3.7 TRANSPORTATION

3.7.1 Introduction

The primary objective of this study is to assess existing and planned future (2015) transportation conditions within the immediate area of the NMAAHC site and to identify potential issues and improvement measures with respect to all transportation modes. The study follows and builds on the existing transportation conditions and issues reports which were prepared in support of the museum study process. These reports incorporated relevant information from the Tier I Final EIS completed for the NMAAHC. The Tier I Final EIS analysis concluded that the proposed action could be developed without any significant adverse impacts on existing and future traffic and parking conditions within the local area of the site. Specifically, the Tier I Final EIS (Smithsonian Institution, 2008a) concludes that the museum development would not degrade the existing capacity/level of service conditions, based on the following assumptions:

- Daily visitor person trips would constitute approximately 0.5 percent of the annual visitation (2.5 million).

- Approximately 90 percent of the daily trips would occur via alternative travel modes including transit and walk. The NMAAHC site is within three blocks of the Smithsonian and Federal Triangle Metrorail stations and several bus stops located along Constitution Avenue and 14th Street. Most of the visitors would approach the museum by walking from the transit stations and bus stops, and from other visitor attractions on the National Mall and adjacent areas.

- No off-street parking would be provided for site visitors.

However, site-specific action alternatives have since been developed. As such, this analysis analyzes the specific effects to roadways in the site vicinity, as well as pedestrian and bicycle circulation, based on the action alternatives. The analysis regarding public transportation and parking was not performed and is not included in this Tier II analysis. The design changes made to the facility since the Tier I Final EIS (Smithsonian Institution, 2008a) was completed would not affect public transportation operations or impacts regardless of the alternative selected.

3.7.2 How are traffic levels measured?

Level of Service (LOS) is based upon the traffic volume present in each lane on the roadway, the capacity of each lane at the intersection, and the delay associated with each directional movement. The LOS for signalized intersections are defined below:

**LOS A** describes operations with very low average delay per vehicle, i.e., less than 10.0 seconds. This occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop. Short signal cycle lengths may also contribute to low delay.

**LOS B** describes operations with average delay in the range of 10.1 to 20.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
LOS C describes operations with delay in the range of 20.1 to 35.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level although many still pass through the intersection without stopping. This is generally considered the lower end of the range of the acceptable LOS in rural areas.

LOS D describes operations with delay in the range of 35.1 to 55.0 seconds per vehicle. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, and/or high traffic volumes as compared to the roadway capacity. Many vehicles are required to stop and the number of vehicles that do not have to stop declines. Individual signal cycle failures, where all waiting vehicles do not clear the intersection during a single green time, are noticeable. This is generally considered the lower end of the range of the acceptable LOS in urban areas.

LOS E describes operations with delay in the range of 55.1 to 80.0 seconds per vehicle. These higher delay values generally indicate poor progression, long cycle lengths, and high traffic volumes. Individual cycle failures are frequent occurrences. LOS E has been set as the limit of acceptable conditions.

LOS F describes operations with average delay in excess of 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over-saturation, i.e., when traffic arrives at a flow rate that exceeds the intersection capacity. It may also occur at high volumes with many individual cycle failures. Poor progression and long cycle lengths may also contribute to such delays.

3.7.3 What are the current vehicular traffic conditions at the Project Site?

Regional access to the site is provided via several roadway connections involving arterial and freeway networks, including Constitution Avenue (U.S. 50) – Interstate 66 (I-66) connection to the west and the 14th Street (U.S. 1) – I-395 connection to the south. Local access is provided via Constitution Avenue to the north, Madison Drive to the south, 14th Street to the east, and 15th Street to the west. Within the immediate vicinity of the site, Constitution Avenue and 14th Street function as major gateways to the District Downtown Area. Figure 3.7.1 shows the location of the site and Metrorail stations with the roadway network. Figure 3.7.2 illustrates the local roadway network and its functional roadway classifications. The operational and service characteristics of the key local roadways are described below.
Figure 3.7.1 Site Location Map
Source: Gorove/Slade, 2010
Figure 3.7.2 Functional Roadway Classifications – Local Roadway Network

Source: Gorove/Slade, 2010
Constitution Avenue

Constitution Avenue is an eight-lane, two-way principal arterial running east-west to the north of the site. It is designated U.S. Route 1/U.S. Route 50 (U.S. 1/U.S. 50) east of 14th Street. West of 14th Street, it is designated U.S. 50 and connects directly with I-66 (not depicted in Figures 3.71. or 3.72). This roadway provides direct access to the NMAAHC site and a number of federal buildings, museums and other visitor attractions; and serves significant commuter and tourist traffic volumes. Curbside parking is provided along both sides of Constitution Avenue, with restrictions during the morning and afternoon peak periods. This roadway carries an ADT volume of approximately 36,900 vehicles per weekday in the vicinity of the site, with lower volumes on weekends. The posted speed limit is 25 mph.

Fourteenth Street

Fourteenth (14th) Street is a seven-lane, two-way principal arterial running north-south to the east of the site. South of Constitution Avenue, it is designated U.S. 1, and connects with I-395 providing access to Northern Virginia and beyond. Fourteenth Street provides direct access to the NMAAHC site and several other museums, federal buildings and visitor attractions, and is a major commuter and visitor travel route. Parking is restricted along 14th Street in the immediate vicinity of the site at all times. This roadway serves an ADT volume of approximately 38,200 vehicles per weekday, with lower volumes on weekends. The posted speed limit is 25 mph.

Fifteenth Street

Fifteenth (15th) Street is a four-lane roadway running north-south to the west of the site. It is classified as a principal arterial north of Constitution Avenue by the District Department of Transportation (DDOT). Fifteenth Street provides access to the NMAAHC site and several important land uses including museums, federal buildings and visitor attractions. Parking is restricted along 15th Street in the immediate vicinity of the site. This roadway carries an ADT volume of approximately 15,000 vehicles on weekdays, with significantly lower volumes on weekends. The posted speed limit is 25 mph.

Madison Drive

Madison Drive is a two-lane, one-way westbound roadway situated to the south of the site. It is classified as a local park road by DDOT. Madison Drive traverses the National Mall from 3rd Street to 15th Street and provides access to the Smithsonian Institution museums and the National Gallery of Art. No parking is permitted between 14th and 15th Streets. However, a lay-by lane for use by the D.C. Tourmobile is provided on the north side of the roadway. Madison Drive carries an ADT volume of approximately 9,400 vehicles per weekday. The posted speed limit is 15 mph.

The primary intersections providing immediate access to the NMAAHC site are as follows:

- Constitution Avenue and 14th Street
- Constitution Avenue and 15th Street
- 14th Street and Madison Drive
- 15th Street and Madison Drive
Figure 3.7.3 illustrates the lane configurations and traffic control devices provided at those intersections.

**Intersection Levels of Service**

Vehicular and pedestrian traffic counts were conducted at the study intersections between the hours of 6:30 a.m. to 9:30 a.m. and 4:00 p.m. to 7:00 p.m. on Thursday, May 31, 2007, and Wednesday, July 9, 2008. The data indicates that the morning and afternoon system peak hours are 8:15 to 9:15 a.m. and 5:00 to 6:00 p.m., respectively. The peak hour vehicle volumes are illustrated in Figure 3.7.4.

Capacity analyses were undertaken for the four signalized intersections providing immediate access to the proposed museum site. These intersections are listed above. The capacity analysis results, presented in Table 3.7.1, show that the intersections are operating within the arterial roadway congestion standard for DDOT, i.e., LOS D/E, based primarily on average vehicular delay (in seconds). It is also noted that the intersection of Constitution Avenue and 15th Street is approaching capacity, with LOS D during both the morning and afternoon peak hours.

**Pedestrian and Bicycle Access**

The NMAAHC site is surrounded by an extensive on-street sidewalk and off-street path network providing connections to the National Mall’s museums and monuments, downtown, and nearby Metrorail stations. The sidewalks on the west side of 15th Street and the south side of Madison Drive, are both designated as bicycle routes and provide bicycle connections to the rest of the National Mall and the Potomac River.

Sidewalks exist along both sides of all streets surrounding the site and an off-street path currently cuts diagonally across the site itself, connecting 14th Street and 15th Street. The off-street bike trails provide good conditions for novice and experienced cyclists. Roadway conditions in the vicinity of the site are fair to poor for bicycling conditions based on DDOT's Bicycle Map (2009). Several factors contribute to fair to poor conditions, including traffic volumes, traffic speeds, volume of turning vehicles, narrow travel lane widths, and lack of on-street bicycle facilities. Marked crosswalks, curb-ramps, and pedestrian count-down timers help facilitate pedestrian crossings to the proposed site at all four of its perimeter intersections.

Most pedestrians within the vicinity of the site appear to be tourists, with a large number of student groups. The dominant pedestrian flow occurs east-west along Constitution Avenue to the north, with lower pedestrian flows along Madison Drive to the south and north-south along 14th and 15th Streets. These are key connections between downtown and the Metro stations and the museums and monuments on the National Mall. Figure 3.7.5 shows the major pedestrian routes within the immediate area of the site.

Historical traffic accident data was obtained from DDOT for the three-year period of 2004 through 2006. The data indicates that the intersection of Constitution Avenue at 14th Street experienced a total of 122 reported accidents, including one (1) that is pedestrian-related. It is also noted that DDOT has included this intersection in its top 5 percent list of high hazard intersections for calendar year 2006 (Federal Highway Administration, 2010).
Figure 3.7.3 Existing Roadway Lane Configuration and Traffic Control Devices
Source: Gorove/Slade, 2010
Figure 3.7.4 Existing Vehicle Peak Hour Volumes

Source: Gorove/Slade, 2010
Table 3.7.1 Existing Condition (2007) Intersection Vehicular Capacity Analysis

<table>
<thead>
<tr>
<th>Intersection</th>
<th>AM Peak Hour</th>
<th>PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Delay (sec/veh)</td>
<td>LOS</td>
</tr>
<tr>
<td><strong>Constitution Avenue and 15th Street</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>45.7</td>
<td>D</td>
</tr>
<tr>
<td>Eastbound</td>
<td>47.4</td>
<td>D</td>
</tr>
<tr>
<td>Westbound</td>
<td>46.6</td>
<td>D</td>
</tr>
<tr>
<td>Northbound</td>
<td>47.4</td>
<td>D</td>
</tr>
<tr>
<td>Southbound</td>
<td>33.9</td>
<td>C</td>
</tr>
<tr>
<td><strong>Constitution Avenue and 14th Street</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>34.7</td>
<td>C</td>
</tr>
<tr>
<td>Eastbound</td>
<td>25.9</td>
<td>C</td>
</tr>
<tr>
<td>Westbound</td>
<td>27.4</td>
<td>C</td>
</tr>
<tr>
<td>Northbound</td>
<td>51.5</td>
<td>D</td>
</tr>
<tr>
<td>Southbound</td>
<td>21.1</td>
<td>C</td>
</tr>
<tr>
<td><strong>Madison Drive and 14th Street</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>19.3</td>
<td>B</td>
</tr>
<tr>
<td>Westbound</td>
<td>35.3</td>
<td>D</td>
</tr>
<tr>
<td>Northbound</td>
<td>18.2</td>
<td>B</td>
</tr>
<tr>
<td>Southbound</td>
<td>20.5</td>
<td>C</td>
</tr>
<tr>
<td><strong>Madison Drive and 15th Street</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>14.0</td>
<td>B</td>
</tr>
<tr>
<td>Westbound</td>
<td>35.8</td>
<td>D</td>
</tr>
<tr>
<td>Northbound</td>
<td>8.3</td>
<td>A</td>
</tr>
<tr>
<td>Southbound</td>
<td>7.7</td>
<td>A</td>
</tr>
</tbody>
</table>

Source: Gorove/Slade, Inc., 2010
Figure 3.7.5 Major Pedestrian Routes
Source: Gorove/Slade, 2010
Figure 3.7.6 Existing Pedestrian Accident Data
Source: Gorove/Slade, 2010
In the vicinity of the site, at the intersections of 14th Street and 15th Street with Madison Drive, Jefferson Drive and Constitution Avenue, there have been less than four pedestrian accidents during the seven year period from 2000 to 2006, as identified in the 2009 DDOT Pedestrian Master Plan. In the vicinity of other Smithsonian Institution museums, most of the intersections along Constitution Avenue have also experienced less than four pedestrian accidents during the seven year period from 2000 to 2006, as identified in the 2009 DDOT Pedestrian Master Plan. The exception is the intersection of 12th Street and Constitution Avenue, which is where 12th Street is one-way northbound coming out from under the National Mall. Figure 3.7.6 shows the existing pedestrian accident data within the vicinity of the site.

Pedestrian traffic counts were conducted at the study intersections between the hours of 6:30 a.m. to 9:30 a.m. and 4:00 p.m. to 7:00 p.m. on Thursday, May 31, 2007, and Wednesday, July 9, 2008. Figure 3.7.7 presents the weekday peak hour pedestrian counts. Using these volumes, Gorove/Slade calculated the level of delay pedestrians experienced. Table 3.7.2 lists the results of this analysis. Pedestrian delay is associated with pedestrians waiting for signal changes and pedestrian signal heads to display walk signals.

<table>
<thead>
<tr>
<th>Intersection (Approach)</th>
<th>Existing Conditions</th>
<th>AM Peak Hour</th>
<th>PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Delay (sec/veh)</td>
<td>LOS</td>
</tr>
<tr>
<td>Constitution Avenue and 15th Street</td>
<td></td>
<td>30.4</td>
<td>D</td>
</tr>
<tr>
<td>Constitution Avenue</td>
<td></td>
<td>15.7</td>
<td>B</td>
</tr>
<tr>
<td>Constitution Avenue</td>
<td></td>
<td>12.5</td>
<td>B</td>
</tr>
<tr>
<td>14th Street</td>
<td></td>
<td>19.2</td>
<td>B</td>
</tr>
<tr>
<td>Constitution Avenue and 14th Street</td>
<td></td>
<td>12.5</td>
<td>B</td>
</tr>
<tr>
<td>Constitution Avenue</td>
<td></td>
<td>19.2</td>
<td>B</td>
</tr>
<tr>
<td>Madison Drive and 14th Street</td>
<td></td>
<td>31.2</td>
<td>D</td>
</tr>
<tr>
<td>Madison Drive</td>
<td></td>
<td>6.5</td>
<td>A</td>
</tr>
<tr>
<td>Madison Drive and 15th Street</td>
<td></td>
<td>30.3</td>
<td>C</td>
</tr>
<tr>
<td>Madison Drive</td>
<td></td>
<td>5.3</td>
<td>A</td>
</tr>
</tbody>
</table>

Source: Gorove/Slade, Inc., 2010

**Public Transportation**

The NMAAHC site is well served by rail transportation systems. These include the Washington Metropolitan Area Transit Authority (WMATA) Metrorail with connections to other regional and national rail lines, as well as several bus transit services. Figure 3.7.8 presents the public transportation map for the site.
Shuttle and Tour Buses

Tour bus operations are concentrated within the National Mall between the Lincoln Memorial and the U.S. Capitol. Major routes through the project area are along Constitution Avenue and Independence Avenue SW. The main access routes are New York Avenue, Pennsylvania Avenue, George Washington Memorial Parkway, I-66, Connecticut Avenue, Wisconsin Avenue, Arlington Memorial Bridge and South Capitol Street. Madison Drive and Jefferson Drive SW along the National Mall are used as drop-off areas. In addition, there are an estimated 300 tour bus spaces throughout the District of Columbia and at other visitor destinations such as Arlington National Cemetery and the National Cathedral. The Union Station garage provides tour bus parking in the central part of the city. Additional parking facilities are being developed at the old Convention Center site and at Robert F. Kennedy (RFK) Stadium. Figure 3.7.9 shows the charter bus and tour bus parking locations.

Tourmobile Sightseeing provides intermittent shuttle services on the National Mall with routes along 14th Street, 15th Street and Madison Drive, in the vicinity of the NMAAHC site. Free all-day parking lots are available for Tourmobile patrons near the Jefferson Memorial. Spaces are limited and available on a first come, first serve basis. Free 3-hour parking is available near the West Potomac Park stop on Ohio Drive SW, south of the Lincoln Memorial. Paid parking for both cars and buses is available at parking lots located at Arlington National Cemetery ($1.25 per hour for the first 3 hours, $2.00 per hour thereafter) and at Union Station. Tourmobile routes are also accessible within walking distance of several Metrorail stations including Union Station (Red Line), Arlington Cemetery (Blue Line) and Smithsonian (Blue and Orange Line) stations. Figure 3.7.8 illustrates the public transportation facilities and services discussed above.
Figure 3.7.7 Existing Pedestrian Peak Hour Volumes
Source: Gorove/Slade, 2010
Figure 3.7.8 Public Transportation
Source: Gorove/Slade, 2010
Figure 3.7.9 Charter Bus/Tour Bus Parking Locations
Source: Gorove/Slade, 2010
**Slug Lines**

“Slugging” is a term used to describe a unique form of commuting within the Washington Metropolitan Area. Its uniqueness relates to the practice in which commuters stop to pick up passengers who are total strangers in an effort to use the high occupancy roadway facilities on I-395. However, this method of informal carpooling is an organized system with its own set of rules and specific pick-up and drop-off locations. It moves thousands of commuters daily, free of charge. The system of “slugging” operates as follows: a motorist needing additional passengers to meet the required high occupancy vehicle (HOV) minimum pulls up to one of the designated “slug” lines and the driver either displays a sign indicating the destination of the car or simply calls it out.

The “slugs” (commuters waiting) first in line for that destination then enter the vehicle and confirm the destination. The carpool vehicle then continues to the desired destination. The southbound side of 14th Street, approximately 150 feet south of Constitution Avenue, is the location of a slug line which forms primarily during 4:00 p.m. to 6:00 p.m. on working weekdays. The slug destinations are various suburban areas in Virginia located along the I-395 corridor.

**Other Modes of Transportation**

Alternative modes of transportation are available to supplement transit access to the site, as well as recreational use within the National Mall. Currently, there are 16 miles of multi-use trails within the National Mall and Memorial Parks which support pedestrians, bicycles, water transport/excursion and personal transportation vehicles. The Segway® HT is another mode of personal transportation and is a motorized two-wheeled vehicle with a maximum speed of up to 12.5 miles per hour. Access for persons with disabilities by Segway® HT and electric scooters are available throughout the National Mall. All other users of Segway® HT or electric scooters would be considered as recreational use. Recreational use is restricted to specific north-south sidewalks crossing the National Mall. Based on NPS policy, recreational Segway® HT riders may cross the National Mall on sidewalks adjacent to streets managed by the District of Columbia including 3rd, 4th, 7th, and 14th Streets.

Segway® HT rentals and tours of District sites are available through private companies. Segway® HT vehicles are also allowed on the Metro trains during evening and weekend periods, as well as during midday off-peak hours. NPS also has integrated the use of Segway® HTs for its staff, and U.S. Park Police throughout their sites within the District to increase mobility, while reducing transportation impacts on NPS resources.
3.7.4 How would operation of the NMAAHC affect traffic levels?

Total future peak hour LOS was calculated based on: (1) existing land use and traffic controls; (2) the total future traffic volumes; and (3) Highway Capacity Manual (HCM) methodologies (using Synchro 6 software). Copies of the LOS calculation worksheets are included in Appendix 9.4.

This section evaluates the transportation effects of each alternative. This assessment also includes an evaluation of the cumulative effects of implementing each alternative and other planned area developments.

For the purpose of defining whether any of the proposed alternatives could potentially affect transportation, several criteria are considered.

**No Effects:** No change to the current roadway network, traffic, existing public transportation, pedestrian, or bicycle circulation.

**No Significant Effect:** A change that would not alter the roadway network and traffic beyond the current level of service, produce excess demand on public transportation, or reduce vehicular-pedestrian-bicycle safety.

**Significant Effects:** A change that would alter the roadway network and traffic beyond the current LOS, produce excess demand on public transportation, or reduce vehicular-pedestrian-bicycle safety.

**No Action Alternative**

**Roadways and Traffic**

The No Action Alternative would not result in any changes to the project site or new development on the site. With the No Action Alternative, the project site would continue to be an open space resource that would be operated by NPS. No effects on background traffic growth would occur with the No Action Alternative. This includes other development projects planned in the immediate project vicinity and regional growth that would generate additional traffic volumes on area roadways.

The future (no action) traffic projections are based on two factors: average annual traffic growth and other planned development projects in the site vicinity. The projected increase in through traffic on the study area roadways until year 2015 was based on a review of historical ADT data for the period 2001 to 2006, and recommendations of DDOT. The historical ADT data indicates that traffic growth along the study area roadways have either remained stable or increased marginally.

DDOT typically recommends consideration of a 2 percent growth factor for planning purposes. In addition, a number of land use changes are planned for the general study area, including the following:

- Institute of U.S. Peace
- National Museum of American History renovation
- Vietnam Veterans Memorial Visitors Center
- American Veterans Disabled for Life Memorial
- Dwight D. Eisenhower Memorial
• Martin Luther King, Jr. Memorial

Based on information obtained from DDOT, there are no short-term improvements programmed for the local area roadway network. Based on the locations of these developments within the monumental core and their proximity to rail and bus transit services, it is expected that the greater proportion of trips associated with these developments would utilize walk, bicycle, and transit modes. Vehicular trips are also likely to be concentrated during the off-peak periods on weekdays. Vehicular trip generation and related impacts of those sites would not be significant.

Service and Loading

Because the NMAAHC would not be constructed or operated as part of the No Action Alternative, there would be no new curb cuts installed at the project site. Some service and loading activities would occur as part of the operation of a temporary concession stand on the south side of the project site.

However, deliveries for the concession are minimal and would continue to be minimal. Service and loading would continue to occur using the bus drop-off area on Madison Drive. There would be no impact on peak or off-peak traffic associated with servicing and loading with the No Action Alternative.

Pedestrian and Bicycle Access

With the No Action, there would be no change in pedestrian and bicycle volumes to and from the site because the NMAAHC would not be constructed. There would be no increase in conflicts between pedestrians and bicyclists with other vehicles. No impact would occur.

Action Alternative 1: Plinth Concept

Roadways and Traffic

The potential traffic of the Plinth Alternative was assessed with respect to the four study area intersections: Constitution Avenue at 14th Street, Constitution Avenue at 15th Street, Madison Drive at 14th Street, and Madison Drive at 15th Street. The future traffic volumes are based on the combination of (1) the future No Action alternative volumes and (2) the projected weekday morning and afternoon peak hour vehicular trip generation and traffic assignment for the Plinth Alternative. The projected vehicular trip generation was derived from the projected annual visitor person trips (2.5 million) based on the following assumptions:

• Average daily visitor person trips would constitute 0.5 percent of the annual visitation (i.e., approximately 13,000 persons);
• Morning peak visitor trips would constitute approximately 5 percent of the daily trips;
• Evening peak visitor trips would constitute approximately 10 percent of the daily trips;
• Average auto occupancy would be approximately 2.5 persons per vehicle; and
• Peak hour modal splits would be approximately 10 percent passenger vehicle, 25 percent transit, 55 percent walk and 10 percent other, based on NPS Visitor Transportation Survey findings.
Based on these assumptions, the morning and afternoon peak hour trip generation for the Plinth Alternative would be quite low (i.e., 26 and 52 trips, respectively).

The expected trip distribution was determined based on (1) information presented in the NPS Visitor Transportation Survey regarding where visitors stay during their trips to the National Mall, and (2) the existing travel patterns and general familiarity with the District and the adjacent Maryland and Virginia suburbs. It is estimated that:

- approximately 30 percent of the vehicular trips would generally approach from the north via 14th and 15th Streets,
- 20 percent from the east via Constitution and Independence Avenues,
- 25 percent from the south primarily via 14th Street, and
- 25 percent from the west via Constitution Avenue.

Because vehicle and bus drop-off would be located along Madison Drive with the Plinth Alternative, most vehicle traffic would be directed to the main entrance. Some drop-off and pick-up activity may occur on Constitution Avenue. It is not anticipated that this would have an adverse impact on traffic operations because the number of site generated vehicle trips would be very low.

The future (2015) total traffic projections were derived by combining the background (No Action) traffic volumes with the Plinth Alternative traffic assignment. Figure 3.7.10 shows the projected future (2015) total traffic volumes.

Capacity analyses were performed to determine the future LOS for the four study intersections when background traffic growth is combined with traffic generated by the Plinth Alternative. The HCM 2000 methodology was used for all analyses. The vehicular capacity and future LOS results are shown in Table 3.7.3. The analysis considered increased pedestrian activity at the study intersections due to the Plinth Alternative and the cumulative projects.

The results in Table 3.7.3 indicate that the Plinth Alternative would have minimal or negligible impacts on future roadway and traffic conditions. However, background traffic growth is forecast to reduce overall LOS at 3 of the 4 intersections within the study area. Overall, no intersection is forecast to fail, but several approaches would experience lengthy delays. The increase in delay experienced at several approaches is associated with background traffic growth forecasted for the study area and is not associated with trips generated with the Plinth Alternative. No significant impact would occur to vehicular traffic during peak hour periods as a result of the Plinth Alternative.
Figure 3.7.10 Future Traffic Volumes
Source: Gorove/Slade, 2010
### Vehicular Capacity Analysis Results: Total Future (2015) Conditions

<table>
<thead>
<tr>
<th>Intersection (Approach)</th>
<th>Background and Total Future (2015) Conditions</th>
<th>AM Peak Hour</th>
<th>PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Background (sec/veh)</td>
<td>LOS</td>
<td>Total Future (sec/veh)</td>
</tr>
<tr>
<td>Overall</td>
<td>59.9</td>
<td>E</td>
<td>59.5</td>
</tr>
<tr>
<td>Eastbound</td>
<td>43.2</td>
<td>D</td>
<td>43.2</td>
</tr>
<tr>
<td>Westbound</td>
<td>88.4</td>
<td>F</td>
<td>88.4</td>
</tr>
<tr>
<td>Northbound</td>
<td>53.5</td>
<td>D</td>
<td>53.7</td>
</tr>
<tr>
<td>Southbound</td>
<td>34.8</td>
<td>C</td>
<td>34.8</td>
</tr>
</tbody>
</table>

**Constitution Avenue and 15th Street,**
- Overall: 59.9 (E), 72.1 (E)
- Eastbound: 43.2 (D), 52.1 (D)
- Westbound: 88.4 (F), 102.0 (F)
- Northbound: 53.5 (D), 81.0 (F)
- Southbound: 34.8 (C), 45.3 (D)

**Constitution Avenue and 14th Street,**
- Overall: 46.8 (D), 66.3 (E)
- Eastbound: 27.7 (C), 38.2 (D)
- Westbound: 28.2 (C), 38.2 (D)
- Northbound: 83.3 (F), 23.1 (C)
- Southbound: 21.5 (C), 127.2 (F)

**Madison Drive and 14th Street,**
- Overall: 30.2 (C), 71.5 (E)
- Westbound: 35.8 (D), 51.3 (D)
- Northbound: 33.2 (C), 14.6 (B)
- Southbound: 22.8 (C), 108.3 (F)

**Madison Drive and 15th Street,**
- Overall: 13.7 (B), 48.1 (D)
- Westbound: 36.4 (D), 24.7 (C)
- Northbound: 8.5 (A), 27.7 (C)
- Southbound: 7.9 (A), 56.0 (E)

Source: Gorove/Slade, Inc., 2010
Service and Loading

For the Plinth Alternative, the service/loading area would be located under the Corona, with ingress and egress provided from 14th Street. This ingress point would be located on the west side of 14th Street and would be situated away from the entrances, bus drop-off and pedestrian facilities. Egress movements from the underground service/loading area would occur at the same access point on 14th Street.

Service access would be restricted to weekday and weekend off-peak daytime and night-time periods when the prevailing traffic volumes on the adjacent streets would be significantly lower compared with the peak commuting periods. In the vicinity of the site, 14th Street is a multi-lane roadway and the access point would provide adequate turning radii and pedestrian safety features. These provisions would enable the ingress and egress movements to occur without significant vehicular and pedestrian traffic impacts.

Based on off-peak observations of existing conditions at the study intersections, the traffic flows of the 14th Street corridor adjacent to the site operate efficiently with queues at the study intersections being processed through the intersection for every signal cycle during the off-peak periods of the day. With this level of efficiency along 14th Street, the addition of less than 15 delivery vehicles per day during off-peak hours would easily be accommodated at the 14th Street curb cut. Gaps in traffic would be created by the existing traffic signals on 14th Street at Constitution Avenue and Madison Drive. The delivery vehicles that could potentially arrive during any off-peak-hour would represent less than 1 percent of the traffic on 14th Street.

Numerous tour bus companies operate within the project area, in addition to several private sightseeing operators that provide hop-on and -off services. The operation of the Plinth Alternative would increase the number of tour bus trips to the project area. However, the potential for vehicle queuing along 14th Street would be eliminated by the provision of a loading area large enough to accommodate the anticipated delivery schedule. With the Plinth Alternative, the loading area would provide adequate space for truck maneuvers, which would eliminate the need for trucks to back out of the site. Thus, service access for the Plinth Alternative would have no significant effect on the surrounding transportation system based on the planned service access, circulation, and staging provisions. The adequacy of the service and loading facilities has been confirmed using the appropriate truck turning software.

A slug line and Metrobus stop are currently located approximately mid-block on 14th Street between Constitution Avenue and Madison Drive within the NMAAHC site. Although the curb cut with the Plinth Alternative would not be expected to occur at the exact location of the slug line and Metrobus stop, service and loading activities could interfere with the slugging and Metrobus loading/unloading. A significant effect to area circulation would occur as a result of the Plinth Alternative. Measures are required to minimize this impact by relocating the Metrobus stop and slug line.

The underground service area would also include minimal parking (three parking spaces). The vehicle trips associated with these three parking spaces were taken into account in the future capacity analysis shown in Table 3.7.3 above. The use of these spaces would have no significant impact on service vehicle access and circulation, or the adjacent roadway network.
both tour buses and school buses typically drop off visitors at one central location for visitors that intend to visit multiple locations on the National Mall. It is likely that tour bus and school bus visits currently associated with nearby Smithsonian Institution and District landmarks that include the Washington Monument, World War II Memorial, NMAH, NMNH, and U.S. Holocaust Museum would also include a visit to the NMAAHC. The existing layby area located on Madison Drive just south of the subject site currently provides that facility for that activity and will continue to do so with the NMAAHC in place. The drop-off area would also accommodate drop-off activity associated with shuttle buses, automobiles, and taxis arriving at the site. These additional vehicle trips to and from the site would not have significant effect on area traffic volumes. The vehicle trips associated with these parking spaces were taken into account in the future capacity analysis shown in Table 3.7.3 above. There would be no significant impact on vehicular traffic during peak hour periods as part of the Plinth Alternative.

Pedestrian and Bicycle Access

The Plinth Alternative would locate the primary entrance on Madison Drive and a secondary entrance on Constitution Avenue. Pedestrians and bicyclists would likely use the entrance nearest to their access route such that pedestrians arriving from north of Constitution Avenue or along Constitution Avenue would enter predominantly through the secondary entrances. Pedestrians accessing the site from the south or from along the National Mall would enter predominantly through the main entrance. Because of the entrance location, it is anticipated that the number of pedestrians walking and bicyclists riding north-south along 14th and 15th Streets between Constitution Avenue and Madison Drive would be reduced. However, there would be no significant effect on external access routes or crossing volumes or patterns at adjacent intersections.

Pedestrian and bicyclist activity at the adjacent intersections and sidewalks would increase during operation of Plinth Alternative. The majority of visitors would likely include pedestrians and bicyclists coming from the National Mall across both 14th and 15th Streets, and crossing Constitution Avenue at 14th and 15th Streets. The NMAAHC site is surrounded by an extensive on-street sidewalk and off-street path network providing connections to the National Mall’s museums and monuments, downtown, and nearby Metrorail stations. Sidewalks exist along both sides of all streets surrounding the site and would be sufficiently wide with the Plinth Alternative to accommodate high pedestrian and bicyclist volumes. Marked crosswalks, curb-ramps, and pedestrian count-down timers would help facilitate pedestrian crossings to the site at all four of its perimeter intersections. Daily visitor person trips would constitute approximately 0.5 percent of the annual visitation (2.5 million person trips), or 13,000 visitors on a typical day. Ninety percent (90 percent) of the daily trips would occur via alternative travel modes including transit and walk.

Based on traffic accident data obtained from DDOT, only two accidents involving pedestrians have occurred over the last three years for which data is available. These accidents occurred at the Constitution Avenue and 14th Street, and Constitution Avenue and 15th Street intersections. Figure 3.7.11 presents the potential pedestrian and bicyclist conflict locations based on existing roadway conditions around the site.
Figure 3.7.11 Pedestrian and Bicyclist Access Routes and Potential Conflict Locations
Source: Gorove/Slade, 2010
Figure 3.7.12 Projected Pedestrian Volumes
Source: Gorove/Slade, 2010
At the intersections of 15th Street with Constitution Avenue, the number of pedestrian crossings is projected to reach up to a maximum of 438 weekday afternoon peak hour pedestrian crossings. At other locations around the subject site, the maximum weekday peak hour pedestrian crossings are in the range of 300 pedestrian crossings per hour. Over the course of the weekday afternoon peak hour, approximately 30 to 40 signal cycles would occur to allow for pedestrians crossings. Applying the range of 300 pedestrians crossing per hour, there would approximately be 7 to 10 pedestrians crossing per signal cycle, which could be easily accommodated by the existing crosswalks. Please refer to Figure 3.7.12 for projected pedestrian crossing volumes at the corners of the site.

DDOT recognizes that the intersection of 14th Street and Constitution Avenue is a high hazard location (Federal Highway Administration, 2010), and has identified potential mitigation measures that include improved signal visibility, timing and coordination, and upgraded pedestrian signage and pavement markings. An increase in the number of pedestrians at these intersections, during operation of the Plinth Alternative, would create a significant impact. To minimize adverse impacts, several improvements would be implemented at the study area intersections. These include optimized pedestrian count-down signal operations, ladder-patterned crosswalks for greater visibility, 10-foot distance between stop bars and crosswalks to better separate motorists from crossing pedestrians, and new curb ramps facing crosswalks as opposed to the center of the intersection.

**Action Alternative 2: Plaza Concept**

**Roadways and Traffic**

Visitor levels for the Plaza Alternative would be the same as the Plinth Alternative because the same programming would be offered. As with the Plinth Alternative, the future traffic volumes for the Plaza Alternative were based on (1) a combination of the future No Action Alternative and (2) the projected weekday morning and afternoon peak hour vehicular trip generation and traffic assignment for the Plaza Concept. The projected vehicular trip generation was derived from the projected annual visitor person trips (2.5 million) using the same assumptions as for the Plinth Alternative.

Based on these assumptions, the morning and afternoon peak hour trip generation for the Plaza Alternative would also be 26 and 52 trips, respectively. As with the Plinth Alternative, it is estimated that approximately 30 percent of the vehicular trips with the Plaza Alternative would generally approach from the north via 14th and 15th Streets, 20 percent from the east via Constitution and Independence Avenues, 25 percent from the south primarily via 14th Street, and 25 percent from the west via Constitution Avenue.

The future (2015) total traffic projections were derived by combining the background (No Action) traffic volumes with the Plaza Alternative traffic assignment. Figure 3.7.10 shows the projected future (2015) total traffic volumes. The future LOS results are shown in Table 3.7.3. The results in Table 3.7.3 above indicate that the Plaza Alternative would have minimal or negligible effects on future roadway and traffic conditions. However, background traffic growth is forecast to reduce overall LOS at 3 of the 4
intersections within the study area. Overall, no intersection is forecast to fail, but several approaches would experience lengthy delays. The increase in delay experienced at several approaches is associated with background traffic growth forecasted for the study area and is not associated with trips generated with the Plaza Alternative. No significant impact would occur on vehicular traffic during peak hour periods as a result of the Plaza Alternative.

Service and Loading

As with the Plinth Alternative, the service/loading area for the Plaza Alternative would be located under the Corona, with ingress and egress provided from 14th Street. This ingress point would be located on the west side of 14th Street and would be situated away from the entrances, bus drop-off and pedestrian facilities. Egress movements from the underground service/loading area would occur at the same access point on 14th Street. Service access would be restricted to weekday and weekend off-peak daytime and nighttime periods when the prevailing traffic volumes on the adjacent streets would be significantly lower compared with the peak commuting periods. In the vicinity of the site, 14th Street is a multi-lane roadway and the access point would provide adequate turning radii and pedestrian safety features. These provisions would enable the ingress and egress movements to occur without significant vehicular and pedestrian traffic impacts.

Based on off-peak observations of existing conditions at the study intersections, traffic flows of the 14th Street corridor adjacent to the site operate efficiently, with queues at the study intersections being processed through the intersection for every signal cycle during the off-peak periods of the day. With this level of efficiency along 14th Street, the addition of less than 15 delivery vehicles per day during off-peak hour as part of the Plaza Alternative would easily be accommodated at the 14th Street curb cut. Gaps in traffic would be created by the existing traffic signals on 14th Street at Constitution Avenue and at Madison Drive. The delivery vehicles that could potentially arrive during any off peak-hour would represent less than 1 percent of the traffic on 14th Street.

In addition, the potential for vehicle queuing along 14th Street with the Plaza Alternative would be eliminated by the provision of a loading area large enough to accommodate the anticipated delivery schedule. The loading area would provide adequate space for truck maneuvers, which would eliminate the need for trucks to back out of the site. Service access for the Plaza Alternative would have no significant impact on the surrounding transportation system based on the planned service access, circulation and staging provisions. The adequacy of service and loading facilities has been confirmed using the appropriate truck turning software.

A slug line and Metrobus stop are currently located approximately mid-block on 14th Street between Constitution Avenue and Madison Drive within the NMAAHC site. Although the curb cut with the Plaza Alternative would not be expected to occur at the exact location of the slug line and Metrobus stop, service and loading activities could interfere with the slugging and Metrobus loading/unloading. A significant effect to area circulation would occur as a result of the Plaza Alternative. Measures are required to minimize this effect by relocating the Metrobus stop and slug line.

With the Plaza Alternative, the underground service/loading area would also include minimal parking (three parking spaces). The vehicle trips associated with these three parking spaces were taken into account in the future capacity analysis shown in Table 3.7.3
above. The use of these spaces would have no significant impact on service vehicle access and circulation, or the adjacent roadway network.

The operation of the Plaza Alternative would increase the number of tour bus trips to the project area. However, both tour buses and school buses typically drop off visitors at one central location for visitors that intend to visit multiple locations on the National Mall. It is likely that tour bus and school bus visits currently associated with nearby Smithsonian Institution and District landmarks that include the Washington Monument, World War II Memorial, NMAH, NMNH, and U.S. Holocaust Museum would also include a visit to the NMAAHC. The existing layby area located on Madison Drive just south of the subject site currently provides that facility for that activity and will continue to do so with the NMAAHC in place. The drop-off area would also accommodate drop-off activity associated with shuttle buses, automobiles, and taxis arriving at the site. These additional vehicle trips to and from the site would not have significant effect on area traffic volumes. The vehicle trips associated with these parking spaces were taken into account in the future capacity analysis shown in Table 3.7.3 above. There would be no significant impact on vehicular traffic during peak hour periods as part of the Plaza Alternative.

*Pedestrian and Bicycle Access*

The Plaza Alternative would locate the primary entrance to the NMAAHC on Madison Drive with a secondary entrance located on the south side of the central plaza. Pedestrians and bicyclists would likely use the entrance nearest to their access route such that pedestrians arriving from north of Constitution Avenue or along Constitution Avenue would predominantly enter through the secondary entrance, while pedestrians accessing the site from the south or from along the National Mall would predominantly enter through the main entrance. Because of the entrance locations, it is anticipated that the number of pedestrians walking and bicyclists riding north-south along 14th and 15th Streets between Constitution Avenue and Madison Drive would be reduced. However, there would be no significant impact on external access routes or crossing volumes or patterns at adjacent intersections.

Pedestrian and bicyclist activity at the adjacent intersections and sidewalks would increase during operation of Plaza Alternative. The majority of visitors would likely include pedestrians and bicyclists coming from the National Mall across both 14th and 15th Streets, and crossing Constitution Avenue at 14th and 15th Streets. Sidewalks exist along both sides of all streets surrounding the site and would be sufficiently wide with the Plaza Alternative to accommodate high pedestrian and bicyclist volumes. Marked crosswalks, curb-ramps, and pedestrian count-down timers would help facilitate pedestrian crossings to the site at all four of its perimeter intersections. Daily visitor person trips would constitute approximately 0.5 percent of the annual visitation (2.5 million person trips), or 13,000 visitors on a typical day. Ninety percent (90 percent) of the daily trips would occur via alternative travel modes including transit and walk.

DDOT recognizes that the intersection of Constitution Avenue and 14th Street is a high hazard location (Federal Highway Administration, 2010). It has identified potential mitigation measures that include improved signal visibility, timing and coordination, and upgraded pedestrian signage and pavement markings. An increase in the number of pedestrians at this intersection during operation of the Plaza Alternative would create a significant impact. To minimize adverse impacts, several
improvements would be implemented at the study area intersections, including optimized pedestrian count-down signal operations, ladder-patterned crosswalks for greater visibility, 10 foot distance between stop bars and crosswalks to better separate motorists from crossing pedestrians, and new curb ramps facing crosswalks as opposed to the center of the intersection. Figure 3.7.12 shows the projected pedestrian crossing volumes at the corners of the site.

Action Alternative 3: Pavilion Concept

Roadways and Traffic

Visitor levels for the Pavilion Alternative would be the same as the Plinth and Plaza Alternatives because the same programming would be offered. As with the Plinth and Plaza Alternatives, potential traffic from the Pavilion Alternative was assessed with respect to the four study area intersections: Constitution Avenue at 14th Street, Constitution Avenue at 15th Street, Madison Drive at 14th Street, and Madison Drive at 15th Street. The future traffic volumes were based on (1) the combination of the future No Action Alternative and (2) the projected weekday morning and afternoon peak hour vehicular trip generation and traffic assignment. The projected vehicular trip generation was derived from the projected annual visitor person trips (2.5 million) using the same assumptions as for the Plinth and Plaza Alternatives.

Based on these assumptions, the morning and afternoon peak hour trip generation for the Pavilion and Plaza Alternatives would also be 26 and 52 trips, respectively. As with the Plinth Alternative, it is estimated that approximately 30 percent of the vehicular trips with the Pavilion Alternative would generally approach from the north via 14th and 15th Streets, 20 percent from the east via Constitution and Independence Avenues, 25 percent from the south primarily via 14th Street, and 25 percent from the west via Constitution Avenue.

The future (2015) total traffic projections were derived by combining the background (No Action) traffic volumes with the Pavilion Alternative traffic assignment. Figure 3.7.10 shows the projected future (2015) total traffic volumes. The future LOS results are shown in Table 3.7.3. The results in Table 3.7.3 above indicate
that the Pavilion Alternative would have minimal or negligible impacts on future roadway and traffic conditions. However, background traffic growth is forecast to reduce overall LOS at 3 of the 4 intersections within the study area. Overall, no intersection is forecast to fail, but several approaches would experience lengthy delays. The increase in delay experienced at several approaches is associated with background traffic growth forecasted for the study area and is not associated with trips generated with the Pavilion Alternative. No significant impact would occur to vehicular traffic during peak hour periods as a result of the Pavilion Alternative.

*Service and Loading*

As with the Plinth and Plaza Alternatives, the service/loading area for the Pavilion Alternative would be located under the Corona, with ingress and egress provided from 14th Street. This ingress point would be located on the west side of 14th Street and would be situated away from the entrances, bus drop-off and pedestrian facilities. Egress movements from the underground service/loading area would occur at the same access point on 14th Street.

Service access would be restricted to weekday and weekend off-peak daytime and night-time periods when the prevailing traffic volumes on the adjacent streets would be significantly lower compared with the peak commuting periods. In the vicinity of the site, 14th Street is a multi-lane roadway and the access point would provide adequate turning radii and pedestrian safety features. These provisions would enable the ingress and egress movements to occur without significant vehicular and pedestrian traffic impacts.

Based on off-peak observations of existing conditions at the study intersections, traffic flows of the 14th Street corridor adjacent to the site operate efficiently with queues at the study intersections being processed through the intersection for every signal cycle during the off-peak periods of the day. With this level of efficiency along 14th Street, the addition of less than 15 delivery vehicles per day during off-peak hour as part of the Pavilion Alternative would easily be accommodated at the 14th Street curb cut. Gaps in traffic would be created by the existing traffic signals on 14th Street at Constitution Avenue and at Madison Drive. The delivery vehicles that could potentially arrive during any off peak-hour would represent less than 1 percent of the traffic on 14th Street.

In addition, the potential for vehicle queuing along 14th Street with the Pavilion alternative would be eliminated by the provision of a loading area large enough to accommodate the anticipated delivery schedule. The loading area would provide adequate space for truck maneuvers, which would eliminate the need for trucks to back out of the site. Thus, service access for the Pavilion Alternative would have no significant impact on the surrounding transportation system based on the planned service access, circulation and staging provisions. The adequacy of the service and loading facilities has been confirmed using the appropriate truck turning software.

A slug line and Metrobus stop are currently located approximately mid-block on 14th Street between Constitution Avenue and Madison Drive within the NMAAHC site. Although the curb cut with the Pavilion Alternative would not be expected to occur at the exact location of the slug line and Metrobus stop, service and loading activities could interfere with the slugging and Metrobus loading/unloading. A significant impact on area circulation would occur as a result of the Pavilion Alternative. Measures are required...
to minimize this effect by relocating the Metrobus stop and slug line.

With the Pavilion Alternative, the underground service/loading area would also include minimal parking (three parking spaces). The vehicle trips associated with these three parking spaces were taken into account in the future capacity analysis shown in Table 3.7.3 above. The use of these spaces would have no significant impact on service vehicle access and circulation, or the adjacent roadway network.

The operation of the Pavilion Alternative would increase the number of tour bus trips to the project area. However, both tour buses and school buses typically drop off visitors at one central location for visitors that intend to visit multiple locations on the National Mall. It is likely that tour bus and school bus visits currently associated with nearby Smithsonian Institution and District landmarks that include the Washington Monument, World War II Memorial, NMAH, NMNH, and U.S. Holocaust Museum would also include a visit to the NMAAHC. The existing layby area located on Madison Drive just south of the subject site currently provides that facility for that activity and would continue to do so with the NMAAHC in place. The drop-off area would also accommodate drop-off activity associated with shuttle buses, automobiles, and taxis arriving at the site. These additional vehicle trips to and from the site would not have significant effect on area traffic volumes. The vehicle trips associated with these parking spaces were taken into account in the future capacity analysis shown in Table 3.7.3 above. There would be no significant impact on vehicular traffic during peak hour periods as part of the Pavilion Alternative.

**Pedestrian and Bicycle Access**

The Pavilion Alternative would locate the primary entrance to the NMAAHC on Madison Drive; no secondary entrance would be provided. As such, pedestrians and bicyclists would all use the main entrance located on the National Mall. Because of the location of the entrance, it is anticipated that the number of pedestrians walking and bicyclists riding north-south along 14th and 15th Streets between Constitution Avenue and Madison Drive would increase. However, there would be no significant impact on external access routes or crossing volumes or patterns at adjacent intersections.

Pedestrian and bicyclist activity at the adjacent intersections and sidewalks would increase during operation of Pavilion Alternative. The majority of visitors would likely include pedestrians and bicyclists coming from the National Mall across both 14th and 15th Streets, and crossing Constitution Avenue at 14th and 15th Streets. Sidewalks exist along both sides of all streets surrounding the site and would be sufficiently wide with the Pavilion Alternative to accommodate high pedestrian and bicyclist volumes. Marked crosswalks, curb-ramps, and pedestrian count-down timers would help facilitate pedestrian crossings at the site’s four perimeter intersections. Daily visitor person trips would constitute approximately 0.5 percent of the annual visitation (2.5 million person trips), or 13,000 visitors on a typical day. Ninety percent (90 percent) of the daily trips would occur via alternative travel modes including transit and walk. Figure 3.7.12 shows the projected pedestrian crossing volumes at the corners of the site.
DDOT recognizes that the intersection of Constitution Avenue and 14th Street is a high hazard location (Federal Highway Administration, 2010). It has identified potential mitigation measures that include improved signal visibility, timing and coordination, and upgraded pedestrian signage and pavement markings. An increase in the number of pedestrians at this intersection during operation of the Pavilion Alternative would create a significant impact. To minimize adverse effects, several improvements would be implemented at the study area intersections, including optimized pedestrian count-down signal operations, ladder-patterned crosswalks for greater visibility, 10 foot distance between stop bars and crosswalks to better separate motorists from crossing pedestrians, and new curb ramps facing crosswalks as opposed to the center of the intersection.

**Action Alternative 4: Refined Pavilion Concept**

**Roadways and Traffic**

Visitor levels for the Refined Pavilion Alternative would be the same as the other Alternatives because the same programming would be offered. As with the other alternatives, the future traffic volumes for the Refined Pavilion Alternative were based on the combination of the future no action situation and the projected weekday morning and afternoon peak hour vehicular trip generation and traffic assignment. The projected vehicular trip generation was derived from the projected annual visitor person trips (2.5 million) using the same assumptions as for the other alternatives.

Based on these assumptions, the morning and afternoon peak hour trip generation for the Refined Pavilion Alternative would also be 26 and 52 trips, respectively. As with the other Alternatives, it is estimated that approximately 30 percent of the vehicular trips with the Refined Pavilion Alternative would generally approach from the north via 14th and 15th Streets, 20 percent from the east via Constitution and Independence Avenues, 25 percent from the south primarily via 14th Street, and 25 percent from the west via Constitution Avenue.

The future (2015) total traffic projections were derived by combining the background (No Action) traffic volumes with the Plaza Alternative traffic assignment. Figure 3.7.10 shows the projected future (2015) total traffic volumes. The future LOS results are shown in Table 3.7.3. The results in Table 3.7.3 above indicate that the Refined Pavilion Alternative would have minimal or negligible effects on future roadway and traffic conditions. However, background traffic growth is forecast to reduce overall...
LOS at 3 of the 4 intersections within the study area. Overall, no intersection is forecast to fail, but several approaches would experience lengthy delays. The increase in delay experienced at several approaches is associated with background traffic growth forecasted for the study area and is not associated with trips generated with the Refined Pavilion Alternative. As such, no significant impact would occur on vehicular traffic during peak hour periods as a result of the Refined Pavilion Alternative.

**Service and Loading**

As with the other alternatives, the service/loading area for the Refined Pavilion Alternative would be located under the Corona, with ingress and egress provided from 14th Street. This ingress point would be located on the west side of 14th Street and would be situated away from the entrances, bus drop-off and pedestrian facilities. Egress movements from the underground service/loading area would occur at the same access point on 14th Street.

Service access would be restricted to weekday and weekend off-peak daytime and night-time periods when the prevailing traffic volumes on the adjacent streets would be significantly lower compared with the peak commuting periods. In the vicinity of the site, 14th Street is a multi-lane roadway and the access point would provide adequate turning radii and pedestrian safety features. These provisions would enable the ingress and egress movements to occur without significant vehicular and pedestrian traffic impacts.

Based on off-peak observations of existing conditions at the study intersections, the traffic flows of the 14th Street corridor adjacent to the site operate efficiently with queues at the study intersections being processed through the intersection for every signal cycle during the off-peak periods of the day. With this level of efficiency along 14th Street, the addition of less than 15 delivery vehicles per day during off-peak hour as part of the Refined Pavilion Alternative would easily be accommodated at the 14th Street curb cut. Gaps in traffic would be created by the existing traffic signals on 14th Street at Constitution Avenue and at Madison Drive. The delivery vehicles that could potentially arrive during any off peak-hour would represent less than 1 percent of the traffic on 14th Street.

In addition, the potential for vehicle queuing along 14th Street with the Refined Pavilion Alternative would be eliminated by the provision of a loading area large enough to accommodate the anticipated delivery schedule. The loading area would provide adequate space for truck maneuvers, which would eliminate the need for trucks to back out of the site. Thus, service access for the Refined Pavilion Alternative would have no significant impact on the surrounding transportation system based on the planned service access, circulation and staging provisions. The adequacy of the service and loading facilities has been confirmed using the appropriate truck turning software.

A slug line and Metrobus stop are currently located approximately mid-block on 14th Street between Constitution Avenue and Madison Drive within the NMAAHC site. Although the curb cut with the Refined Pavilion Alternative would not be expected to occur at the exact location of the slug line and Metrobus stop, service and loading activities could interfere with the slugging and Metrobus loading/unloading. As such, a significant effect to area circulation would occur as a result of the Refined Pavilion Alternative. Measures are required to minimize this effect by relocating the Metrobus stop and slug line.
With the Refined Pavilion Alternative, the underground service/loading area would also include minimal parking (three parking spaces). The vehicle trips associated with these three parking spaces were taken into account in the future capacity analysis shown in Table 3.7.3 above. The use of these spaces would have no significant impact on service vehicle access and circulation, or the adjacent roadway network.

The operation of the Refined Pavilion Alternative would increase the number of tour bus trips to the project area. However, both tour buses and school buses typically drop off visitors at one central location for visitors that intend to visit multiple locations on the National Mall. It is likely that tour bus and school bus visits currently associated with the nearby Smithsonian Institution and District landmarks that include the Washington Monument, World War II Memorial, NMAH, NMNH, and U.S. Holocaust Museum would also include a visit to the NMAAHC. The existing layby area located on Madison Drive just south of the subject site currently provides that facility for that activity and would continue to do so with the NMAAHC in place. The drop-off area would also accommodate drop-off activity associated with shuttle buses, automobiles, and taxis arriving at the site. These additional vehicle trips to and from the site would not have significant effect on area traffic volumes. The vehicle trips associated with these parking spaces were taken into account in the future capacity analysis shown in Table 3.7.3 above. There would be no significant impact on vehicular traffic during peak hour periods as part of the Refined Pavilion Alternative.

**Pedestrian and Bicycle Access**

The Refined Pavilion Alternative would locate the primary entrance to the NMAAHC on Madison Drive with a secondary entrance located on the north face of the Corona on the Constitution Avenue side. Pedestrians and bicyclists would likely use the entrance nearest to their access route such that pedestrians arriving from north of Constitution Avenue or along Constitution Avenue would predominantly enter through the secondary entrances, while pedestrians accessing the site from the south or from along the National Mall would predominantly enter through the main entrance. Because of the entrance location, it is anticipated that the number of pedestrians walking and bicyclists riding north-south along 14th and 15th Streets between Constitution Avenue and Madison Drive would be reduced. However, there would be no significant impact on external access routes or crossing volumes or patterns at adjacent intersections.

Pedestrian and bicyclist activity at the adjacent intersections and sidewalks would increase during operation of Refined Pavilion Alternative. The majority of visitors would likely include pedestrians and bicyclists coming from the National Mall across both 14th and 15th Streets, and crossing Constitution Avenue at 14th and 15th Streets. Sidewalks exist along both sides of all streets surrounding the site and would be sufficiently wide with the Refined Pavilion Alternative to accommodate high pedestrian and bicyclist volumes. Marked crosswalks, curb-ramps, and pedestrian count-down timers would help facilitate pedestrian crossings to the site at all four of its perimeter intersections. Daily visitor person trips would constitute approximately 0.5 percent of the annual visitation (2.5 million person trips), or 13,000 visitors on a typical day. Ninety percent (90 percent) of the daily trips would occur via alternative travel modes including transit and walk.

DDOT recognizes that the intersection of Constitution Avenue and 14th Street is a high hazard location (Federal Highway...
It has identified potential mitigation measures that include improved signal visibility, timing and coordination, and upgraded pedestrian signage and pavement markings. An increase in pedestrians at this intersection during operation of the Refined Pavilion Alternative would create a significant impact. To minimize adverse impacts, several improvements would be implemented at the study area intersections. These include optimized pedestrian count-down signal operations, ladder-patterned crosswalks for greater visibility, 10-foot distance between stop bars and crosswalks to better separate motorists from crossing pedestrians, and new curb ramps facing crosswalks as opposed to the center of the intersection.

Figure 3.7.12 shows the projected pedestrian crossing volumes at the corners of the site.

### 3.7.5 What efforts would be taken to minimize impacts on Transportation?

As discussed above, the action alternatives would further compound existing pedestrian safety hazards at nearby intersections. In addition, service and loading activities could interfere with the Metrobus stop and slug line located on 14th Street between Constitution Avenue and Madison Drive. The following mitigation measures are recommended to reduce adverse impacts:

- Optimize signal timing and coordination at the study intersections and install enhanced pavement markings and other roadway changes to accommodate the projected museum vehicular and pedestrian traffic. These improvements have been identified for the Constitution Avenue and 14th Street intersection by DDOT.
- Install enhanced signage to prohibit left-turns by all vehicles, except buses and taxis, at the Constitution Avenue and 14th Street intersection.
- Install signage restricting charter bus drop-off and pick-up activity to 10:00 a.m. to 3:00 p.m. on 14th and 15th Streets along the site boundary.
- Install enhanced signage prohibiting parking on 14th and 15th Streets along the site boundary.
- Implement pedestrian measures at the surrounding area intersections, including optimized pedestrian count-down signal operations, ladder-patterned crosswalks for greater visibility, 10 foot distance between stop bars and crosswalks to better separate motorists from crossing pedestrians, and new curb ramps facing crosswalks as opposed to the center of the intersection.
- Work with WMATA and DDOT to relocate the Metrobus stop and “slug” line to the north or south along 14th Street to minimize conflicts with the eventual location of the 14th Street curb cut for servicing and loading.