (2021) Conditions Pedestrian Analysis Results (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	6	5	1	0	0
		Corner Reservoirs	5	5	0	0	0
		Crosswalks	3	1	0	2	0
	PM	Sidewalks	6	5	1	0	0
		Corner Reservoirs	5	5	0	0	0
		Crosswalks	3	1	0	1	1
World Trade Center/Fulton Street	AM	Sidewalks	1	1	0	0	0
		Corner Reservoirs	1	1	0	0	0
	PM	Sidewalks	1	1	0	0	0
		Corner Reservoirs	1	1	0	0	0

Source: AKRF, Inc.

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 2,051 new pedestrian trips in both AM and PM peak hours, which would result in 200 or more peak-hour pedestrian trips at the following 14 pedestrian elements:

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

Most of these pedestrian elements operate at LOS D (which is considered marginally acceptable) operations or better. The following locations operate 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 north crosswalk of Seventh Avenue and West 32nd Street operates at LOS E during the AM and PM peak hours.

WORLD TRADE CENTER/FULTON STREET

Based on the detailed assignment of pedestrian trips near World Trade Center/Fulton Street (1,222 new pedestrian trips in the peak hour), the CBD Tolling Alternative would result in 200 or more peak-hour pedestrian trips at the following two pedestrian elements:

- West sidewalk along Broadway between Liberty and Cortlandt Streets
- Northwest corner of Broadway and Liberty Street

Both pedestrian elements operate at acceptable LOS C or better during both peak hours.

4E.2.3 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 were increased by 0.5 percent to reflect potential growth from new development in the area.) In the No Action Alternative, all the analysis locations would continue to operate at the same LOS as existing conditions. (Appendix 4E, “Transportation: Supporting Documentation for Pedestrian Analyses,” presents the detailed pedestrian LOS tables and peak-hour pedestrian volume figures.)

CBD TOLLING ALTERNATIVE

The CBD Tolling Alternative would result in increased pedestrian activity near transit stations throughout the regional study area. However, the increased volumes at many locations would not adversely affect pedestrian circulation or the LOS of sidewalks, corners, and crosswalks. At most transit stations presented in Table 4E-1, 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. 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-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 World Trade Center/Fulton Street areas, the projected increments for Tolling Scenario E would exceed 200 trips in the peak hour; therefore, an analysis was conducted to identify any adverse effects on pedestrian circulation. The pedestrian volumes generated by Tolling Scenario E were added to the No Action Alternative volumes to determine the CBD Tolling Alternative volumes (Table 4E-3). (Appendix 4E, “Transportation: Supporting Documentation for Pedestrian Analyses,” presents the detailed pedestrian LOS tables and peak-hour pedestrian volume figures.)

Table 4E-3. CBD Tolling Alternative 2023 Pedestrian Analysis Results

TRANSIT STATION AREA	PEAK HOUR	PEDESTRIAN ELEMENT	NUMBER OF ANALYSIS LOCATIONS	NUMBER OF LOCATIONS THAT WOULD OPERATE AT			
				LOS C OR BETTER	LOS D	LOS E	LOS F
Herald Square/Penn Station New York	AM	Sidewalks	6	4	2	0	0
		Corner Reservoirs	5	5	0	0	0
		Crosswalks	3	1	0	2	0
	PM	Sidewalks	6	5	1	0	0
		Corner Reservoirs	5	5	0	0	0
		Crosswalks	3	1	0	1	1
World Trade Center/Fulton Street	AM	Sidewalks	1	1	0	0	0
		Corner Reservoirs	1	0	1	0	0
	PM	Sidewalks	1	1	0	0	0
		Corner Reservoirs	1	1	0	0	0

Source: AKRF, Inc.

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.
- The north crosswalk of Seventh Avenue and West 32nd Street would operate at LOS E during the AM and PM peak hours.

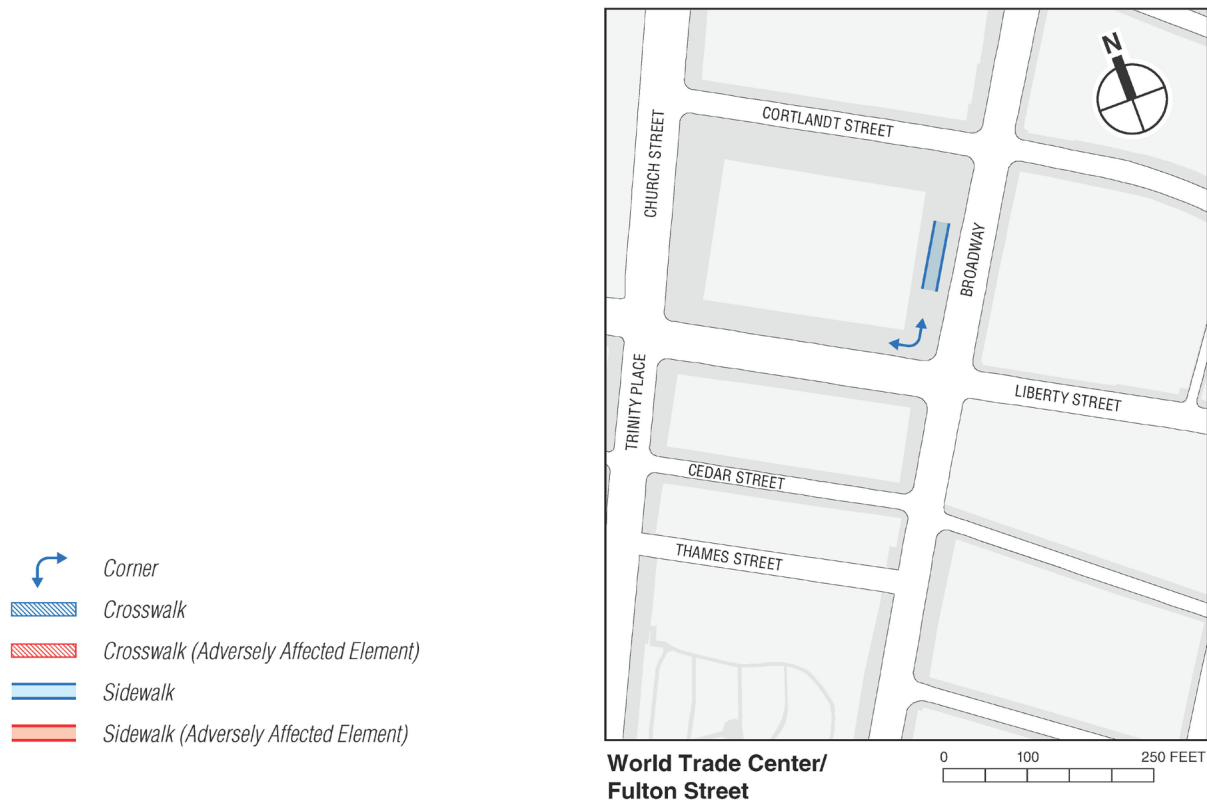
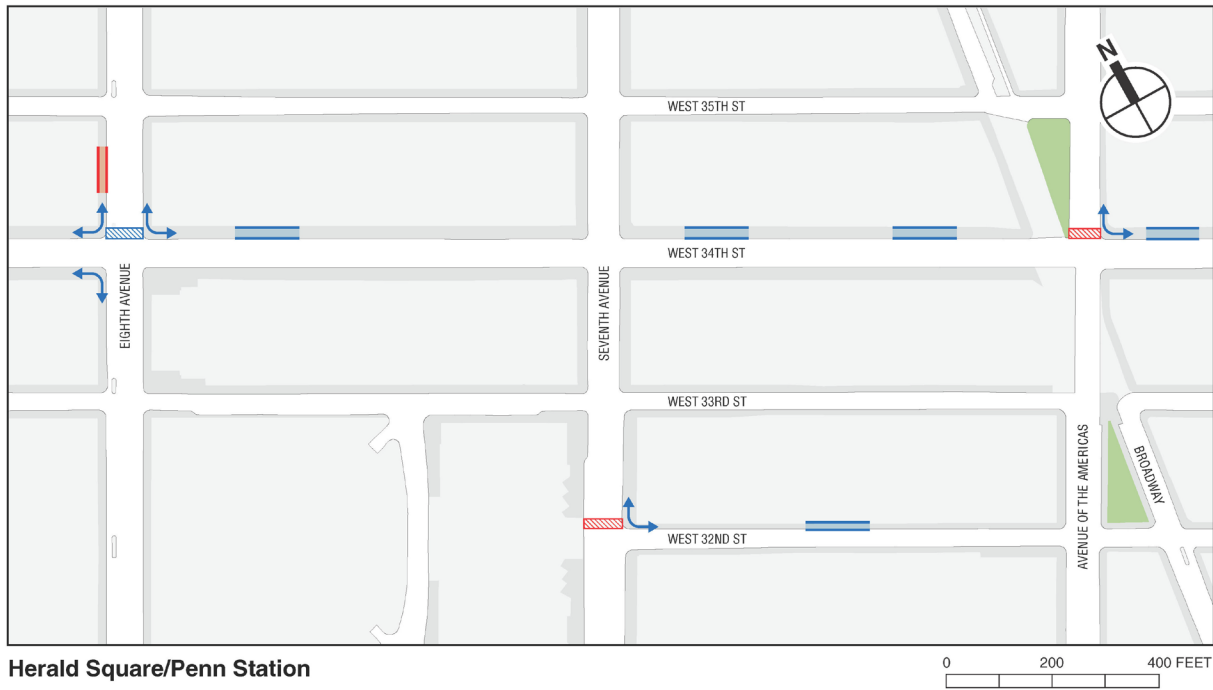
Although there would be no change in the number of congested LOS E or LOS F pedestrian elements with or without the Project, there would be slight deteriorations in SFP values. Based on the *CEQR Technical Manual* adverse effects criteria (**Appendix 4E, “Transportation: Supporting Documentation for Pedestrian Analyses”**), the CBD Tolling Alternative could potentially result in adverse pedestrian effects near Herald Square/Penn Station New York, as follows:






- The west sidewalk of Eighth Avenue between West 34th and West 35th Streets would operate at LOS D with a decrease of 3.2 SFP in the AM peak hour and 2.9 SFP in the PM peak hour compared to the No Action Alternative.
- The Sixth Avenue and West 34th Street north crosswalk would operate at LOS E with a decrease of 2.2 SFP in the AM peak hour and at LOS F with a decrease of 0.8 SFP in the PM peak hour compared to the No Action Alternative.
- The Seventh Avenue and West 32nd Street north crosswalk would operate at LOS E with a decrease of 1.3 SFP in the AM peak hour compared to the No Action Alternative.

Figure 4E-2 shows the locations of adverse effects. The adverse effects at these three locations will be mitigated through standard measures that will be implemented as part of the Project under any tolling scenario, if needed. None of these measures would affect existing bicycle infrastructure in the street. Any additional vehicular traffic generated by increased transit activity related to the Project at transit hubs in the 28-county regional study area is not anticipated to measurably reduce safety conditions because this modest increased activity would be along routes already traveled by high volumes of traffic. Increased pedestrian space on sidewalks and crosswalks can be achieved via physical widening and/or removing or relocating obstructions. **Table 4E-4** shows the recommended measures and predicted conditions with their implementation. While potential measures are shown, each specific treatment for attaining increased pedestrian space at the affected locations will be developed in coordination with NYCDOT prior to its implementation. The Project Sponsors will undertake monitoring at the locations near Herald Square/Penn Station with identified potential adverse effects, including pre-implementation baselining and monitoring before and after the first year after implementation of the Project, starting no sooner than two months after implementation to account for a potential initial period of fluctuation in travel behavior.⁵

⁵ For London’s congestion zone, a Transit Cooperative Research Program report noted that traffic patterns stabilized at six weeks after charging began. See Chapter 14, “Road Value Pricing” in *Transit Cooperative Research Program Report 95: Traveler Response to Transportation System Changes*. p. 14-13. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_95c14.pdf.

Figure 4E-2. Adverse Pedestrian Effects near Herald Square/Penn Station New York



-  Corner
-  Crosswalk
-  Crosswalk (Adversely Affected Element)
-  Sidewalk
-  Sidewalk (Adversely Affected Element)

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

Table 4E-4. No Action Alternative, CBD Tolling Alternative, and CBD Tolling Alternative with Improvement Measures—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							
West sidewalk along Eighth Avenue between West 34th Street and West 35th Street	Provide 0.5 feet of additional width by removing constricting sidewalk obstruction (relocate movable planter so it is not directly across from parking sign pole; easy to implement).	31.5	D	28.3	D	31.4	D
Sixth Avenue and West 34th Street: north crosswalk	Widen the crosswalk by 2 feet (easy to implement).	12.8	E	10.6	E	11.8	E
Seventh Avenue and West 32nd Street: north crosswalk	Widen the crosswalk by 1 foot (easy to implement).	12.7	E	11.4	E	12.0	E
Weekday PM Peak Hour							
West sidewalk along Eighth Avenue between West 34th Street and West 35th Street	Provide 0.5 feet of additional width by removing constricting sidewalk obstruction (relocate movable planter so it is not directly across from parking sign pole; easy to implement).	28.6	D	25.7	D	28.7	D
Sixth Avenue and West 34th Street: north crosswalk	Widen the crosswalk by 2 feet (easy to implement).	6.8	F	6.0	F	6.8	F

Source: AKRF, Inc.

The monitoring results will be compared to the No Action SFP and LOS as well as the *CEQR Technical Manual* thresholds described above to validate the need for, and design of, mitigations such as crosswalk restriping, movable obstruction relocation, and other improvements as necessary to ensure there will be no adverse effects. **Table 4E-4** also notes the relative ease of implementation of each recommended measure.

World Trade Center/Fulton Street

With implementation of the CBD Tolling Alternative, the west sidewalk of Broadway between Liberty and Cortlandt Streets during the AM and PM peak hours and the northwest corner of Broadway and Liberty Street during the PM peak hour would operate at LOS C or better. The northwest corner of Broadway and Liberty Street would operate at LOS D in the AM peak hour with a decrease of 1.9 SFP as compared to LOS C in 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 pedestrian elements near World Trade Center/Fulton Street.

4E.3 BICYCLES

4E.3.1 Methodology

Neither the New York State Environmental Quality Review Act nor the *CEQR Technical Manual* describe a methodology for quantitative capacity analysis of bicycle facilities or identification of adverse effects on bicycle facilities. Because the BPM is not capable of estimating new bicycle trips from the CBD Tolling Alternative, it was assumed that 2 percent of the AM and PM peak-hour Project-generated transit-to-walk trips to Manhattan CBD transit stations would be bicycle trips (reflecting the greatest concentration of potential new bicycle trips throughout the region). This distribution of bicycle mode share is based on the New York Metropolitan Transportation Council's *Hub Bound Travel Data Report 2019*, which presents data showing that 2 percent of all trips entering and leaving the Manhattan CBD on a typical weekday were made by bicycle. Using this assumption, a qualitative assessment of existing and future on-street bicycle facilities, including the expected increase in bicycle trips at Herald Square/Penn Station New York and World Trade Center/Fulton Street, was prepared. 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.

4E.3.2 Affected Environment

In recent years, New York City has expanded its bicycle network, including new bicycle lanes and upgrades to existing bicycle lanes. The network is well established within and around the Manhattan CBD. **Figure 4E-3** shows the City of New York's bicycle map for the Manhattan CBD. NYCDOT plans to continue adding new bicycle lanes and enhancing existing ones throughout the city both in and outside the Manhattan CBD.

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.⁶ 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.

⁶ <https://www1.nyc.gov/html/dot/downloads/pdf/nyc-bike-map-2021.pdf>.

Figure 4E-3. Bicycle Routes in the Manhattan CBD



Source: NYCDOT and New York City Department of City Planning. May 2021. 2021 NYC Bike Map.

NYCDOT implemented bicycle infrastructure improvements in 2021 and has planned additional improvements in the near future. The CBD Tolling Alternative would not affect or prevent any of these planned improvements. The following recently implemented or planned pedestrian and bicycle improvements are within and near the Manhattan CBD:⁷

- Future conversion of Queensboro Bridge south and north outer roadways from a vehicular travel lane to pedestrian walkway and existing shared-use path to exclusive bike lane, respectively
- Conversion of a vehicular travel lane on the Brooklyn Bridge to a bicycle lane
- Creation of protected bicycle lane and parking along the following:
 - Columbus Avenue bicycle lane islands between West 59th Street and West 62nd Street
 - East 60th, East 61st, and East 62nd Streets between Fifth Avenue and York Avenue for Queensboro Bridge access
- Creation of bike lane adjacent to the median of Broadway from Columbus Circle to West 72nd Street

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.⁸ 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.

4E.3.3 Environmental Consequences

NO ACTION ALTERNATIVE

In the No Action Alternative, 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 in **Section 4E.2.1**, the CBD Tolling Alternative would result in increases in peak-hour pedestrian volumes high enough to warrant detailed pedestrian analysis near the Herald Square/Penn Station New York 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 two areas have been assessed for bicycle effects. With up to 2,051 and 1,222 new pedestrian trips predicted in the peak hours, 41 and 24 new hourly bicycle trips would be generated by the Project at Herald Square/Penn Station New York and World Trade Center/Fulton Street, assuming a 2 percent bike share, respectively. 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.

⁷ NYCDOT, “Current Projects,” <https://www1.nyc.gov/html/dot/html/about/current-projects.shtml>.

⁸ Citi Bike, <https://www.citibikenyc.com/>.

Outside the Manhattan CBD, the shift to bicycle use because of the CBD Tolling Alternative would not be substantial. It would be about 2 percent or less within New York City based on the assumptions above for stations within the Manhattan CBD. According to Long Island Rail Road and Metro-North Railroad data, less than 1 percent of commuters bike to their stations, 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 total additional bicycle trips associated with the CBD Tolling Alternative would not result in any adverse effects on bicycle operations outside the Manhattan CBD.

4E.4 VEHICULAR AND PEDESTRIAN SAFETY

4E.4.1 Methodology

Pursuant to methodologies outlined in the *CEQR Technical Manual*, vehicular and pedestrian safety assessments were prepared for the same intersections for which detailed pedestrian analyses were conducted, adjacent to the areas of Herald Square/Penn Station New York and World Trade Center/Fulton Street. Crash data were obtained from NYCDOT for the most recent three-year period for which data are available (January 1, 2015, to December 31, 2017). The data quantify the total number of reportable crashes (defined as involving fatality, injury, or more than \$1,000 in property damage), as well as a yearly breakdown of vehicular crashes with pedestrians and bicycles at each location.

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 corner pedestrian ramps were evaluated to identify if the ramps meet minimum ADA compliance.

4E.4.2 Affected Environment

During the 2015–2017 period, the crash data reveals that 167 reportable crashes, consisting of 1 fatality, 116 injuries, and 63 pedestrian/bicyclist-related crashes occurred at the intersections in the areas of Herald Square/Penn Station New York and World Trade Center/Fulton Street. A rolling total of crash data⁹ identifies three high-crash locations:

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

Each of these intersections experience high pedestrian volumes throughout the day.

To assess minimum ADA compliance of curb pedestrian ramps in the affected environment, observations were conducted using street view images captured in July and August 2021. At the northwest, northeast,

⁹ As described in **Appendix 4E, “Transportation: Supporting Documentation for Pedestrian Analyses,”** high-crash locations are defined as 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. NYCDOT crash data does not contain non-reportable crashes, which make up a negligible portion of intersection crashes, because nearly all involve property damage exceeding \$1,000 or an injury or fatality.

and southwest corners of Eighth Avenue and West 34th Street, northeast corners of Sixth Avenue and West 34th Street and Seventh Avenue and West 32nd Street, and northwest corner of Broadway and Liberty Street, none of the curb pedestrian ramps meet minimum ADA compliance. Additional information is provided in **Appendix 4E, “Transportation: Supporting Documentation for Pedestrian Analyses.”** NYCDOT has an ongoing Pedestrian Ramp Program,¹⁰ which is dedicated to upgrading and installing pedestrian ramps throughout New York City.

Appendix 4E, “Transportation: Supporting Documentation for Pedestrian Analyses,” shows the total crash characteristics by intersection, as well as a breakdown of pedestrian and bicycle crashes by year and location. For the three high-crash locations, an examination of each pedestrian/bicyclist-related incident was conducted, along with a field audit of each intersection’s geometric and operational conditions. These efforts, as detailed in **Appendix 4E, “Transportation: Supporting Documentation for Pedestrian Analyses,”** showed that causes for the recorded crashes vary and are mostly attributed to inattentiveness of and failure to yield—by motorists but also by pedestrians and bicyclists. As part of the City of New York’s Vision Zero¹¹ initiative, many additional safety measures have been added to roadways and intersections across New York City.

4E.4.3 Environmental Consequences

NO ACTION ALTERNATIVE

In the No Action Alternative, 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 would result in slight increases in pedestrian volumes at the three identified high-crash locations. The Project would not exacerbate safety concerns at the locations, which already experience high pedestrian volumes throughout the day. The CBD Tolling Alternative 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. Three locations near Herald Square could realize a degradation in the LOS because of the CBD Tolling Alternative, but the widening of a sidewalk through the removal of sidewalk obstructions and the widening of two crosswalks will address this potential degradation in the LOS. The CBD Tolling Alternative 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 could 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 would not result in any adverse effects on vehicular, pedestrian, and bicycle safety, and mitigation measures to address vehicular, pedestrian, and bicycle safety are not necessary.

¹⁰ <https://www1.nyc.gov/html/dot/html/pedestrians/pedramps.shtml>.

¹¹ <https://www1.nyc.gov/content/visionzero/pages/>.

4E.5 CONCLUSION

Using methodology presented in the *CEQR Technical Manual*, a detailed assessment of increases in pedestrian activity was warranted for areas around the Herald Square/Penn Station New York and World Trade Center/Fulton Street transit hubs in Manhattan.

- Herald Square/Penn Station New York in Midtown Manhattan where Penn Station New York (Amtrak and commuter rail), three subway stations serving multiple subway routes, a Port Authority Trans-Hudson (PATH) station, and commuter and local bus routes are located
- World Trade Center/Fulton Street in Lower Manhattan where a PATH station, multiple subway stations serving multiple subway routes, and local bus routes are located

Based on detailed analysis of the pedestrian elements at these locations that would experience more than 200 new peak-hour trips, there would be no adverse effect on pedestrian circulation except at three locations in the Harold Square/Penn Station study area. These effects would occur at two crosswalks on one sidewalk, and they will be mitigated with measures that are routinely implemented throughout the city. The Project Sponsors will monitor the affected locations before and after completion of the Project to validate the analysis results and will implement the necessary mitigation to alleviate adverse effects.

The bicycle network is well established within and around the Manhattan CBD, and additional bicycle trips generated by the Project would be negligible compared to the magnitude of existing bicycle use adjacent to transit station complexes. Therefore, the CBD Tolling Alternative would not result in any adverse effects on bicycle operations.

The CBD Tolling Alternative would not exacerbate safety concerns at the three identified high-crash locations within the study area, nor would it exacerbate safety concerns at other locations within or outside the Manhattan CBD that do not already experience high pedestrian volumes throughout the day. The CBD Tolling Alternative would not result in substantially modified geometric or operational traffic, pedestrian, or bicycle conditions that would exacerbate safety concerns. Because fewer vehicular trips would be entering and exiting the Manhattan CBD, the CBD Tolling Alternative could result in reduced traffic volumes at these locations, which could reduce vehicle-vehicle and vehicle-pedestrian conflicts, leading to an overall increase in safety.

Table 4E-5 summarizes the effects of the CBD Tolling Alternative on pedestrians and bicycles.

Table 4E-5. Summary of Effects of the CBD Tolling Alternative on Pedestrians and Bicycles

TOPIC	SUMMARY OF EFFECTS	EFFECT FOR ALL TOLLING SCENARIOS	POTENTIAL ADVERSE EFFECT	MITIGATION AND ENHANCEMENTS
Pedestrian Circulation	Increased pedestrian activity on sidewalks outside transit hubs because of increased transit use. At all but one location in the Manhattan CBD (Herald Square/Penn Station), the increase in transit riders would not generate enough new pedestrians to adversely affect pedestrian circulation in the station area. Outside the Manhattan CBD, transit usage at individual stations would not increase enough to adversely affect pedestrian conditions on nearby sidewalks, crosswalks, or corners.	Adverse effects on pedestrian circulation at one sidewalk segment and two crosswalks	Yes	Mitigation needed. The Project Sponsors will implement a monitoring plan at this location. The plan will include a baseline, specific timing, and a threshold for additional action. If that threshold is reached, the Project Sponsors will increase pedestrian space on sidewalks and crosswalks via physical widening and/or removing or relocating obstructions.
Bicycles	Small increases in bicycle trips near transit hubs and as a travel mode, both inside and outside the Manhattan CBD	Small increases in bicycle trips near transit hubs with highest increases in pedestrian trip share; some shifts from automobiles to bicycles	No	No mitigation needed. No adverse effects
Safety	No adverse effects	No substantial increases in pedestrian volumes or increased safety concerns, including at existing identified high-crash locations. Overall, fewer vehicular trips entering and exiting the Manhattan CBD, the CBD Tolling Alternative could 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.	No	No mitigation needed. No adverse effects