FBI HQ Consolidation

GSA

FBI Headquarters
Consolidation

Appendix B: Draft Transportation Impact Assessment: J. Edgar Hoover Parcel

Appendix B

Federal Bureau of Investigation Headquarters Consolidation

Draft Transportation Impact Assessment

J Edgar Hoover Parcel

Prepared by

Louis Berger

for

GSA

October 2015

Table of Contents

List of Appendices

List of Tables

List of Figures

(This page intentionally left blank.)

1.0 Introduction

This report presents the findings of the transportation impact assessment (TIA) prepared as part of the Environmental Impact Statement (EIS) that will guide the evaluation of alternatives for a new permanent location for a proposed consolidated Federal Bureau of Investigation (FBI) Headquarters (HQ).

The proposed action encompasses two parts:

- acquisition of a consolidated FBI HQ at a new permanent location; and
- exchange of the J. Edgar Hoover (JEH) parcel.

The proposed action would allow the United States (U.S.) General Services Administration (GSA) to leverage its current assets in exchange for property and services to support the space consolidation efforts of GSA and FBI. The exchange would convey the JEH parcel to the private sector consistent with local land use controls and redevelopment goals for Pennsylvania Avenue. The proposed action constitutes a major Federal action that must be analyzed under the provisions of the National Environmental Policy Act (NEPA) of 1969, as amended, and Section 106 of the National Historic Preservation Act. As such, this TIA has been prepared in accordance with NEPA, the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508 [1986]), GSA Order ADM 1095.1F Environmental Considerations of Decision Making (1999), and GSA's Public Buildings Service NEPA Desk Guide (1999). NEPA requires all Federal agencies to prepare an environmental impact statement (EIS) for actions with potentially significant environmental impacts. This process ensures that the policies and goals defined in NEPA are reflected in agencies' programs and actions. In compliance with these regulations, the evaluation presented in this TIA assesses the transportation impacts associated with the proposed action for the JEH parcel. Other TIAs accompanying the EIS examine the transportation impacts of developing a new consolidated FBI HQ at one of three alternative sites as compared to a No-action Alternative (see Appendices C, D, and E of the EIS).

Because future redevelopment plans for the existing JEH parcel are currently unknown, any future developer would likely be required to conduct a traffic impact study according to District Department of Transportation (DDOT) standards and District of Columbia regulations. A more thorough traffic study, which may include additional intersections, may be warranted, depending on the actual redevelopment plan for the parcel. The scope of any future studies to be conducted by the developer would be at the discretion of DDOT and in accordance with requirements for mitigation measures to offset impacts.

(This page intentionally left blank.)

2.0 Background

Sections 2.1 and 2.2, respectively introduce the proposed action and the purpose and need that have warranted this TIA. Section 2.3 outlines the NEPA requirements that initiated the evaluation of transportation impacts for the JEH parcel, and the framework for evaluating the indirect transportation impacts of future redevelopment of the parcel. Section 2.4 summarizes local land use plans within the study area. These plans establish a background for the remainder of the report and provide context for the evaluation of the future redevelopment scenarios.

2.1 Proposed Action

The proposed action for the accompanying EIS encompasses two parts:

- acquisition of a consolidated FBI HQ at a new permanent location, and
- exchange of the JEH parcel.

The proposed action would allow GSA to leverage its current assets in exchange for property and services to support the space consolidation efforts of GSA and FBI. The exchange would convey the JEH parcel to the private sector, consistent with local land use controls and redevelopment goals for Pennsylvania Avenue.

Three site alternatives in the National Capital Region (NCR) are under consideration for the location of a consolidated FBI HQ, including the Greenbelt site, known as Greenbelt Metro Station, and the Landover site, known as the former Landover Mall, both of which are located in Prince George's County, Maryland, and the Springfield site, known as the GSA Franconia Warehouse Complex located in Fairfax County, Virginia.

2.2 Purpose and Need

The purpose of the proposed action is to consolidate the existing FBI HQ into one location in the NCR and to provide FBI with an HQ that meets the Interagency Security Committee (ISC) Level V security standards. This standard is reserved for agencies with mission functions critical to national security or the continuation of government.

A consolidated FBI HQ is needed to support information sharing, collaboration, and integration of strategic priorities. Currently, the aging JEH building houses only 52 percent of HQ staff with the remainder dispersed over multiple locations in the NCR. Fragmentation resulting from FBI HQ's multiple locations diverts time and resources from investigations, hampers interoffice coordination, and decreases flexibility. Dispersion across multiple locations also gives rise to redundancy in operations and inefficient use of space. The consolidation is needed to eliminate redundancies and provide for significant space savings.

The proposed action is also needed to provide an FBI HQ that meets the ISC Level V security standards. Currently, FBI HQ elements are housed in the JEH building and in multiple locations in the NCR that do not meet the ISC Level V security standards. The FBI needs a complex that supports its mission and allows it to defend against terrorists, weapons of mass destruction, and other threats. Additionally, as an integral agency for the management of intelligence and national security programs, the FBI needs an HQ that provides highly reliable utilities and infrastructure.

2.3 NEPA Requirements

Council on Environmental Quality (CEQ) regulations require that agencies analyze the potential direct and indirect impacts of their proposed actions on the natural and human environment for each alternative, including a No-action Alternative. Four alternatives are evaluated in the EIS:

- **No-action Alternative**: FBI HQ would not consolidate, and its staff and operations would remain dispersed throughout the NCR at JEH and other leased facilities.

- **Greenbelt Action Alternative**: FBI HQ staff and operations would be consolidated at the Greenbelt site, and the JEH parcel would be exchanged to an exchange partner. The range of indirect impacts resulting from the exchange of the JEH parcel are evaluated based on two Reasonably Foreseeable Development Scenarios (RFDSs).

- **Landover Action Alternative**: FBI HQ staff and operations would be consolidated at the Landover site, and the JEH parcel would be exchanged to an exchange partner. The range of indirect impacts resulting from the exchange of the JEH parcel are evaluated based on two RFDSs.

- **Springfield Action Alternative**: FBI HQ staff and operations would be consolidated at the Springfield site, and the JEH parcel would be exchanged to an exchange partner. The range of indirect impacts resulting from the exchange of the JEH parcel are evaluated based on two RFDSs.

CEQ regulations define direct impacts as those "which are caused by the action and occur at the same time and place," and indirect impacts as those "caused by the action and are later in time... but are still reasonably foreseeable" (*see* 40 CFR § 1508.8[b]). Therefore, the EIS accompanying this TIA evaluates the direct and indirect impacts of the proposed action for each action alternative as well as the No-action Alternative, which provides a baseline for evaluating the impacts of each action alternative.

The proposed action would result in both direct and indirect impacts from the consolidation of FBI HQ at one of the site alternatives. The real estate transaction transferring the JEH parcel from public into private ownership would not have any direct impacts; however, indirect impacts may occur later in time as a result of any future redevelopment of the JEH parcel after the exchange has been completed. To assess the potential indirect impacts from the exchange of the JEH parcel to a private developer, the EIS identifies two RFDSs that are components of each action alternative.

An RFDS is essentially a "what-if" development scenario for future private redevelopment. It is GSA's estimate of what could be reasonably developed by a private developer on the parcel in the foreseeable future. **It is important to underscore that the RFDSs have been developed for analysis purposes only, and they are not GSA's suggestions or proposals for future use or design of the JEH parcel.** GSA developed two RFDSs for the JEH parcel. RFDS 1 assumes a reuse of the current JEH building, and RFDS 2 assumes the demolition of the JEH building to maximize development capacity while adhering to applicable land use controls and applying recent urban development trends. Each RFDS is described in more detail in Section 5.0 of this document and subsequent sections of that chapter.

The analysis of the transportation impacts associated with each of the three site alternatives is found in Sections 5.2.9, 6.2.9, and 7.2.9 of the EIS and in the corresponding TIA. Indirect transportation impacts associated with the future development of the JEH parcel can be found in this document and in Section 4.2.9 of the EIS. It should be noted that the exchange of the JEH parcel, analyzed in the EIS via two RFDSs, would be required to consolidate the FBI HQ at any of the sites under consideration; therefore, the exchange of the JEH parcel is a component of the proposed action common to each action alternative.

Impacts associated with the alternatives are analyzed in the No-build and Build Condition sections. Potential impacts are described in terms of:

- **Type**: the positive or negative effects of an action – ***beneficial***, reducing congestion or barriers and/or improving travel patterns, safety, or travel time; ***adverse*****,** increasing congestion or barriers and/or degrading travel patterns, safety, or travel time.

- **Category**: the type of effects – ***direct effects*** are caused by the action and occur at the same time and place; ***indirect effects*** are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.
- **Duration**: the length of time of the effects – ***short-term***, lasting during construction or up to one year after; ***long-term***, lasting more than one year.
- **Intensity**: see below

The thresholds for determining the intensity of effects on local pedestrian, bicycle, transit, parking, traffic networks, and truck access are guided by the following definitions:

- **Not Measureable** – a localized impact that is barely perceptible to most users.
- **Beneficial or Adverse** - a localized impact that is measurable to most users.
- **Adverse Major** – a broad area impact that is highly noticeable and would substantially affect a large numbers of network users.

Because both traffic and transit entail extensive analysis, more detailed impact thresholds have been established for these transportation modes. See table 2-1 for these specific impact thresholds. Any impact thresholds included in table 2-1 would be compared to the previous condition or the No-action/No-build Condition, or against the corresponding condition of another site.

Table 2-1: Traffic and Transit Impact Thresholds

Impact Thresholds	Traffic	Transit
Adverse Major	Delays impact corridors of the study area creating more of a regional impact dealing with several intersections that are key to the operation of the roadway. A corridor can be defined as several adjacent intersections along the same roadway providing a vital connection between roadways or important passage through a highly congested area.	An increase in transit ridership that creates modest passenger delays, measured as increasing volumes above Washington Metropolitan Area Transportation Authority (WMATA) thresholds for capacity at any combination of two of the following: individual Metrorail facility elements (vertical elements, faregate aisles, or platform capacity) or bus routes (including substantial delays from roadway operations.
Adverse	Delays are localized, such as at independent intersections.	An increase in transit ridership that creates minimal passenger delays, measured as increasing volumes above WMATA thresholds for capacity at any one of the following: individual Metrorail facility elements (farecard vending machines) or bus routes (including substantial delays from roadway operations).
Not Measurable	Delays are not perceptible to most users and the number of users is within capacity. Improvements to traffic operations (travel time, throughput, or delays) are also not perceptible to most users.	Condition would not degrade or improve transit capacity or change the overall transit level of service provided to users.
Beneficial	Improvements to traffic operations (travel time, throughput, or delays)	An increase in transit service or capacity for Metrorail facility elements (farecard vending machines) and/or bus routes (including reduced delays from roadway operational improvements).

2.4 Local Land Use Plans

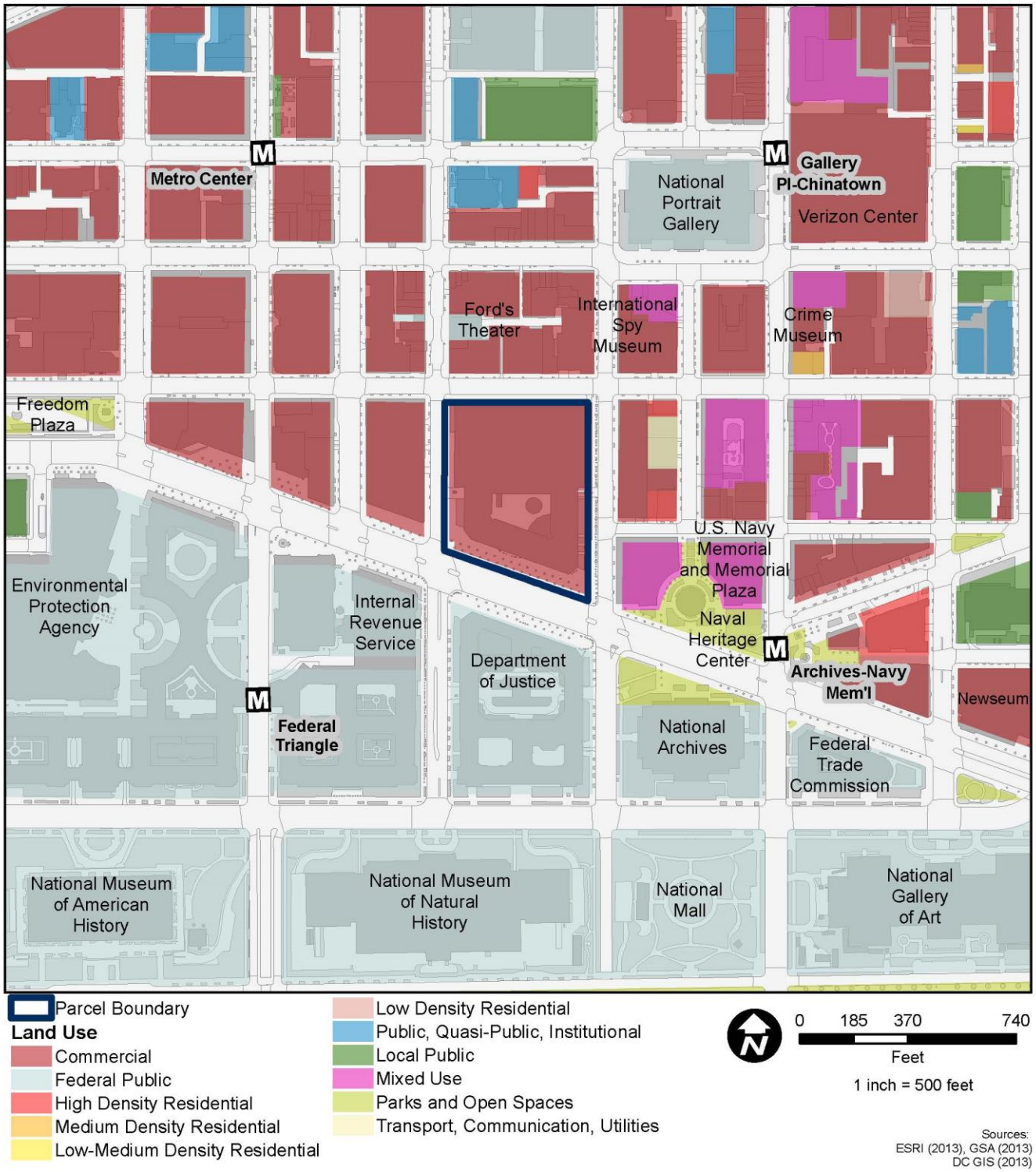
2.4.1 Existing Land Use

Land uses within in the vicinity of the JEH parcel are predominately medium- to high-density residential, office commercial, and retail commercial combined with Federal, local public facilities, These uses are interspersed with parks and open spaces. Table 2-2 contains the culturally important facilities, such as museums and memorials, and other public buildings in the study area. Figure 2-1 illustrates the existing land use within 0.25-mile radius of the JEH parcel.

Table 2-2: Culturally Important Facilities

Arts and Entertainment	Civic and Open Space	Museums	Federal Facilities
Ford's Theatre	Naval Heritage Center	International Spy Museum	Department of Justice
Landmark E Street Cinema	Freedom Plaza	Crime Museum	Internal Revenue Service
Warner Theatre	U.S. Navy Memorial and Memorial Plaza	Newseum	U.S. Environmental Protection Agency
Verizon Center	The National Mall	Koshland Science Museum	National Archives
Sidney Harman Hall		Museum of Arts and Sciences	Federal Trade Commission
Zenith Gallery		Smithsonian American Art Museum	
Red Aspen Gallery		National Portrait Gallery	
		National Museum of Natural History	
		National Museum of American History	
		National Gallery of Art	

Figure 2-1: D.C. Land Use Map



2.4.2 Planning Context

The FBI has occupied the JEH building, located at 935 Pennsylvania Avenue NW, Washington, D.C., since the building's completion in 1974. During construction in the 1970s, the area south of Pennsylvania Avenue was the location of consolidated government agencies built in the 1930s, while the north side of the avenue was a commercial area that had lost customers due to suburbanization and was in the process of being redeveloped by the Pennsylvania Avenue Development Corporation (PADC) (Cultural Tourism DC 2009). PADC led a major redevelopment of the Pennsylvania Avenue NW corridor starting in the 1970s by shaping the design and character of the street and the surrounding neighborhood.

After PADC was dissolved in 1996, time has taken a toll on Pennsylvania Avenue. Wear and tear on the avenue from increased event use, aging infrastructure, and jurisdictional challenges have led to a recent multi-agency effort to study the near- and long-term needs of the avenue, identify a governance framework, and develop a vision for the corridor through the Pennsylvania Avenue Initiative (NCPC 2014). This initiative, along with other local and national planning guidance that provide a vision and guiding framework for the study area, are presented below.

2.4.3 Comprehensive Plan for the National Capital

The Comprehensive Plan for the National Capital is a statement of principles, goals, and planning policies to guide the growth and development in Washington, D.C., for the next 20 years. The Comprehensive Plan is a unified plan composed of Federal and District Elements. Both elements have sections describing policies to guide transportation within the District of Columbia and, for the Federal Elements, federal facilities in the NCR.

The transportation policies included in the Federal Elements of the Comprehensive Plan are built upon the principles of transit-oriented development and smart growth (NCPC 2004). In conjunction with the location and design policies of the Federal Element, the transportation policies focus on maximizing the access of federal facilities to the region's extensive transit system. Goals regarding transportation for the NCR area include increased capacity and connectivity, congestion management and improved air quality, balanced land use and smart growth, and transportation options beyond the private automobile.

The District transportation elements of the Comprehensive Plan are broken into two sections: citywide elements and area-specific elements. Citywide transportation policies in the plan are focused on linking land use and transportation, including a focus on transit-oriented development, context sensitive transportation, and ensuring transportation impacts of development projects are focused on multi-modal standards rather than on vehicular standards (DCOP 2006). Citywide transportation policies also address regional smart growth transportation solutions and transportation system efficiency and management, including transportation demand management strategies. The Comprehensive Plan also puts a strong focus on multi-modal transportation choices, including the proposed District streetcar system discussed in more detail below.

The Comprehensive Plan's area-wide policy guidance for the JEH parcel is based on the location of the site within the Central Washington area. Within this area, the Comprehensive Plan specifically notes the goal of improving pedestrian connections within the Downtown Retail Core, "with a particular emphasis on improving the north-south connections along 6th, 8th, 9th, 10th, 11th, 12th, and 13th Streets NW to better connect the [downtown] area to the Federal Triangle and the National Mall." The policies also encourage the provision of sufficient parking and loading areas in areas adjacent to the Downtown Retail Core, an emphasis on short-term parking for shoppers, and preparation of streetscape improvement plans for 7th, 8th, and 9th Streets NW that physically enforce the desired character of the area as the city's "Arts Walk."

2.4.4 The Pennsylvania Avenue Initiative

The Pennsylvania Avenue Initiative was recently initiated by the National Capital Planning Commission (NCPC), GSA, and the National Park Service, in coordination with other federal and district agencies with interest in Pennsylvania Avenue. Although the initiative is currently in the development process and is expected to take several years, it is expected to:

- Articulate and advance a vision for improving the avenue to meet local and national needs in a twenty-first century capital city.
- Evaluate the feasibility and the framework required to effectively manage the operations, maintenance, programming, and physical improvements to the avenue.
- Execute the vision through short- and long-term improvement projects (NCPC 2015).

2.4.5 Monumental Core Framework Plan

The Monumental Core Framework Plan was initiated to help preserve the historic landscape of the National Mall as a place for national gatherings and a place to honor our country's heroes and cultural heritage. While the framework plan's initial purpose was to improve the settings for future museums and commemorative works located off the National Mall, it expanded in scope to address broader needs, including the demand for Federal office space and the planning and economic interests of the city (NCPC 2009). The framework's goals are as follows:

- Protect the national mall from overuse.
- Create distinctive settings for cultural activities and commemorative works.
- Improve connections between the National Mall, the city, and the waterfront.
- Transform the monumental core into a vibrant and sustainable place to visit, work, and live.

The recommendations of the plan are location specific, and represent the downtown District core. The JEH parcel falls in the Federal Triangle South portion of the downtown, which encompasses the area between the National Mall and Washington's traditional downtown, including Pennsylvania Avenue NW and the Federal Triangle. The key improvements recommended for this area include:

- Establish new destinations on Pennsylvania Avenue by concentrating a mix of office, culture, and hotel uses on Pennsylvania Avenue between 9th and 12th Streets NW.
- Enhance the public realm by establishing a welcoming, interconnected system of lively and beautiful streets, introducing sustainable public spaces, and improving the pedestrian experience and symbolic importance of Pennsylvania Avenue and Federal Triangle.

2.4.6 DC Retail Action Strategy: Downtown-East End

The DC Retail Action Strategy: Downtown-East End was initiated by the District of Columbia Office of Planning in 2010. The plan outlines strengths and weaknesses and potential for future development in the area encompassed by the neighborhoods of Chinatown, Penn Quarter, Gallery Place, McPherson Square, Federal Triangle, Midtown, and Franklin Square (DCOP 2010). The plan presents the challenge now being faced by the downtown business improvement district to provide neighborhood-oriented retail offerings in a submarket that is developing as a regional destination, with higher first floor rents than are typically found in neighborhood retail spaces.

The DC Retail Action Strategy assessed five submarkets that are established commercial districts with recognized market positions, but may be in transition. The assessment was intended to address key strategic issues such as underperformance and current/future retail positions, with a view to protecting, maintaining, and/or enhancing market share.

2.4.7 MoveDC: The District of Columbia's Multi-modal Long-Range Transportation Plan

The District of Columbia's Multi-modal Long-Range Transportation Plan was officially completed and initiated in October 2014 by DDOT to provide a vision and clear set of goals for the future of the District's transportation (DDOT 2014a). The vision for the District is to have a world-class transportation system that services the people who live, work, and visit the city to make the city more livable, sustainable, prosperous, and attractive. The goals and objectives created to achieve this vision of the District's future of transportation are to:

- increase non-auto mode split;
- increase access to parks and green space;
- encourage active transportation for health benefits;
- reduce air and water quality impacts of transportation; and
- prepare the transportation system for changing environmental and climatological conditions.

2.4.8 Streetcar Land Use Study

The District of Columbia initiated plans to build a streetcar network emerging from a long-term assessment of the city's transportation needs. Integrated with Metrorail and other transit services, the 37-mile system would extend transit to large, underserved portions of the District and expand the benefits of transit for many areas already served by Metrorail (DDOT 2012a).

There are currently four alternatives for the north-south line currently undergoing environmental review by DDOT that are in proximity to the JEH parcel (DC Streetcar 2014). Alternative 1 would have a direct north to south alignment down 7th Street NW, passing one to two blocks east of the JEH parcel. Alternative 2 would meander through Washington, D.C. traveling from Georgia Avenue near Howard University, to 14 Street NW, and eventually along 7th Street NW, again passing one to two blocks east of the JEH parcel. Alternative 3 would also pass the JEH parcel one to two blocks east on 7th Street NW, and then travel along Pennsylvania Avenue. Alternative 4 would travel directly in front of the JEH parcel along Pennsylvania Avenue. To date, there has not been a preferred alternative chosen for this transit corridor development nor is there an implementation or goal in-service date.

The area surrounding the JEH Parcel is already well connected to a variety of public transit options which connect JEH to a variety of locations throughout the NCR. The implementation of a north south streetcar connection would complement the existing public transit options and is consistent with other land use plans in the vicinity.

2.4.9 2014 DC Circulator Transit Development Plan Update

The DC Circulator Transit Development Plan was originally initiated in 2011, and recently updated in 2014. The 2014 update will guide the future growth of the DC Circulator bus system by keeping the existing system and future growth of the system current and aligned with demand and development in the District (DDOT 2014b). The

purpose of the plan is to continually improve the existing system and to provide for future growth of the system that is aligned with demand and development in D.C. The plan accomplishes the following objectives:

- providing a transparent planning and decision-making process through a broad outreach and participation process;
- updating citywide land use, demographic, and development data, in addition to data and plans for other transit services, to identify corridors that support DC Circulator service and warrant all-day 10-minute headways;
- applying previously defined measures and criteria to this data to plan new service; and
- developing a usable, living plan for near- and long-term growth.

In addition to collecting input from a variety of sources to define priorities and inform the future growth of the DC Circulator, DDOT also conducted a thorough review and analysis of current DC Circulator operations. The system evaluation identified several opportunities to improve the DC Circulator. DDOT also identified activity centers and evaluated the existing transit connections between them to identify transit needs and avoid duplication of existing service. The results of the planning process included six new recommended Circulator routes (National Mall Route, National Cathedral – McPherson Square, NoMA, Convention Center – Southwest Waterfront, Dupont – Southwest Waterfront, and Columbia Heights – Washington Hospital Center – Brookland – NoMa), one recommended extension (Dupont Circle – Georgetown – Rosslyn Extension to U St/Howard University), and three additional extensions to existing routes (Georgetown – Union Station Extension to National Cathedral, Union Station – Navy Yard Extension to Southwest Waterfront, and Potomac Avenue Metro – Skyland Extension to Congress Heights). Both phasing and implementation plans were also provided to guide next steps for the system.

2.5 Transportation Assumption Agreement

Prior to initiating the transportation analysis, it was essential to determine what analysis tools, data parameters, and assumptions would provide the basis of the analysis. In coordination with GSA, the project team met with DDOT to come to an agreement on the assumptions to follow for each site.

DDOT, through its comprehensive transportation review (CTR) process (DDOT 2012b), requires that a scoping form be approved prior to analysis outlining the agreed upon level of detail, the data parameters, and type of analysis. These parameters and assumptions include a study area, trip generation, trip distribution, modal split, analysis years, analysis methods, and No-action/No-build transportation assumptions (background growth, planned developments, and planned roadway improvements).

Appendix B1 contains the DDOT Scoping Form.

3.0 Existing Condition: FBI HQ Study Area

This chapter describes the study area for the existing JEH parcel in downtown Washington, D.C., and provides a summary of the existing transportation conditions within the study area as of February 2015. Data were collected between July 2014 and February 2015 and include descriptions of the study area, pedestrian network, bicycle network, public transit system, parking conditions, truck access, traffic operations, and crash analysis. Separate TIA reports have been written for each of the site alternatives (Greenbelt, Landover, and Springfield).

3.1 Introduction

This section describes the study area and the roadways serving it, followed by a summary of the data collection process.

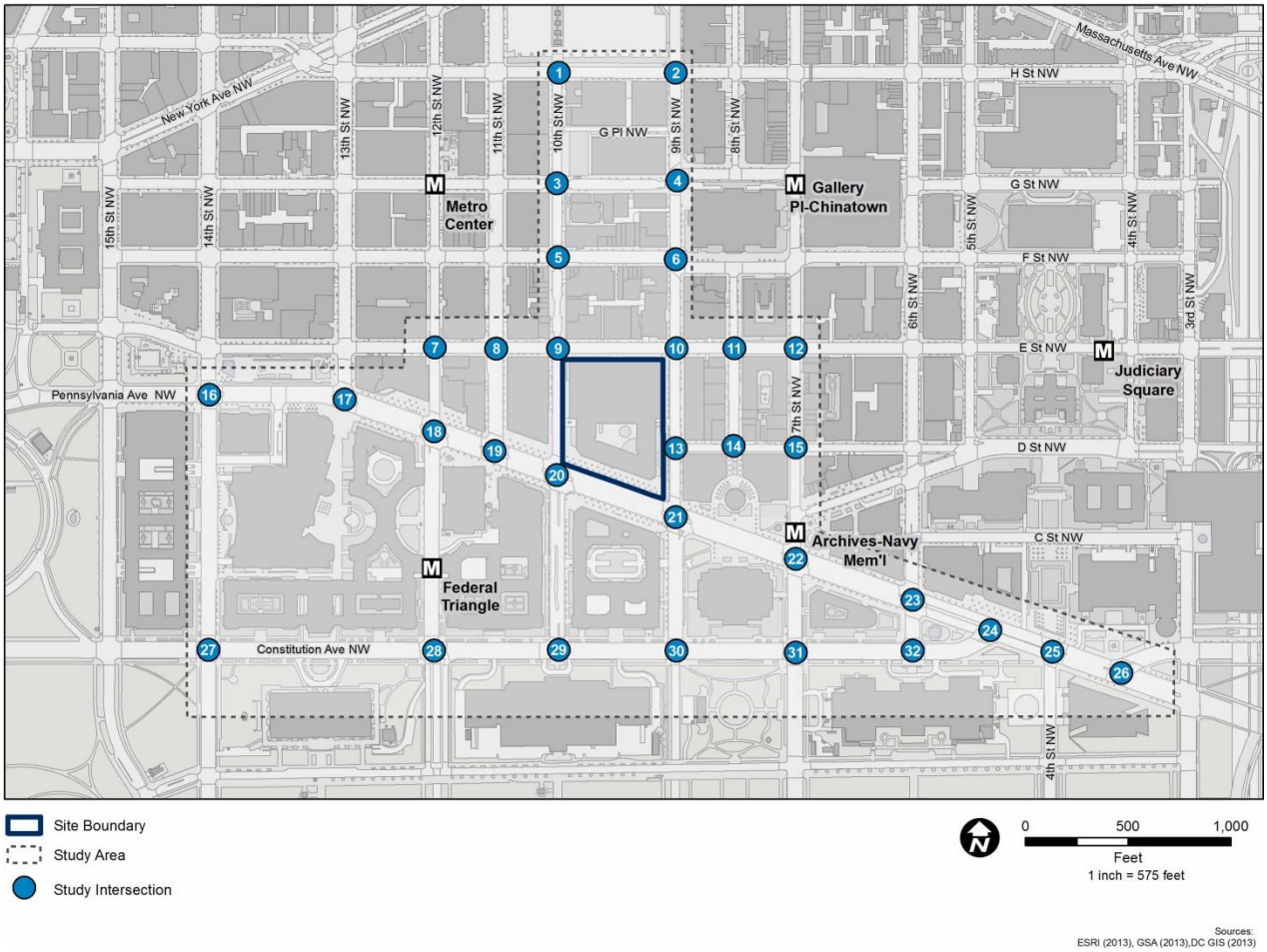
3.1.1 Study Area Description

The JEH parcel is located in Northwest Washington, D.C. Located in Ward 2, the parcel is situated north of Constitution Avenue NW and the National Mall, west of North Capitol Street, and south of H Street NW. The parcel is located at 935 Pennsylvania Avenue NW, in a mixed-use area of downtown with a variety of cultural buildings (museums and theaters), government buildings, hotels, office buildings, restaurants, and retail options.

For this assessment, the transportation conditions were studied within a study area that is generally bounded on the north by H Street NW, 3rd Street NW to the east, Constitution Avenue NW to the south, and 14th Street NW to the west. The study area was established in coordination with DDOT to capture traffic from main regional traffic generating roadways in proximity to the site (see DDOT Scoping Form in Appendix B1). There are a total of 32 intersections in the study area (figure 3-1).

The study area analyzed for the other transportation modes generally includes all areas within the same study area described above. The Metrorail impact evaluation for the JEH parcel was refined to more effectively evaluate impacts. Given its location in downtown Washington, D.C., there are numerous Metrorail entrances for those stations, so only those entrances closest to the parcel for each Metrorail line were included in the analysis.

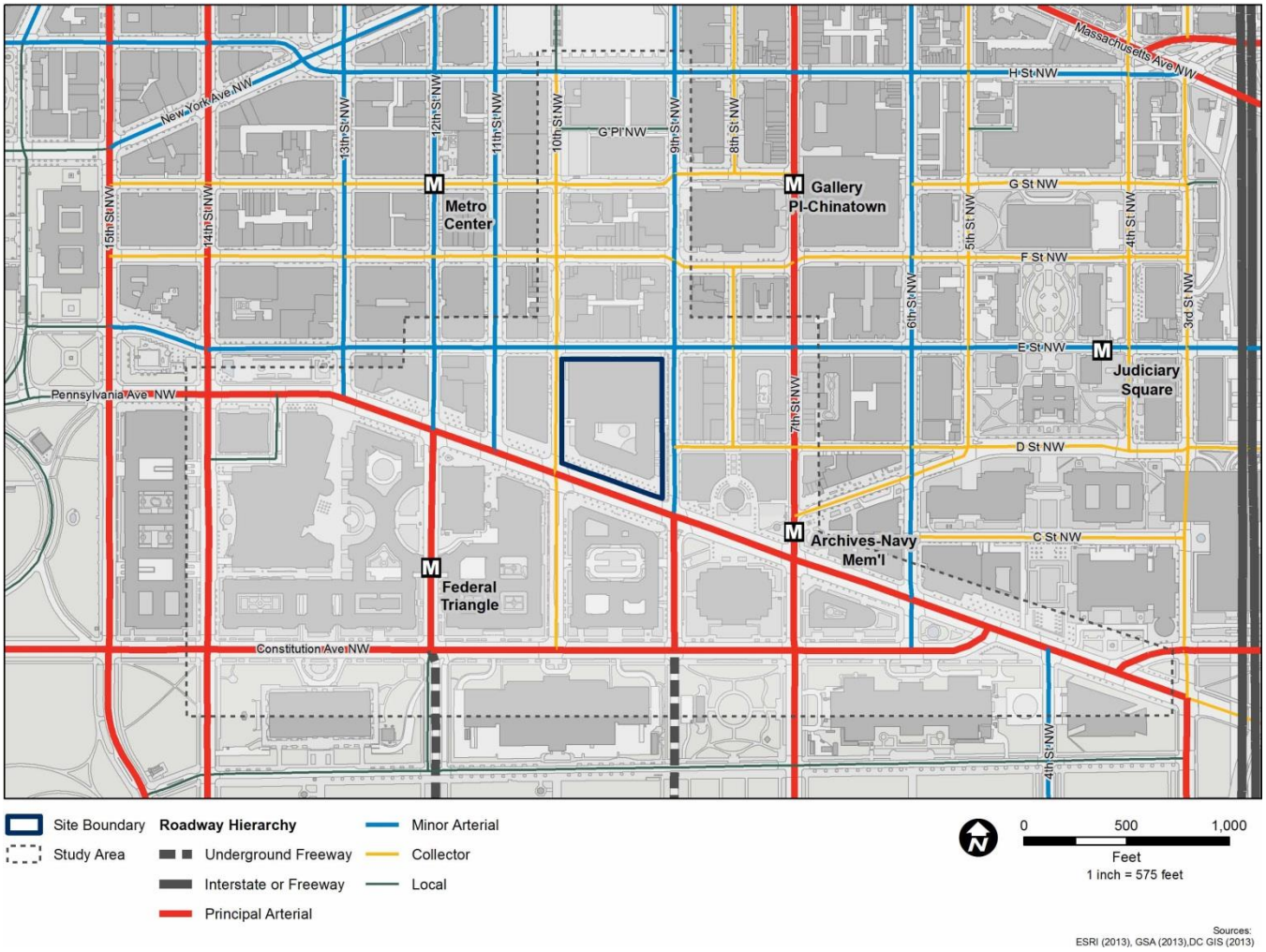
Figure 3-1: JEH Parcel Study Area



3.1.2 Study Area Accessibility

The JEH parcel is served by regional highways (Southwest Freeway/Interstate [I]-395) via the 9th and 12th Street Expressways and by the following principal arterial roadways: Constitution Avenue NW, 14th Street NW, 7th Street NW, and Pennsylvania Avenue NW, all of which traverse the study area. Several minor arterials also provide access to the parcel, including 9th and 12th Streets NW. The roadway classifications within the study area are shown in figure 3-2. The properties in the study area are also served by transit including Metrorail, commuter bus, local bus, several shuttles, as well as by tourist buses. The study area generally has wide complete sidewalks, especially along the main thoroughfares of Constitution Avenue NW and Pennsylvania Avenue NW. Some bicycle facilities (mainly Capital Bikeshare) also serve the study area, and many well established on-street bike lanes are currently available within the study area.

Figure 3-2: Roadway Hierarchy and Classification



3.1.3 Roadway Descriptions

The following section describes the roadways within the study area, including the DDOT roadway classification, the number of lanes in each direction, the latest average annual daily traffic (AADT) volumes available from DDOT from 2012, and any noteworthy characteristics such as the roadway's role within the transportation network and if bike lanes are present. The information was collected from a DC Roadway Functional Classification map (DDOT 2014c), observations in the field, aerial imagery, and DDOT's 2012 Traffic Volume Map (DDOT 2013a). The number of lanes of traffic indicated below are for AM and PM rush hour conditions. Mid-day and weekend conditions may have fewer travel lanes because on-street parking is allowed during non-peak hours.

14th Street NW extends for a short stretch in the study area from Constitution Avenue NW to Pennsylvania Avenue NW. It is a two-way roadway that is classified by DDOT as a principal arterial. The roadway is oriented north-south, connects Northwest D.C. to the 14th Street Bridge, and varies between three and four lanes in both the northbound and southbound directions. 14th Street NW provides connections to Constitution Avenue NW and Pennsylvania Avenue NW, both of which are major east-west arterial roadways and also serve as major regional and commuter routes between Arlington, Virginia, to the southwest and downtown D.C. to the north. The AADT for 14th Street NW in the study area was 39,000 in 2012 (DDOT 2013a).

12th Street NW is classified by DDOT as a minor arterial from the north until Pennsylvania Avenue NW, at which point it becomes a principal arterial. Between Constitution Avenue NW and Pennsylvania Avenue NW it is a north-south oriented, two-way roadway that operates with three lanes of northbound traffic and two lanes of southbound traffic. This stretch of 12th Street connects to the 12th Street Expressway to the south, south of Constitution Avenue near the National Mall, eventually merging with Maine Avenue SW.

Between Pennsylvania Avenue NW and E Street NW, 12th Street NW is a one-way roadway with four lanes of northbound traffic. In 2012, the AADT north of Pennsylvania Avenue NW was 15,200; south of Pennsylvania Avenue NW, it was 18,400 (DDOT 2013a).

11th Street NW is a two-way roadway that is classified by DDOT as a minor arterial. The north-south roadway carries two lanes of southbound traffic and two lanes of northbound traffic. There is ample bike infrastructure present on this street, including advance stop boxes at intersections and direction specific bike lanes for both northbound and southbound traffic. 11th Street NW only extends for a short stretch within the study area, from E Street NW to Pennsylvania Avenue NW. In 2012, the AADT for 11th Street NW was 10,000 (DDOT 2013a).

10th Street NW is a north-south roadway that is classified by DDOT as a collector. Between Pennsylvania Avenue NW and H Street NW, 10th Street NW is a one-way, two-lane, southbound only roadway with a sporadic bike lane. However, between Pennsylvania Avenue NW and Constitution Avenue NW, 10th Street NW is a two-way roadway that varies between two and three lanes in the southbound direction and one and two lanes in the northbound direction. In 2012, 10th street NW had an AADT of 2,000 (DDOT 2013a).

9th Street NW is a one-way roadway that is classified by DDOT as a minor arterial. The roadway is oriented north-south, carries three lanes of southbound traffic, and sporadically has a bike lane or bike and bus-only lane. Between Pennsylvania Avenue NW and Constitution Avenue NW, DDOT classifies 9th Street NW as a principal arterial where it becomes a two-way roadway with four lanes of southbound traffic and one lane of northbound traffic. This roadway then leads into the below grade 9th Street Expressway and eventually connects to the Southwest Freeway/I-395. In 2012, the AADT north of the Pennsylvania Avenue NW was 16,700, and it was 19,600 south of Pennsylvania Avenue NW (DDOT 2013a).

8th Street NW is a two-way roadway that is classified by DDOT as a collector. The north-south roadway has one lane in each direction and is only present in the study area for a short stretch. During the summer months, this short stretch of roadway is closed to traffic every Thursday from 1:00 PM until dark for a Farmers Market.

7th Street NW is a two-way roadway that is classified by DDOT as a principal arterial. The roadway is north-south oriented. Between E Street NW and Pennsylvania Avenue NW, the roadway has one to two lanes of southbound traffic and two lanes of northbound traffic, with one of the northbound lanes reserved only for bikes and buses north of Indiana Avenue. However, between Pennsylvania Avenue NW and Constitution Avenue NW, the roadway width increases to three lanes of traffic in both directions. In 2012, 7th Street NW had an AADT of 15,500 (DDOT 2013a).

6th Street NW is a two-way roadway that is classified by DDOT as a minor arterial. The north-south roadway is present in the study areas for a very short stretch and has three lanes of traffic in both directions. (The AADT values for 6th Street NW are not included because the roadway section in the study area is so small and the AADT values do not match up well with this location.)

Constitution Avenue NW is a two-way roadway that is classified by DDOT as a principal arterial. The roadway is east-west oriented and skirts the northern edge of the National Mall. Constitution Avenue NW carries four lanes of traffic in each direction. This roadway progresses into Route 50 to the west, which serves as a major regional and commuter route to Virginia. In 2012, the AADT east of the JEH parcel was 31,900; west of the JEH parcel, it was 21,800 (DDOT 2013a).

Pennsylvania Avenue NW is a two-way roadway that is classified by DDOT as a principal arterial. The roadway runs along a diagonal in a northwest to southeast orientation. Pennsylvania Avenue NW ranges from three to four lanes of traffic in both directions, although it is as narrow as two to three lanes wide between 13th and 15th Streets NW. In 2012, west of the JEH parcel on Pennsylvania Avenue NW, the AADT was 18,600 and east of the parcel, it was 28,900 (DDOT 2013a).

Pennsylvania Avenue NW has bike infrastructure with a two-way cycle track that runs through the central median of the roadway between 15th Street NW and 3rd Street NW. This cycle track has one lane of traffic in each direction, established turning lanes, and is clearly separated from automobile traffic through the means of Armadillo lane dividers or Park-Its (recycled rubber parking stops usually used in parking lots).

D Street NW is a two-way roadway that is classified by DDOT as a collector. The roadway is oriented east-west and extends from 9th Street NW to 7th Street NW. D Street NW has one lane of traffic in both westbound and eastbound directions, and in 2012, it had an AADT of 4,300 (DDOT 2013a).

E Street NW is a two-way roadway that is classified by DDOT as a minor arterial. The roadway is oriented east-west and has one lane of traffic in each direction with a central turning lane. This roadway has one-way bike lanes present on both westbound and eastbound lanes, and in 2012, the AADT was 10,000 (DDOT 2013a).

F Street NW is a two-way roadway that is classified by DDOT as a collector. The roadway is oriented east-west and has two lanes of traffic in each direction. Only the stretch of roadway between 10th Street NW and 9th Street NW is within the study area. In 2012, this portion of F Street NW had an AADT of 7,800 (DDOT 2013a).

G Street NW is east-west oriented and is a two-way roadway with one lane of traffic in each direction. This roadway is classified by DDOT as a collector. Only the stretch of roadway between 10th Street NW and 9th Street NW is within the study area. Portions of G Street NW have one-way bike lanes present on both eastbound and westbound lanes between 9th and 10th Streets NW. In 2012, this portion of G street NW had an AADT of 6,700 (DDOT 2013a).

H Street NW is a two-way roadway that is classified by DDOT as a minor arterial. The roadway is oriented east-west and has three lanes of traffic in each direction. Only the stretch of roadway between 10th Street NW and 9th Street NW is within the study area. In 2012, this portion of H Street had an AADT of 15,600 (DDOT 2013a).

3.1.4 Data Collection

As part of the field data collected, a detailed inventory of the lane geometry was conducted through field reconnaissance and a study of aerial imagery. Based on this information, the existing lane geometry and traffic control type (signalized or unsignalized) of intersections in the study area is shown in figure 3-3.

(This page intentionally left blank.)

Figure 3-3: Existing Lane Geometry and Traffic Control Type

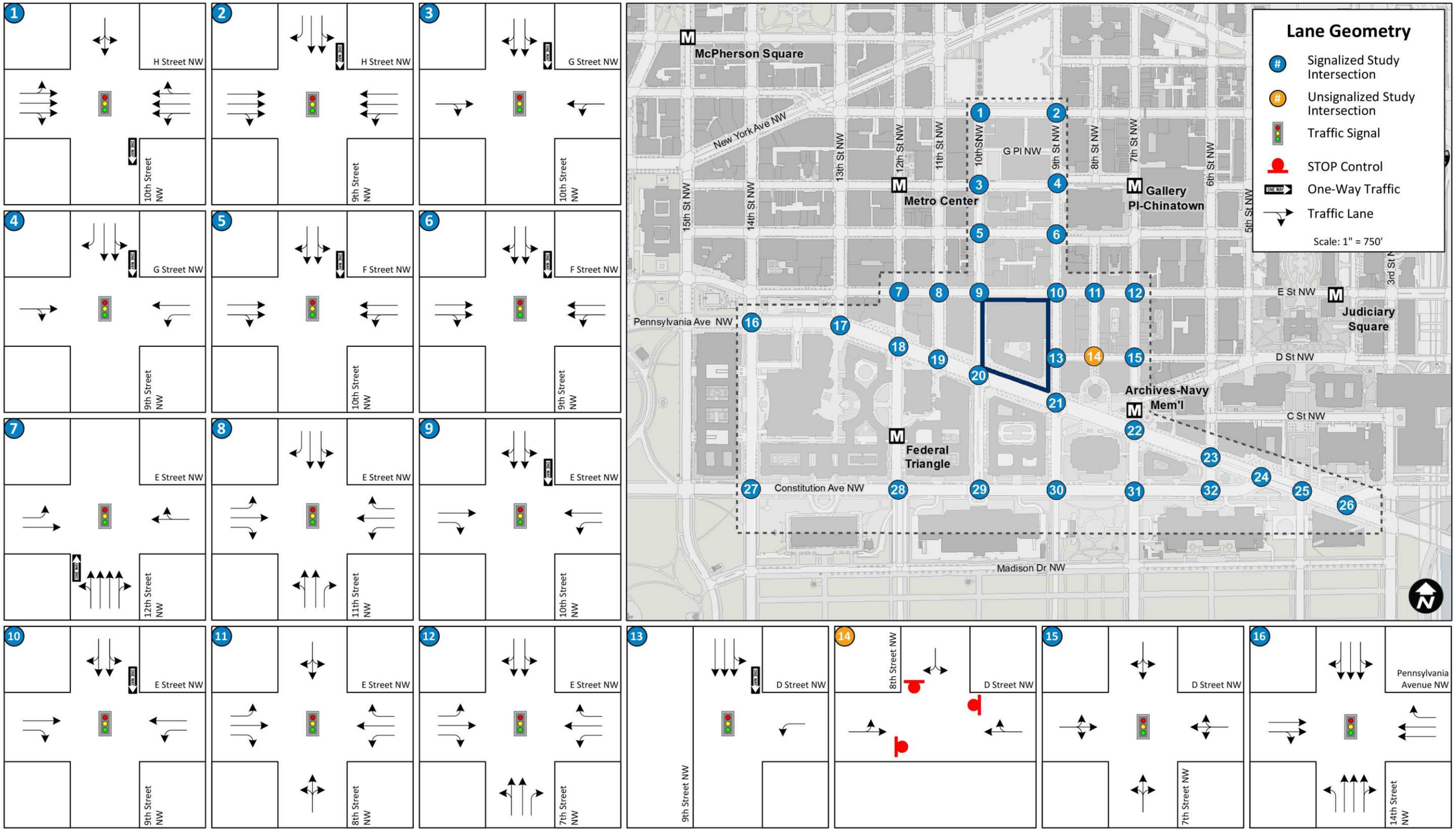
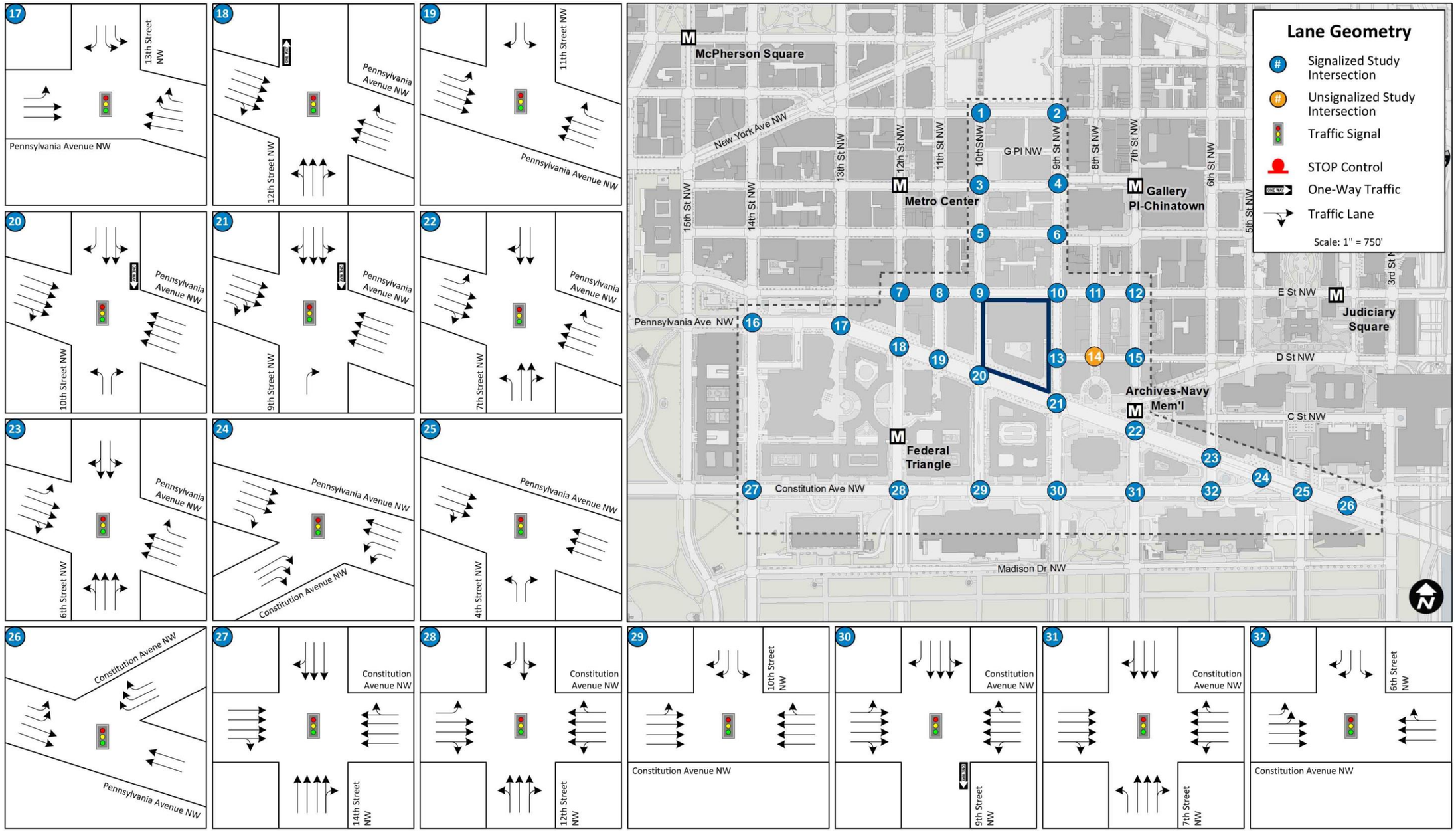


Figure 3-3: Existing Lane Geometry and Traffic Control Type (continued)



To supplement existing data collected for the Old Post Office Building Redevelopment Final Environmental Assessment (GSA in cooperation with NCPC 2013b) and the Union Station to Georgetown Alternatives Analysis for Premium Transit Service (DDOT 2013b), vehicular counts from 25 intersections in the study area were collected. The data from the 25 intersections combined with the available 7 intersection vehicular counts provided the necessary data to cover all 32 study area intersections. These data were obtained on May 20, 21, and 22, 2014, between the hours of 6:30 AM and 9:30 AM and 4:00 PM and 7:00 PM (Appendix B2). Vehicular counts include vehicular, truck, bicycle, and pedestrian volumes. These counts were used in combination with data from the Old Post Office study (collected in April 2012) and the DC Streetcar Alternatives Analysis (collected in early 2013) to perform the existing conditions traffic operations analyses.

As advised by DDOT and similar to other transportation studies performed for DDOT, the worst-case AM and PM weekday peak hour volumes by intersection were used to calculate the traffic operations, so that a worst-case condition could be evaluated. Based on the various count collection periods for the study area intersections, the overall weekday AM peak hour occurs between 8:15 AM and 9:15 AM, and the weekday PM peak hour occurs between 5:00 PM and 6:00 PM. Figure 3-4 shows the existing AM and PM weekday peak hour turning movement volumes for the study area.

(This page intentionally left blank.)

Figure 3-4: Existing AM and PM Peak Hour Turning Movement Volumes

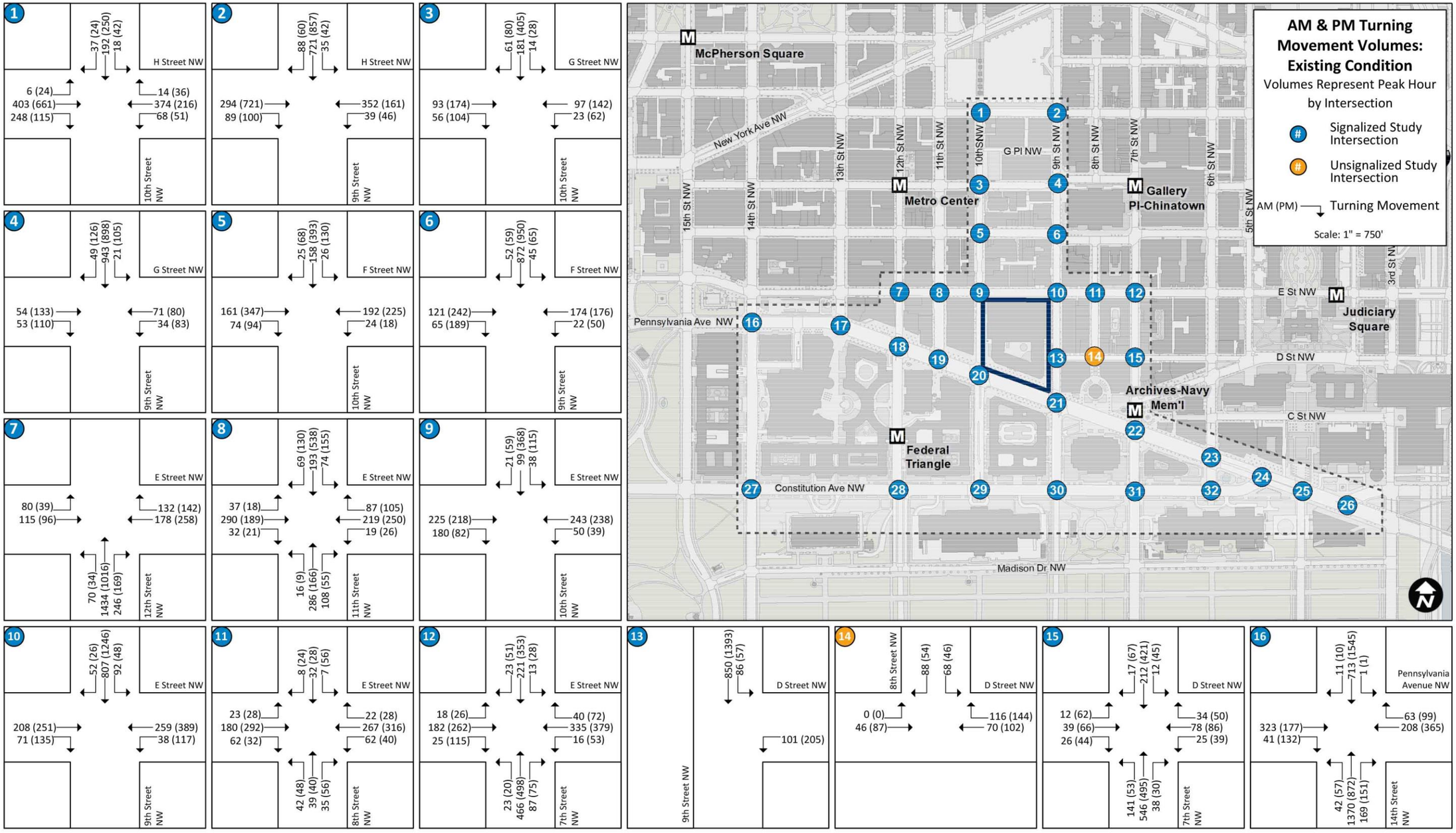
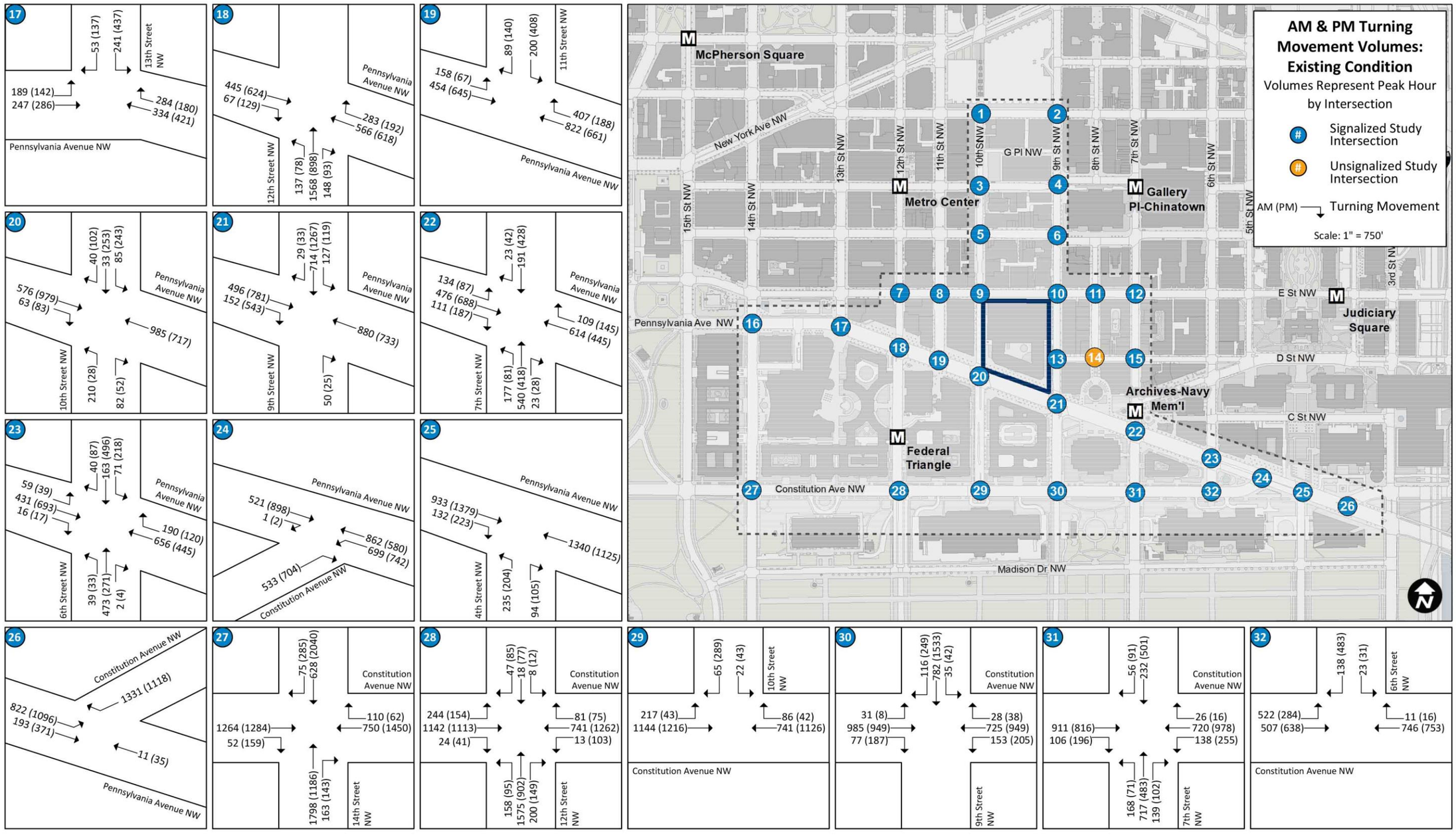


Figure 3-4: Existing AM and PM Peak Hour Turning Movement Volumes (continued)



3.2 Pedestrian Network

Analysis of the pedestrian network includes an overall description of sidewalks in the study area, origin and destination points of pedestrians, commonly used sidewalks in the study area, disruptions or obstacles in the pedestrian environment, and general Americans with Disabilities Act (ADA) compliance.

3.2.1 Overall Sidewalk Observations

Sidewalks are provided along both sides of all roads through the entire study area expect for areas undergoing temporary construction. Pedestrian facilities within the study area include highly used and generally adequate facilities. Facilities were considered adequate if sidewalk conditions were in decent condition (with only small amounts of overgrowth, cracks, or uneven pavement) and were at least 4 feet wide. Intersections within the study area generally have reasonable accommodations for pedestrians, including traffic lights and crosswalks; although, in some instances, these crosswalks are not ADA compliant (see Section 3.2.2).

The origins and destinations of pedestrian trips in the study area are a mix of office, retail, restaurants, and tourist attractions. During the lunch period on July 17, 2014, a high level of foot traffic to and from cafes and restaurants in the area was observed. The same level of traffic was seen during the PM peak period as commercial pedestrians mixed with the dinner crowd transiting the area. According to the Old Post Office Environmental Assessment, pedestrian volumes are also very high in the morning rush hour when commuters arrive to work (GSA in cooperation with NCPC 2013a). As observed, the area at the intersection of F Street NW and 7th Street NW also experienced an increase of foot traffic during the lunch break due to the number of food trucks that congregate in this area. Occasionally food trucks also line up along E Street NW, in between 9th and 10th Streets NW, as well as along 12th Street NW near Metro Center Station. The lowest pedestrian activity in the area was during the period between the AM peak commuting hours and the lunch hours. Otherwise the area experiences regular high pedestrian activity.

According to DDOT's 2009 Pedestrian Master Plan, the Downtown Business District, which contains the JEH study area has mostly mid- to high-pedestrian activity potential. Constitution Avenue NW, 14th Street NW, 7th Street NW, and segments of Pennsylvania Avenue NW and 12th Street NW have the highest levels of pedestrian activity and subsequently are likely candidates for high pedestrian deficiency (DDOT 2009a). Therefore, this area is prioritized for further study and possible action.

This same Master Plan does not identify streets in the study area that have "sidewalk gaps" defined as a missing sidewalk that is more than 10 percent of the length of the block. However it is worth noting that there are intermittent locations within the study area that negatively impact the quality and attractiveness of pedestrian travel, including narrow sections of sidewalks north of Pennsylvania Avenue (mostly due to restaurants' outdoor seating on the sidewalks), sections of sidewalk without street trees, construction, and commercial loading areas. These deficiencies are common to urban environments.

There are a few barriers and areas of concern within the study area that negatively impact the quality and attractiveness of pedestrian travel, including narrow sidewalks along several streets (mostly due to restaurants' outdoor seating on the sidewalks), construction, and road quality.

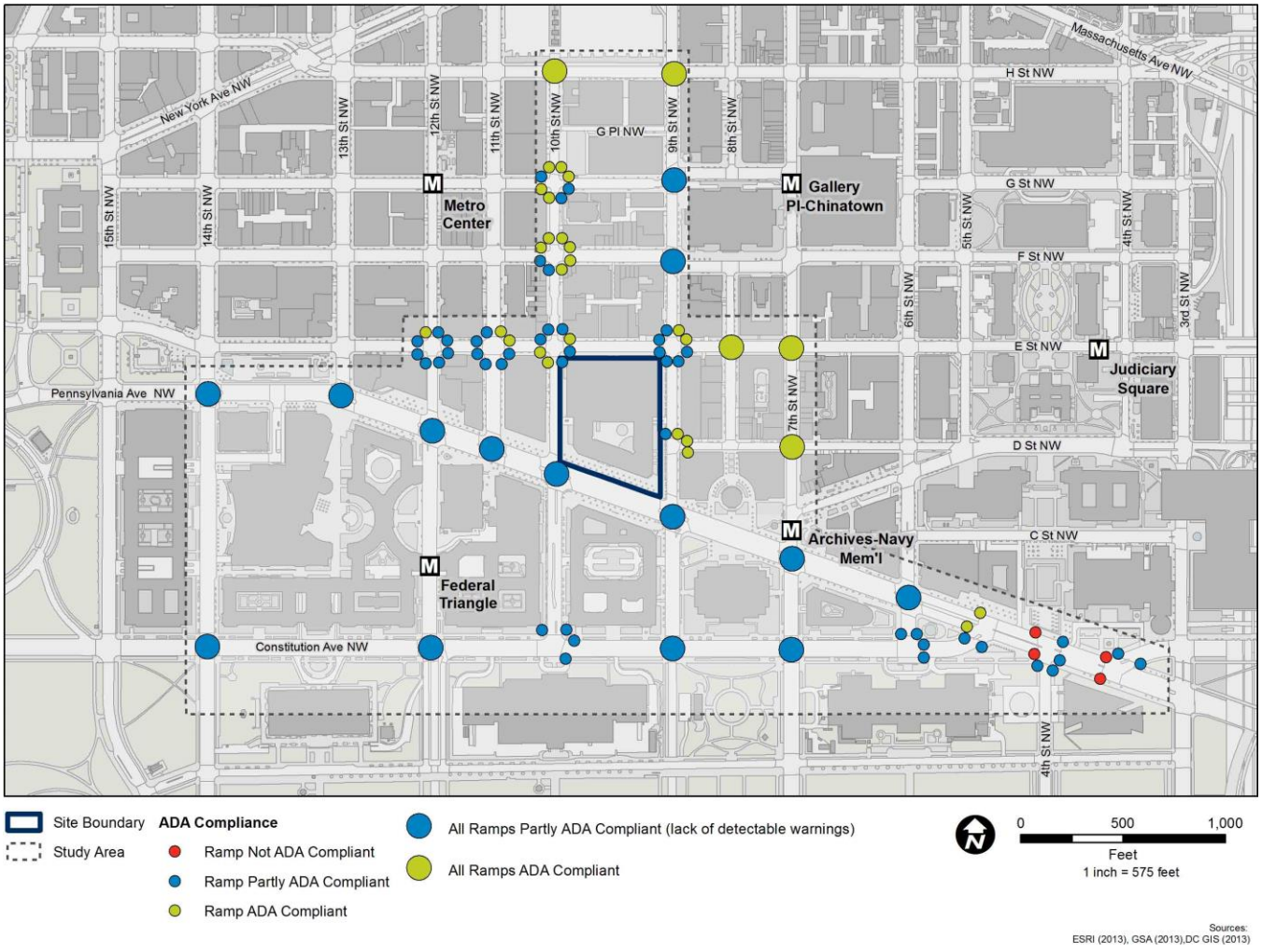
3.2.2 Accessibility Compliance

Sidewalks in the pedestrian network range from 2 feet wide through upwards of 30 feet in some locations in the study area. FHWA guidelines recommend that sidewalks have a minimum width of 5.0 feet if setback from the curb or 6.0 feet if at the curb face (FHWA 2006). Any sidewalk width less than 5.0 feet must be 3.0 feet wide with 5-foot turn-around locations every 200 feet to meet the minimum requirements for people with disabilities (USDOJ 2010). This minimum sidewalk width requirement exists in most of the study area. Due to zoning requirements,

certain stretches of sidewalk far exceed this minimum width. For example, Pennsylvania Avenue has 30-foot sidewalk sections as a result of the design requirements of The Pennsylvania Avenue Plan and other local land use and historic preservation regulations as described in Section 2.4.2.

According to DDOT, ADA compliant curb ramps are at least 4 feet wide and have a rumble-strip on its surface (DDOT 2009a). Figure 3-5 lays out a detailed depiction of the state of ADA compliance at crosswalks in the study area. As seen in this figure, most of the curbs in the study area are at least partly compliant; their shortcoming is the lack of a rumble strip. The curbs in the vicinity of the JEH parcel, and the curbs in proximity to the neighboring Metrorail stations in the study area, are all wholly or partly compliant. Only four of the curb ramps within the study area are not ADA compliant; these are all located at the intersections of Constitution Avenue NW and Pennsylvania Avenue NW (east intersection) and Constitution/Pennsylvania Avenue NW and 4th Street NW. The information for figure 3-5 was gathered during site visits on July 16 and 17, 2014.

Figure 3-5: ADA Compliant Curb Ramps



3.3 Bicycle Network

There are a number of bicycle facilities on roadways within the JEH parcel study area, as well as Capital Bikeshare stations. Portions of E Street NW, 11th Street NW, 10th Street NW, 9th Street NW, 7th Street NW, 4th Street NW, and G Street NW all have bicycle lanes within the study area. Additionally, Pennsylvania Avenue NW has a cycle track in the center of the roadway. The four roadways that surround the JEH parcel (9th Street NW,

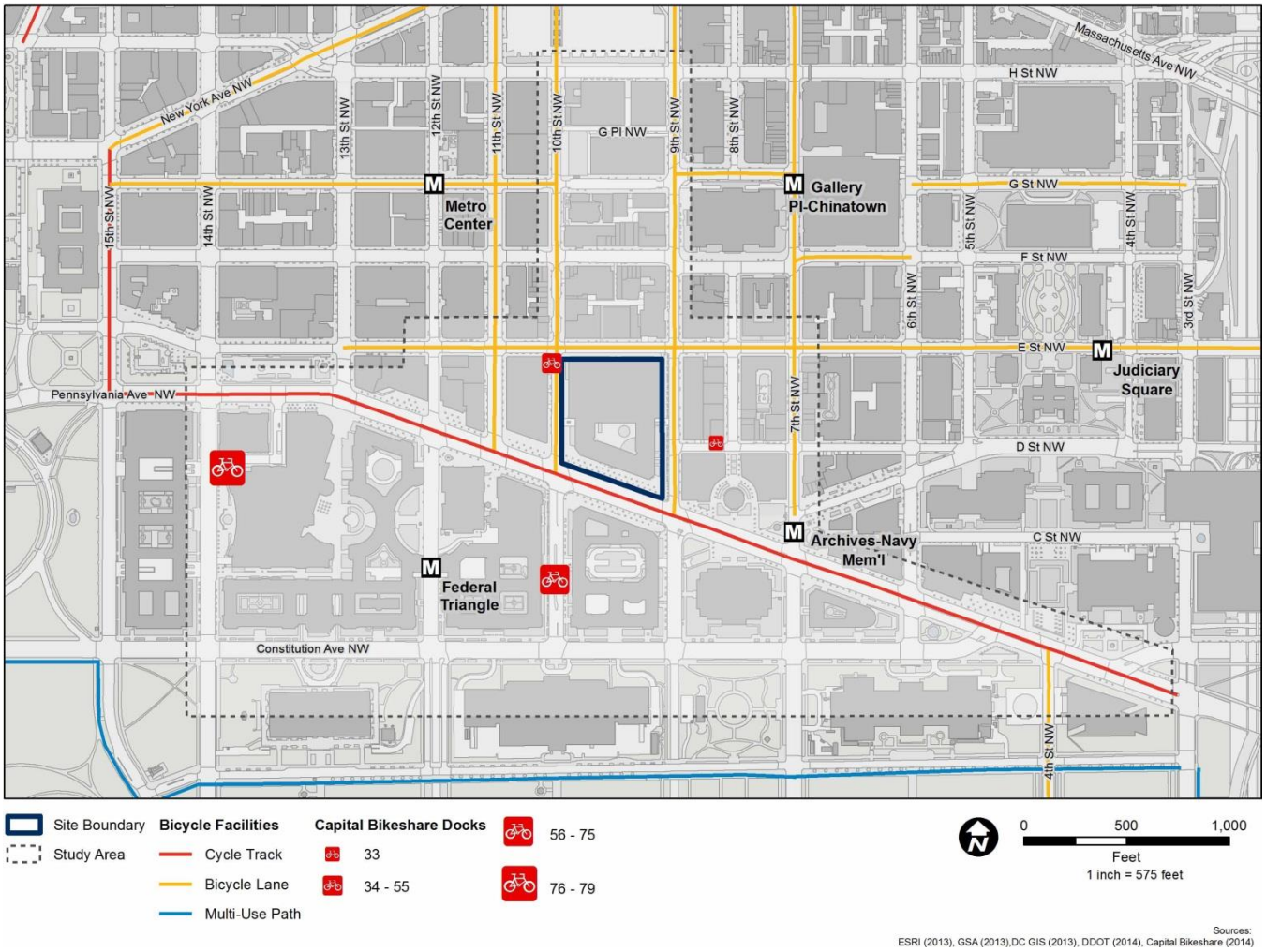
10th Street NW, E Street NW, and Pennsylvania Avenue NW) all have bicycle facilities. Table 3-1 and figure 3-6 summarize bicycle facilities in the study area.

Table 3-1: Existing Bicycle Facilities within the Study Area

Street Name	Limits in Study Area	Type
Pennsylvania Avenue NW	West of Constitution Avenue	Cycle Track
E Street NW	Through entire study area	Bicycle Lane
11th Street NW	North of Pennsylvania Avenue	Bicycle Lane
10th Street NW	North of Pennsylvania Avenue	Bicycle Lane
9th Street NW	North of Pennsylvania Avenue	Bicycle Lane
7th Street NW	North of Indiana Avenue	Bicycle Lane
4th Street NW	South of Pennsylvania Avenue	Bicycle Lane
G Street NW	East of 9th Street and west of 10th Street	Bicycle Lane

Source: DC GIS (2014), DDOT Bicycle Facility GIS Shapefile, Received 12/11/14

Figure 3-6: Existing Bicycle Facilities within the Study Area



There is one major gap in bicycle facilities within the study area. There is a lack of north-south facilities between Pennsylvania Avenue NW and Constitution Avenue NW that would connect to the trails along the National Mall. The reasons for this may include the lack of roadway space to stripe a bicycle lane, Federal building set-back requirements, or heavy traffic volumes (DDOT 2005).

Within 2 miles of the JEH parcel there are numerous bicycle accommodations, including several shared use paths along the National Mall, the Rock Creek Trail, the Metropolitan Branch Trail, and the Mount Vernon Trail in Arlington, Virginia. Appendix B3 has further details on bicycle accommodations within 2 miles of the site.

3.3.1 Capital Bikeshare

There are five Capital Bikeshare stations within the study area for the JEH parcel. Capital Bikeshare was launched in 2010 and currently has 326 stations in the District of Columbia; Arlington County, Virginia; Alexandria, Virginia; and Montgomery County, Maryland. Capital Bikeshare is often used as a “last mile” connection between transit stations or stops and users’ places of work or living. The system is created to support one-way trips in that a bicycle is picked up at one location and dropped off at another, without a need to secure the bike in-between trips or make a return trip to the same starting point. Table 3-2 and figure 3-6, summarize these stations, their distance to the JEH parcel and the number of bicycle docks available at each.

Table 3-2: Capital Bikeshare Stations within Study Area

Station	Number of Docks	Distance to JEH (miles)
10th Street and E Street NW	15	0.05
10th Street and Constitution Avenue NW	29	0.1
14th Street and D Street NW (Ronald Reagan Building)	21	0.4
8th Street and D Street NW	15	0.05
9th Street and G Street NW (Martin Luther King Jr. Library)	23	0.25

Source: Capital Bikeshare (2014b)

3.3.2 Trip Purpose

The *2013 Capital Bikeshare Member Survey* revealed that nearly 60 percent of trips using Capital Bikeshare were for work or school purposes (LDA Consulting 2013). Fifty-four percent of respondents said that at least one of the Capital Bikeshare trips they made last month either started or ended at a Metrorail station. Twenty-three percent of respondents said they used Capital Bikeshare to access a bus stop within the last month.

3.3.3 Ridership Patterns

Ridership data were obtained for the third quarter of 2013 for four of the five Capital Bikeshare stations within the study area: 10th Street and E Street NW, 10th Street and Constitution Avenue NW, 14th Street and D Street NW, and 8th Street and D Street NW (Capital Bikeshare 2014b). The station at 9th Street and G Street NW was not installed until July 2014, so no data were available. The third-quarter data were chosen because it typically sees the highest amount of ridership.

Overall, ridership was higher on weekends versus weekdays for each of the four stations. The 10th Street and Constitution Avenue NW station had the highest ridership, with an average of 75 trip ends per weekday, 97 trip ends per Saturday, and 89 trip ends per Sunday. On weekdays, peak ridership occurred during the midday period (9:00 AM to 3:00 PM) at each station with the exception of the 14th Street and D Street NW station, where ridership was highest during the AM peak period (6:00 AM to 9:00 AM). Table 3-3 summarizes trip ends at each station for an average weekday, Saturday, and Sunday.

Table 3-3: Capital Bikeshare Station Average Daily Trip Ends

Stations	Weekday [a]							Saturday	Sunday
Location	Early AM	AM Peak	Midday	PM Peak	Evening	Late Night	Weekday Average	Average	Average
10th and E St NW	0	13	17	15	9	1	55	68	56
10th St and Constitution Ave NW	0	15	31	22	7	1	75	97	89
14th and D St NW / Ronald Reagan Building	1	24	23	23	7	1	79	75	67
8th and D St NW	0	4	13	10	5	1	33	36	34

[a] **Early AM**: 4:00 AM to 6:00 AM; **AM Peak:** 6:00 AM to 9:00 AM; **Midday:** 9:00 AM to 3:00 PM; **PM Peak:** 3:00 PM to 7:00 PM; **Evening:** 7:00 PM to 11:00 PM; **Late Night:** 11:00 PM to 4:00 AM

Source: Capital Bikeshare (2014b)

The peak hour for trips beginning at each station is between 5:00 PM and 6:00 PM on weekdays, while the peak hour for trips ending at each station is between 8:00 AM and 9:00 AM. During these two time periods, the 14th Street and D Street NW station had the highest ridership, with 14 trip ends and 14 trip starts. Table 3-4 summarizes peak hour trip starts and ends at each station.

Table 3-4: Average Weekday Peak Hour Trip Starts and Ends by Station

Capital Bikeshare Station	Peak Hour Trip Ends (8:00 AM)	Peak Hour Trip Starts (5:00 PM)
10th and E St NW	7	8
10th St and Constitution Ave NW	11	13
14th and D St NW / Ronald Reagan Building	14	14
8th and D St NW	3	4

Source: Capital Bikeshare (2014b)

3.3.4 Station Use

Data on instances of stations being completely empty or full were obtained for April 2014 (Capital Bikeshare 2014a). These data represent station demand and can be used to determine if additional docks are needed at existing stations, if certain stations need rebalancing, or if new stations are needed nearby. Rebalancing is the process of bringing bikes from full stations to empty stations, or vice versa; the process is often needed during peak hours when users tend to travel in one direction, such as into the city in the morning and out of the city in the evening. Like the third quarter of 2013 noted above, data were not available for the 9th Street and G Street NW station. Of the stations in the study area, the 10th Street and E Street NW station had the most instances of being empty and full. It also had the highest number of total minutes being empty. The 8th Street and D Street NW station had the highest number of minutes being full. Table 3-5 summarizes the total number of instances of being empty or full and the total number of minutes being empty or full by station. Based on the results, if changes were

needed to the system, it appears that additional docks or more rebalancing would be helpful at the 10th and E Street NW and 8th and D Street NW Capital Bikeshare Stations.

Table 3-5: April 2014 Instances and Total Time of Station being Empty or Full

Station Name	Total Empty Instances	Total Empty Minutes	Empty Min/Day	Total Full Instances	Total Full Minutes	Full Min/Day
10th and E St NW	70	1,772	59	138	3,288	110
10th St and Constitution Ave NW	34	1,294	43	110	2,031	68
14th and D St NW / Ronald Reagan Building	45	1,101	37	133	2,161	72
8th and D St NW	57	1,227	41	123	3,590	120

Source: Capital Bikeshare (2014a)

3.4 Public Transit

This section describes the existing conditions of Metrorail, Metrobus, commuter bus, carshare facilities, slugging (casual ridesharing – see Section 3.4.4), and shuttles within the JEH study area. Of these modes, Metrobus and Metrorail potentially have capacity issues within the study area, as summarized in table 3-6. Note that the station and bus analysis results throughout the TIA includes rounding; therefore, values may not add up to the precise value indicated.

Table 3-6: Summary of Capacity Issues in Study Area

Capacity Issue	Location
Bus Routes with Overcrowded Trips	11Y, 16X, 32, 34, 36, 39, 42, 52, 54, 63, 64, 70, 79, 7Y, 80, D1, G8, S2, S4, X2, X9
Metrorail Station Vertical Elements	-
Metrorail Station Faregate Aisles	-
Metrorail Station Fare Vending Machines	Gallery Place East, Gallery Place West, Metro Center South
Metrorail Platforms	Gallery Place Glenmont, Gallery Place Shady Grove, Metro Center Glenmont, Metro Center Shady Grove
Metrorail Platform Clearance >4 Minutes[a]	Archives, Federal Triangle, Gallery Place East/West, Metro Center East
Metrorail Station Clearance >6 Minutes [a]	Archives, Federal Triangle, Gallery Place East/West, Metro Center East/South

[a] Although platform and station clearance times were examined, WMATA is not required to meet the National Fire Protection Association (NFPA) thresholds noted in the table. See Appendix B5 for more information.

3.4.1 Metrorail

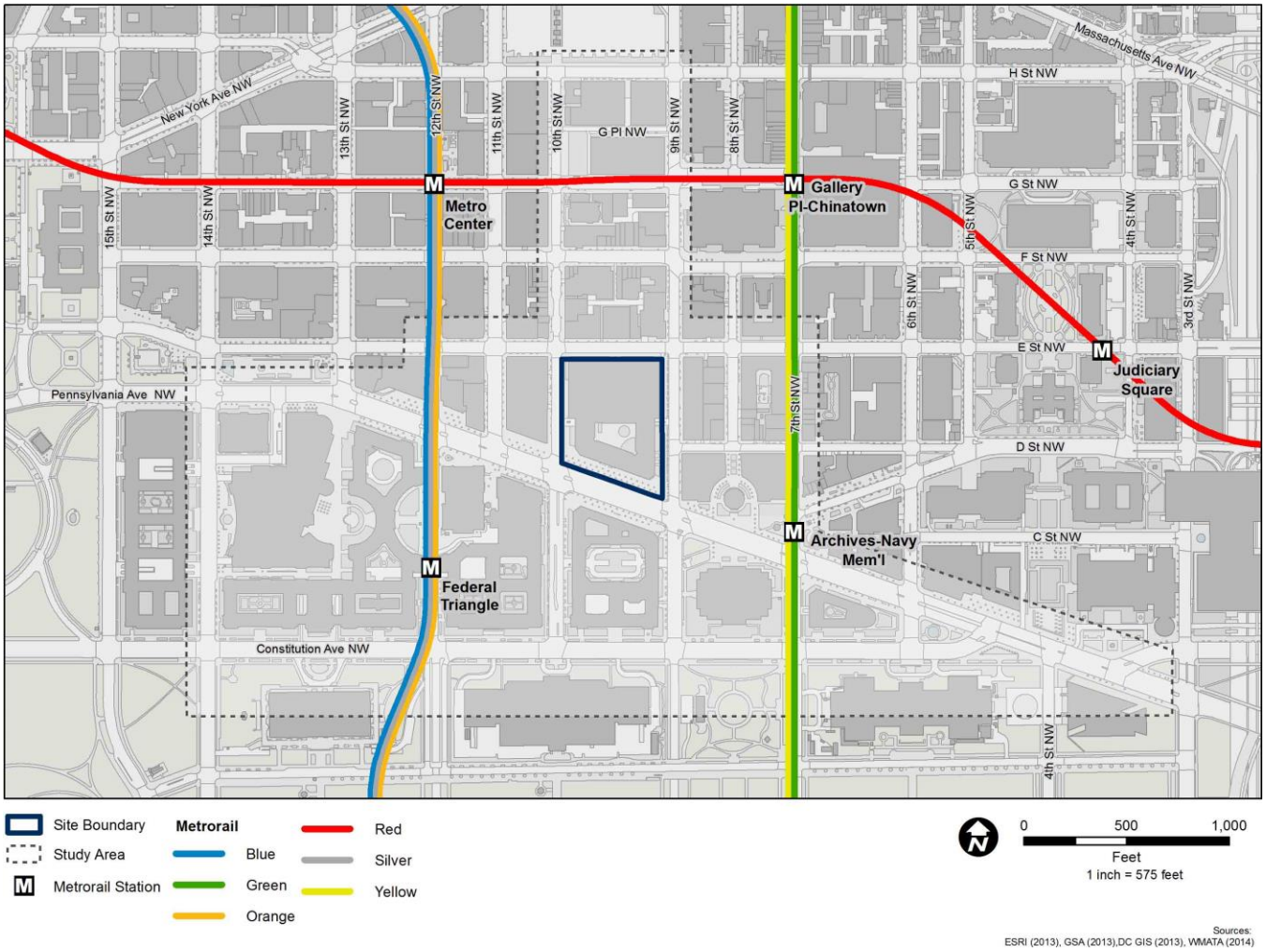
The JEH parcel is served by all six Metrorail lines via four Metrorail stations located in the study area. The four Metrorail stations serving the JEH parcel are Archives-Navy Memorial, Federal Triangle, Gallery Place-Chinatown, and Metro Center. Table 3-7 and figure 3-7 summarize entrance locations and lines served for each station in the study area.

Table 3-7: Metrorail Stations and Lines in Study Area

Station	Entrances	Lines
Archives-Navy Memorial	7th/Pennsylvania	Green/Yellow
Federal Triangle	12th south of Pennsylvania	Blue/Orange/ Silver
Gallery Place-Chinatown	7th/F, 7th/H, 9th/G	Red/Green/ Yellow
Metro Center	11th/G, 12th/G, 12th/F, 13th/G	Red/Blue/ Orange/ Silver

Source: WMATA (2014a)

Figure 3-7: Metrorail Station Entrances in Study Area



3.4.1.1 Metrorail Station Frequency of Service

Metrorail service operates on all lines between 5:00 AM and 12:00 AM Monday through Thursday, 5:00 AM and 3:00 AM on Fridays, 7:00 AM and 3:00 AM on Saturdays, and 7:00 AM and 12:00 AM on Sundays. Peak frequencies vary between 3 and 12 minutes on all lines, while off-peak frequencies vary between 6 and 20 minutes. Several lines share tracks through the study area, including the Orange, Blue, and Silver lines (Metro Center and Federal Triangle), and the Green and Yellow lines (Gallery Place-Chinatown and Archives).

Archives-Navy Memorial

Archives-Navy Memorial is served by the Red, Green, and Yellow lines. Peak headways on the Green and Yellow lines create an effective headway of 3 minutes if trains are on time. A total of 20 Green and Yellow line trains are scheduled to serve the station every hour, with 6-minute headways each on the Green and Yellow lines. Midday, evening, and Saturday daytime periods all have 12-minute scheduled headways on each line. Table 3-8 summarizes Metrorail headways and timespan by line at Archives-Navy Memorial.

Table 3-8: Archives-Navy Memorial Metrorail Headway and Timespan

Day	Timespan	Period	Headways (Minutes)		
			Green	Yellow	Green & Yellow Effective Headway
Weekday	5:00 AM – 9:30 AM 3:00 PM – 7:00 PM	Peak	6	6	3
	9:30 AM – 3:00 PM	Midday	12	12	6
	7:00 PM – 9:30 PM	Evening	12	12	6
	9:30 PM – 12:00 AM [a]	Late night	20	20	10
Saturday	7:00 AM – 9:30 PM	Daytime	12	12	6
	9:30 PM – 3:00 AM	Late night	20	20	10
Sunday	7:00 AM – 9:30 PM	Daytime	15	15	7.5
	9:30 PM – 12:00 AM	Late night	20	20	10

[a] Service is extended to 3:00 AM on Fridays

Note: Effective headways are calculated by dividing an hour (60 minutes) by the total number of trains that are scheduled to serve the station during an hour. For example, on morning weekday trips, 6 minute headway = 10 trains/hour. For an effective headway of Green and Yellow lines (2 lines @ 6 minute headways each), 10 trains/hour x 2 lines = 20 trains/hour and 60 ÷ 20 = 3 minute effective headways.

Source: WMATA (2014b)

Federal Triangle

Federal Triangle is served by the Orange, Silver, and Blue lines, which all share a single platform. Peak headways on these three lines create an effective headway of 2.5 minutes if trains are on time. A total of 25 Orange, Silver, and Blue line trains are scheduled to serve the station every hour, with 6-minute scheduled headways on the Orange and Silver lines and 12-minute scheduled headways on the Blue line. Midday, evening, and Saturday daytime periods all have 12-minute headways on each line. Table 3-9 summarizes Metrorail headways and timespan by line at Federal Triangle.

Table 3-9: Federal Triangle Metrorail Headway and Timespan

Day	Timespan	Period	Headways (Minutes)			
			Orange	Silver	Blue	Orange, Blue & Silver Effective Headway
Weekday	5:00 AM – 9:30 AM 3:00 PM – 7:00 PM	Peak	6	6	12	2.5
	9:30 AM – 3:00 PM	Midday	12	12	12	4
	7:00 PM – 9:30 PM	Evening	12	12	12	4
	9:30 PM – 12:00 AM [a]	Late night	20	20	20	7
Saturday	7:00 AM – 9:30 PM	Daytime	12	12	12	4
	9:30 PM – 3:00 AM	Late night	20	20	20	7
Sunday	7:00 AM – 9:30 PM	Daytime	15	15	15	5
	9:30 PM – 12:00 AM	Late night	20	20	20	7

[a] Service is extended to 3:00 AM on Fridays

Note: Effective headways are calculated by dividing an hour (60 minutes) by the total number of trains that are scheduled to serve the station during an hour. For example, on midday weekday trips, 12 minute headway = 5 trains/hour. For an effective headway of Orange, Blue, and Silver lines (3 lines @ 12 minute headways each), 5 trains/hour x 3 lines = 15 trains/hour and 60 ÷ 15 = 4 minute effective headways.

Source: WMATA (2014b)

Metro Center

Metro Center is served by the Red, Orange, Silver, and Blue lines. The Red line operates on the upper platform, while the Orange, Blue, and Silver lines operate on the lower platform. Peak headways on the Red Line are scheduled to be 3 minutes, with every other train only operating between Silver Spring and Grosvenor-Strathmore stations. All other trains operate the full length of the line between Glenmont and Shady Grove. Peak headways on the Orange, Silver, and Blue lines create an effective headway of 2.5 minutes if trains are on time. A total of 25 Orange, Silver, and Blue line trains are scheduled to serve the station every hour. Orange and Silver line trains scheduled to serve the station every 6 minutes and Blue line trains scheduled to serve the station every 12 minutes. Table 3-10 summarizes Metrorail headways and timespan by line at Metro Center.

Table 3-10: Metro Center Metrorail Headway and Timespan

Day	Timespan	Period	Headways (Minutes)				
			Red	Orange	Silver	Blue	Orange, Blue & Silver Effective Headway
Weekday	5:00 AM – 9:30 AM 3:00 PM – 7:00 PM	Peak	3	6	6	12	2.5
	9:30 AM – 3:00 PM	Midday	12	12	12	12	4
	7:00 PM – 9:30 PM	Evening	6-10	12	12	12	4
	9:30 PM – 12:00 AM [a]	Late night	15-18	20	20	20	7
Saturday	7:00 AM – 9:30 PM	Daytime	12	12	12	12	4
	9:30 PM – 3:00 AM	Late night	15	20	20	20	7
Sunday	7:00 AM – 9:30 PM	Daytime	15	15	15	15	5
	9:30 PM – 12:00 AM	Late night	15	20	20	20	7

[a] Service is extended to 3:00 AM on Fridays

Note: Effective headways are calculated by dividing an hour (60 minutes) by the total number of trains that are scheduled to serve the station during an hour. For example, on midday weekday trips, 12 minute headway = 5 trains/hour. For an effective headway of Orange, Blue, and Silver lines (3 lines @ 12 minute headways each), 5 trains/hour x 3 lines = 15 trains/hour and 60 ÷ 15 = 4 minute effective headways.

Source: WMATA (2014b)

Gallery Place-Chinatown

Gallery Place-Chinatown is served by the Red, Green, and Yellow lines. The Red line operates on the upper platform, while the Green and Yellow lines operate on the lower platform. Peak headways on the Red line are scheduled to be 3 minutes, with every other train only operating between Silver Spring and Grosvenor-Strathmore stations. All other trains operate the full length of the line between Glenmont and Shady Grove. Peak headways on the Green and Yellow lines create an effective headway of 3 minutes if trains are on time. A total of 20 Green and Yellow line trains are scheduled to serve the station every hour, with scheduled 6-minute headways each on the Green and Yellow lines. Table 3-11 summarizes Metrorail headways and timespan by line at Gallery Place-Chinatown.

Table 3-11: Gallery Place-Chinatown Metrorail Headway and Timespan

Day	Timespan	Period	Headways (Minutes)			
			Red	Green	Yellow	Green & Yellow Effective Headway
Weekday	5:00 AM – 9:30 AM 3:00 PM – 7:00 PM	Peak	3	6	6	3
	9:30 AM – 3:00 PM	Midday	12	12	12	6
	7:00 PM – 9:30 PM	Evening	6-10	12	12	6
	9:30 PM – 12:00 AM [a]	Late night	15-18	20	20	10
Saturday	7:00 AM – 9:30 PM	Daytime	12	12	12	6
	9:30 PM – 3:00 AM	Late night	15	20	20	10
Sunday	7:00 AM – 9:30 PM	Daytime	15	15	15	7.5
	9:30 PM – 12:00 AM	Late night	15	20	20	10

[a] Service is extended to 3:00 AM on Fridays

Note: Effective headways are calculated by dividing an hour (60 minutes) by the total number of trains that are scheduled to serve the station during an hour. For example, on morning weekday trips, 6 minute headway = 10 trains/hour. For an effective headway of Green and Yellow lines (2 lines @ 6 minute headways each), 10 trains/hour x 2 lines = 20 trains/hour and 60 ÷ 20 = 3 minute effective headways.

Source: WMATA (2014b)

3.4.1.2 Metrorail Station Mode of Access, 2012

The 2012 Metrorail Passenger Survey details the AM peak period mode of access to all Metrorail stations in the system. Overall, most passengers walked, were dropped off at, or took a bus to access the four Metrorail stations in the study area. At Archives-Navy Memorial Station, nearly 60 percent of passengers walked to the station, and 28 percent rode a bus to the station. At Federal Triangle Station, 38 percent of passengers were dropped off at the station, and another 38 percent walked to the station. At Gallery Place-Chinatown, nearly 70 percent of passengers walked to the station, while 22 percent rode a bus. Finally, at Metro Center, nearly 37 percent of passengers walked to the station, and nearly 40 percent rode a bus. Table 3-12 summarizes all modes of access used in 2012 to the four study area stations.

Table 3-12: Mode of Access to Station in 2012

Mode	Percent of Total Passengers			
	Archives	Federal Triangle	Gallery Place	Metro Center
Bicycle	1.6%	-	-	-
Dropped Off	1.6%	38.1%	4.6%	11.1%
Drove & Parked	4.7%	4.8%	3.4%	5.9%
Rode & Parked	-	4.8%	0.5%	6.0%
Metrobus	17.2%	9.5%	20.5%	13.7%
Other Bus	10.9%	4.8%	1.0%	25.9%
Shuttle	3.1%	-	0.5%	-
Taxi	1.6%	-	-	0.5%
Walked	59.4%	38.1%	69.6%	36.8%

Source: WMATA (2013a)

3.4.1.3 Metrorail Station Parking Infrastructure

There is no automobile parking at any of the stations within the study area. There are 20 bike racks at Federal Triangle, eight bike racks at Metro Center, and no bike racks at Archives-Navy Memorial or Gallery Place-Chinatown. Table 3-13 details the parking infrastructure located at each station.

Table 3-13: Metrorail Station Parking Infrastructure

Station	All-Day Parking Spaces	Long-term Parking Spaces	Short-term Metered Spaces	Bicycle Racks	Bicycle Lockers
Archives-Navy Memorial	0	0	0	0	0
Federal Triangle	0	0	0	20	0
Metro Center	0	0	0	8	0
Gallery Place-Chinatown	0	0	0	0	0

Source: WMATA (2014a)

3.4.1.4 Metrorail Station Vertical Infrastructure and Fare Infrastructure

Vertical infrastructure and fare infrastructure include vertical circulation elements, farecard vendors, and faregate aisles. For vertical circulation, WMATA Metrorail stations have escalators, stairs, and elevators between street and mezzanine, mezzanine and platform, and platform to platform. Fare infrastructure includes fare vending machines, exit fare vending machines, and SmarTrip vending machines. All stations have both standard faregate aisles and at least one ADA-compliant faregate aisle. The amount of vertical infrastructure elements varies by station entrance based off need and demand. All stations are ADA-accessible.

Archives-Navy Memorial

The single entrance to Archives-Navy Memorial Station is located 0.1 mile from the JEH parcel at 701 Pennsylvania Avenue NW, on 7th Street north of Pennsylvania Avenue. Table 3-14 details the station's vertical infrastructure and fare infrastructure.

Table 3-14: Archives-Navy Memorial Station Vertical Infrastructure and Fare Infrastructure

Infrastructure Element			Number of Existing Elements
Vertical Circulation	Street to Mezzanine	Escalators	3
		Elevators	1
		Stairs	0
	Mezzanine to Platform	Escalators	2
		Elevators	1
		Stairs	0
Farecard Vendors		Passes only	0
		Farecards and passes	5
		SmarTrip vendors	2
		Exit fare	2
Faregate Aisles		Standard	6
		ADA	1
		Total	7

Source: Site Visit (November 2014)

Federal Triangle

The single entrance to Federal Triangle Station is 0.4 mile from the JEH parcel at 301 12th Street NW, on the west side of 12th street between Pennsylvania and Constitution Avenues NW. Between the street and mezzanine level there is an entrance to the Ronald Reagan building. Table 3-15 highlights the station's vertical infrastructure.

Table 3-15: Federal Triangle Station Vertical Infrastructure and Fare Infrastructure

Infrastructure Element			Number of Existing Elements	Notes
Vertical Circulation	Street to Mezzanine	Escalators	3 (2 sets)	There are two sets of three escalators between the mezzanine and street levels, with an entrance to the Ronald Reagan building between the two sets.
		Elevators	2	One elevator operates from Mezzanine level to the Ronald Reagan building level.
		Stairs	0	
	Mezzanine to Platform	Escalators	3	
		Elevators	1	
		Stairs	0	
Farecard Vendors		Passes only	3	
		Farecards and passes	3	
		SmarTrips	2	
		Exit fare	2	
Faregate Aisles		Standard	11	
		ADA	1	
		Total	12	

Source: Site Visit (November 2014)

Metro Center

Metro Center station is officially located at 607 13th Street NW, but has four entrances (north, south, east, and west), the closest of which are the east and south entrances, each 0.3 mile from the JEH parcel. The upper level platform serves the Red line with side platforms, while the lower level platform serves the Blue, Orange, and Silver lines with an island platform.

Table 3-16 shows the vertical infrastructure and fare infrastructure at each entrance. The north entrance is located at the northeast corner of 12th and G Street NW. The south entrance is located 0.3 mile from the JEH parcel at the southwest corner of 12th and F Street NW. The Metro Center sales office is located on the mezzanine level of the south entrance. The east entrance is located 0.3 mile from the JEH parcel at the southeast corner of 11th and G Street NW. An underground entrance to the Grand Hyatt Hotel and the Washington Center offices is located on the mezzanine level. The west entrance is located 0.4 mile from the JEH parcel at the southeast corner of 13th and G Street NW. An underground entrance to Macy's retail store is located on the mezzanine level.

Table 3-16: Metro Center Vertical Infrastructure and Fare Infrastructure

Infrastructure Element			Elements per Entrance			
			North	South	East	West
Vertical Circulation	Street to Mezzanine	Escalators	2	3	3	3
		Elevators	1	0	0	0
		Stairs	1	0	0	0
	Mezzanine to Platform	Escalators	-	-	4	4
		Elevators	-	-	0	0
		Stairs	-	-	0	0
	Upper Platform to Lower Platform	Escalators	3	3	-	-
		Elevators	1	1	-	-
		Stairs	3	3	-	-
Farecard Vendors		Passes only	1	2	2	2
		Farecards and passes	3	4	4	5
		SmarTrips	2	2	2	2
		Exit Fare	2	2	2	2
Faregate Aisles		Standard	4	6	6	9
		ADA	1	1	1	1
		Total	5	7	7	10

Source: Site Visit (November 2014)

Gallery Place-Chinatown

Gallery Place-Chinatown station is officially located at 630 H Street NW, but has three entrances (north, east, and west), the closest of which is the west entrance that is 0.4 mile from the JEH parcel. The upper level platform serves the Red line with side platforms, while the lower level platform serves the Green and Yellow lines with an island platform.

Table 3-17 shows the vertical infrastructure and fare infrastructure at each entrance. The west entrance is located 0.4 mile from the JEH parcel at the southeast corner of 9th and G Street NW. The east entrance is located 0.4 mile from the JEH parcel at the northeast corner of 7th and F Street NW, and includes the elevators located on 7th Street NW between G Street NW and F Street NW. The north entrance is located 0.6 mile from the JEH parcel at the southeast corner of 7th and H Street NW.

Table 3-17: Gallery Place-Chinatown West Entrance Vertical Infrastructure and Fare Infrastructure

Infrastructure Element			Elements per Entrance		
			North	East	West
Vertical Circulation	Street to Mezzanine	Escalators	3 (two sets) [a]	4	2
		Elevators	0	2	0
		Stairs	0	1	0
	Mezzanine to Upper Platform	Escalators	0	4	4
		Elevators	0	0	0
		Stairs	0	0	0
	Upper Platform to Lower Platform	Escalators	5	5	-
		Elevators	0	1	-
		Stairs	1	1	-
Farecard Vendors		Passes only	0	3 + 1 for elevators	1
		Farecards and passes	5	3 + 1 for elevators	2
		SmarTrips	2	2 + 1 for elevators	2
		Exit fare	2	2 + 1 for elevators	2
Faregate Aisles		Standard	7	11 + 2 for elevators	4
		ADA	1	1 + 2 for elevators	1
		Total	8	12 + 4 for elevators	5

[a] There are two sets of three escalators at this location, with a small platform walkway between.
Source: Site Visit (November 2014)

3.4.1.5 Metrorail Station Ridership

Weekday Ridership by Station

Weekday Metrorail ridership for the four stations in the study area was obtained for October 2013 and March 2014 from WMATA. Table 3-18 shows average weekday Metrorail ridership for the four stations by entries and exits, highlighting peak periods. WMATA defines the AM peak period as 5:00 AM to 9:30 AM, and the PM Peak period as 3:00 PM to 7:00 PM. Gallery Place-Chinatown and Metro Center are among the busiest stations in the system, each with more than 23,000 average weekday passengers.

Table 3-18: Average Weekday Metrorail Ridership by Station

Entrance	AM Peak (5:00 AM – 9:30 AM)		PM Peak (3:00 PM – 7:00 PM)		Weekday Total	
	Enter	Exit	Enter	Exit	Enter	Exit
Archives-Navy Memorial	350	4,339	4,828	883	7,535	7,673
Federal Triangle	165	4,506	4,887	562	6,982	7,043
Gallery Place-Chinatown	1,648	8,611	10,458	6,890	23,875	24,232
Metro Center	1,439	12,206	13,772	4,431	24,839	25,190

Source: WMATA (2014c)

Metro Center has the highest weekday total ridership with 50,029 entries and exits, followed by Gallery Place-Chinatown with 48,107, Archives-Navy Memorial with 15,208, and Federal Triangle with 14,025. Within the study area, Metro Center represents 39 percent of all weekday activity, Gallery Place-Chinatown represents 38 percent, Archives-Navy Memorial represents 12 percent, and Federal Triangle represents 11 percent.

All four stations have a significantly higher number of passengers exiting the station than entering the station during the AM peak period, with an opposite pattern during the PM peak period. This is consistent with stations located in a high-employment downtown setting.

Peak period activity represents 63 percent of all the stations' total weekday activity. At Federal Triangle, peak period activity represents 72 percent of weekday total activity. At Archives-Navy Memorial, peak period activity represents 68 percent of weekday total activity. At Metro Center, peak period activity represents 64 percent of weekday total activity. At Gallery Place-Chinatown, peak period activity represents 57 percent of weekday total activity. Table 3-19 summarizes the total weekday peak activity at each station. Table 3-20 summarizes the proportion of entries versus exits during each peak period at each station.

Table 3-19: Proportion of Weekday Entries and Exit Taking Place during Peak Periods

Entrance	Peak Enter Percent	Peak Exit Percent
Archives-Navy Memorial	69	68
Federal Triangle	72	72
Gallery Place-Chinatown	51	64
Metro Center	61	66

Source: WMATA (2014c)

Table 3-20: Peak Period Entries and Exits Proportion of Weekday Total Activity

Entrance	AM Peak (5:00 AM – 9:30 AM)		PM Peak (3:00 PM – 7:00 PM)	
	Percent Enter	Percent Exit	Percent Enter	Percent Exit
Archives-Navy Memorial	8	93	16	85
Federal Triangle	4	97	90	10
Gallery Place-Chinatown	16	84	24	76
Metro Center	11	90	40	60

Source: WMATA (2014c)

Weekday Ridership by Station Entrance

Table 3-21 shows the weekday ridership by station entrance, for the peak periods and weekly totals. Metro Center has four entrances, Gallery Place-Chinatown has three entrances, and Archives-Navy Memorial and Federal Triangle each have one entrance.

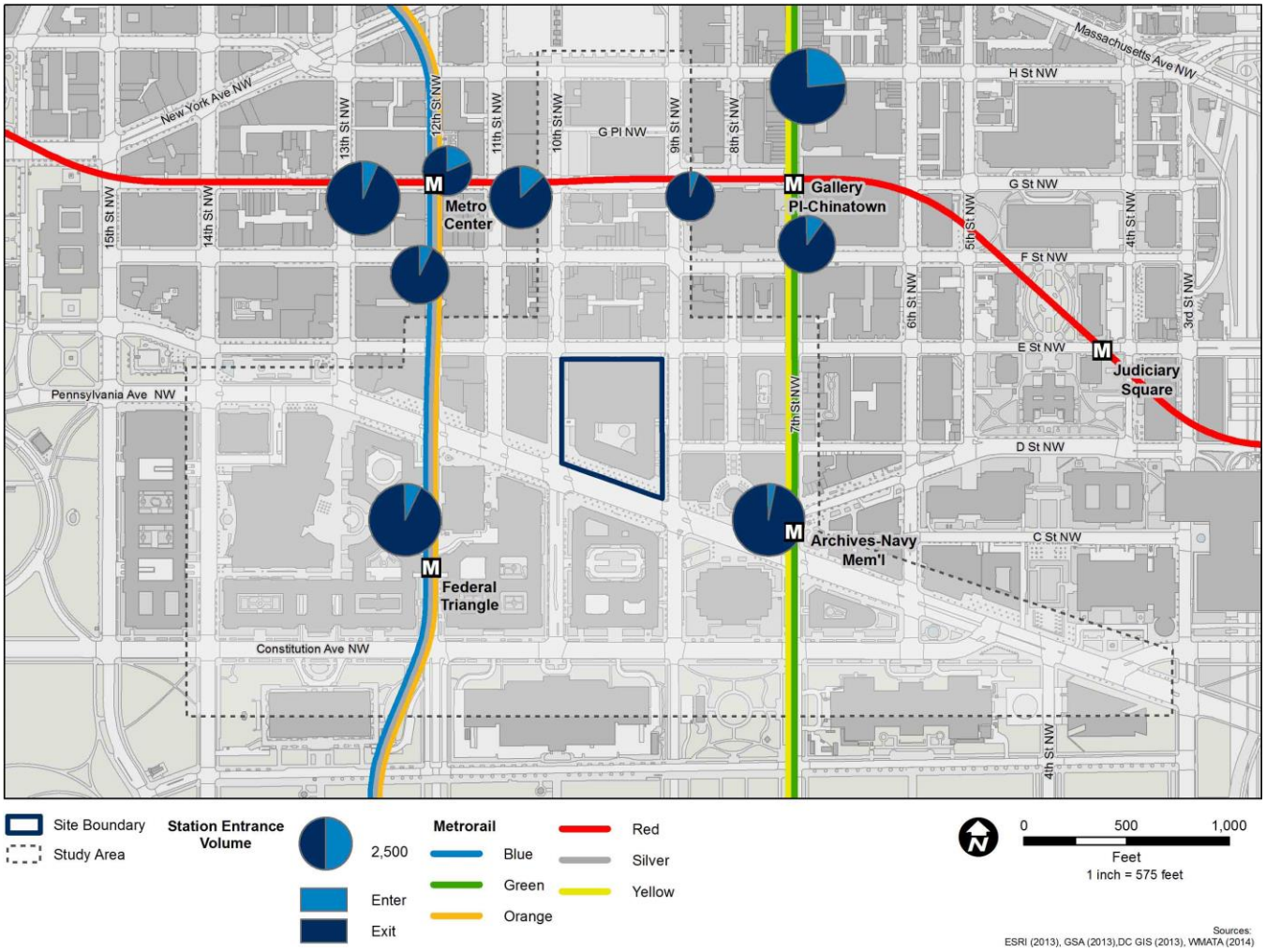
Table 3-21: Weekday Metrorail Ridership by Station Entrance

		AM Peak		PM Peak		Weekday Total	
Entrance	**Location**	**Enter**	**Exit**	**Enter**	**Exit**	**Enter**	**Exit**
Archives-Navy Memorial	7th/Pennsylvania	350	4,339	4,828	883	7,535	7,673
Federal Triangle	12th S of Pennsylvania	165	4,506	4,887	562	6,982	7,043
Gallery Place-Chinatown, E	7th/F	299	2,641	3,217	2,965	7,828	8,885
Gallery Place-Chinatown, N	7th/H	1,226	3,929	4,849	3,074	11,916	10,971
Gallery Place-Chinatown, W	9th/G	123	2,041	2,392	851	4,131	4,376
Metro Center, E	11th/G	467	3,051	3,491	1,144	6,640	6,270
Metro Center, N	12th/G	415	1,781	2,454	951	4,534	4,358
Metro Center, S	12th/F	223	2,828	2,969	1,218	5,669	6,279
Metro Center, W	13th/G	335	4,547	4,858	1,119	7,995	8,283

Source: WMATA (2014c)

The highest total weekday ridership activity occurs at the Gallery Place North, Gallery Place East, and Metro Center West entrances. Gallery Place North represents 18 percent of the weekday total ridership for entrances at the four stations, while Gallery Place East and Metro Center West each represent 13 percent. However, Gallery Place North is the farthest station entrance from the JEH parcel and is likely not used to access the study area. Archives Station, the closest station entrance to the JEH parcel, represents the fourth highest weekday total ridership at 12 percent. Figure 3-8 illustrates AM peak entries and exits by station entrance.

Figure 3-8: Peak Period (AM) Entries and Exits by Station Entrance



Peak Hourly and Peak 15 Minute Ridership by Station Entrance

Table 3-22 shows the start time of the weekday peak hourly total and peak 15-minute period ridership by station entrance. The peak entering hour for every station entrance is the 5:00 PM to 6:00 PM hour. The peak exiting hour for most entrances is the 8:00 AM to 9:00 AM hour, although at Federal Triangle it is the 9:00 AM to 10:00 AM hour and at Gallery Place-Chinatown East it is the 6:00 PM to 7:00 PM hour. The anomaly at Gallery Place-Chinatown East is likely due to its proximity to the Verizon Center, which often hosts sports games and other venues during the evening. The peak 15-minute entering period varies between 5:00 PM and 5:15 PM and between 5:30 PM and 5:45 PM. The peak 15-minute exiting period is between 8:45 AM and 9:00 AM at all nine station entrances in the study area.

Table 3-22: Weekday Peak Hourly and Peak 15-Minute Ridership by Station Entrance

Entrance	Location	Entries		Exits		Entries		Exits	
		Peak Hour	Total	Peak Hour	Total	Peak 15-Min	Total	Peak 15-Min	Total
Archives-Navy Memorial	7th/ Pennsylvania	5:00 PM	1,886	8:00 AM	1,879	5:00 PM	524	8:45 AM	524
Federal Triangle	12th South of Pennsylvania	5:00 PM	1,793	9:00 AM	1,761	5:00 PM	501	8:45 AM	467
Gallery Place-Chinatown, E	7th/F	5:00 PM	1,179	6:00 PM	1,363	5:00 PM	329	8:45 AM	370
Gallery Place-Chinatown, N	7th/H	5:00 PM	1,650	8:00 AM	1,659	5:30 PM	439	8:45 AM	484
Gallery Place-Chinatown, W	9th/G	5:00 PM	916	8:00 AM	936	5:00 PM	254	8:45 AM	301
Metro Center, E	11th/G	5:00 PM	1,279	8:00 AM	1,334	5:30 PM	346	8:45 AM	434
Metro Center, N	12th/G	5:00 PM	968	8:00 AM	850	5:00 PM	268	8:45 AM	278
Metro Center, S	12th/F	5:00 PM	1,147	8:00 AM	1,321	5:30 PM	330	8:45 AM	427
Metro Center, W	13th/G	5:00 PM	1,907	8:00 AM	2,183	5:30 PM	518	8:45 AM	753

Source: WMATA (2014c)

The station entrances with the highest peak hour entries and exits are Metro Center West, Archives-Navy Memorial, and Federal Triangle. Metro Center West represents 16 percent of the peak hour activity, Archives-Navy Memorial represents 15 percent, and Federal Triangle represents 14 percent. Archives-Navy Memorial is the closest station entrance to the JEH parcel.

Among the Gallery Place Station entrances, the north entrance has the highest hourly and 15-minute peak activity followed by the east entrance and the west entrance. The north entrance represents 43 percent of peak hour activity at this station, the east entrance represents 33 percent, and the west entrance represents 24 percent.

Among the Metro Center entrances, the west entrance has the highest hourly and 15-minute peak activity followed by the east entrance, the south entrance, and the north entrance. The west entrance represents 37 percent of peak hour activity at this station, the east entrance represents 24 percent, the south entrance represents 22 percent, and the north entrance represents 17 percent.

The station entrances with the highest 15-minute peak period entries and exits are Metro Center West, Archives-Navy Memorial, and Federal Triangle. The Metro Center West entrance is unlikely to be used to access the JEH parcel, however, because Metro Center South and Metro Center East are closer.

3.4.1.6 Metrorail Origin-Destination Data

Origin-destination ridership data were obtained from WMATA for October 2013 and March 2014 for the four Metrorail stations within the JEH study area. These data show ridership patterns to and from the four study area stations. All four stations indicate commuter ridership patterns with high levels of AM and PM peak activity.

Archives Station Origin-Destination

Table 3-23 summarizes the top origin-destination pairs during the AM peak period for Archives-Navy Memorial Station (the total number of passengers who enter at these stations and exit at Archives-Navy Memorial Station).

Table 3-23: Archives-Navy Memorial Top Station Origin-Destination Pairs During the AM Peak Period

Rank	From	Jurisdiction	Metrorail	Archives-Navy Memorial	Percent of Total
1	Pentagon	Arlington County, VA	Yellow, Blue	13,404	7.0%
2	Branch Avenue	Prince George's County, MD	Green	12,069	6.3%
3	Huntington	Fairfax County, VA	Yellow	11,952	6.3%
4	Pentagon City	Arlington County, VA	Yellow, Blue	11,919	6.2%
5	Columbia Heights	Northwest, DC	Yellow, Green	9,435	4.9%
6	Greenbelt	Prince George's County, MD	Yellow, Green	7,847	4.1%
7	Suitland	Prince George's County, MD	Green	7,383	3.9%
8	Franconia-Springfield	Fairfax County, VA	Yellow	7,250	3.8%
9	Crystal City	Arlington County, VA	Yellow, Blue	6,987	3.7%
10	Braddock Road	Alexandria County, VA	Yellow, Blue	6,979	3.7%

Source: WMATA (2014c)

The top three origins for AM peak exits at Archives-Navy Memorial Station are Pentagon, Branch Avenue, and Huntington. Pentagon represents nearly 7 percent of AM peak exits, while Branch Avenue and Huntington each represent 6 percent of AM peak exits. Six of the top 10 AM peak exit stations are located in Virginia: three in Arlington County, two in Fairfax County, and one in the City of Alexandria. Three of the top 10 stations are located in Prince George's County, Maryland, and one station is located in Northwest Washington, D.C.

Archives-Navy Memorial Station is served by the Yellow and Green lines. Two of the top three AM peak exit stations are served by the Yellow line, while one is served by the Green line. Eight of the top 10 AM peak exit stations are served by the Yellow line, five are served by the Blue line, and four are served by the Green line. No stations are served by the Orange, Red, or Silver lines.

Federal Triangle Origin-Destination

Table 3-24 summarizes the top origin-destination pairs during the AM peak period for Federal Triangle Station (the total number of passengers who enter at these stations and exit at Federal Triangle Station during the AM peak period).

Table 3-24: Federal Triangle Top Station Origin-Destination Pairs during the AM Peak Period

Rank	From	Jurisdiction	Metrorail	Federal Triangle	Percent of Total
1	Vienna	Fairfax County, VA	Orange	15,324	7.7%
2	New Carrollton	Prince George's County, MD	Orange	12,708	6.4%
3	West Falls Church	Fairfax County, VA	Orange	11,176	5.6%
4	Largo Town Center	Prince George's County, MD	Blue, Silver	6,619	3.3%
5	Union Station	Northeast, DC	Red	6,282	3.2%
6	Ballston	Arlington County, VA	Orange, Silver	6,164	3.1%
7	Branch Avenue	Prince George's County, MD	Green	5,731	2.9%
8	Pentagon	Arlington County, VA	Blue, Yellow	5,445	2.7%
9	Franconia-Springfield	Fairfax County, VA	Blue, Yellow	5,376	2.7%
10	Rosslyn	Arlington County, VA	Blue, Orange, Silver	5,004	2.5%

Source: WMATA (2014c)

The top three origins for AM peak exits at Federal Triangle are Vienna, New Carrollton, and West Falls Church. Vienna represents 8 percent of AM peak exits, while New Carrollton and West Falls Church each represent 6 percent. Six of the top 10 AM peak exit stations are located in Virginia: three in Arlington County and three in Fairfax County. Three of the top 10 stations are located in Prince George's County, Maryland. One station is located in Northeast Washington, D.C.

Federal Triangle is served by the Blue, Orange, and Silver lines. The top three stations are all served by the Orange line. Overall, five of the top 10 AM peak exit stations are served by the Orange line, four are served by the Blue line, and three are served by the Silver line.

Metro Center Origin-Destination

Table 3-25 summarizes the top origin-destination pairs during the AM peak period for Metro Center Station (the total number of passengers who enter at these stations and exit at Metro Center Station during the AM peak period).

Table 3-25: Metro Center Top Station Origin-Destination Pairs during the AM Peak Period

Rank	From	Jurisdiction	Metrorail	Metro Center	Percent of Total
1	Union Station	Northeast, DC	Red	37,804	7.0%
2	Shady Grove	Montgomery County, MD	Red	30,630	5.7%
3	Vienna	Fairfax County, VA	Orange	22,311	4.2%
4	Silver Spring	Montgomery County, MD	Red	20,853	3.9%
5	DuPont Circle	Northwest, DC	Red	19,135	3.6%
6	Grosvenor	Montgomery County, MD	Red	16,239	3.0%
7	West Falls Church	Fairfax County, VA	Orange	15,676	2.9%
8	Friendship Heights	Northwest, DC	Red	14,833	2.8%
9	Bethesda	Montgomery County, MD	Red	14,438	2.7%
10	New Carrollton	Prince George's County, MD	Orange	13,984	2.6%

Source: WMATA (2014c)

The top three origins for AM peak period exits at Metro Center are Union Station, Shady Grove, and Vienna. Union Station represents 7 percent of AM peak exits, Shady Grove represents 6 percent of AM peak exits, and Vienna represents 4 percent. Five of the top 10 AM peak exit stations are located in Maryland: four are in Montgomery County and one is in Prince George's County. Three of the stations are located in Washington, D.C.: two are in Northwest and one is in Northeast. Two of the stations are located in Fairfax County, Virginia.

Metro Center is served by the Red, Blue, Orange, and Silver lines. The top three stations are served by either the Red or Orange line. Seven of the top 10 AM peak exit stations are served by the Red line, and three are served by the Orange line. No stations are served by the Blue, Yellow, Green, or Silver lines.

Gallery Place-Chinatown Origin-Destination

Table 3-26 summarizes the top origin-destination pairs during the AM peak period for Gallery Place-Chinatown Station (the total number of passengers who enter at these stations and exit at Gallery Place-Chinatown Station during the AM peak period).

Table 3-26: Gallery Place-Chinatown Top Station Origin-Destination Pairs during the AM Peak Period

Rank	From	Jurisdiction	Metrorail	Gallery Place-Chinatown	Percent of Total
1	Union Station	Northeast, DC	Red	26,466	7.0%
2	Columbia Heights	Northwest, DC	Green, Yellow	16,659	4.4%
3	Pentagon	Arlington County, VA	Blue, Yellow	16,625	4.4%
4	Shady Grove	Montgomery County, MD	Red	13,985	3.7%
5	Huntington	Fairfax County, VA	Yellow	12,815	3.4%
6	Branch Avenue	Prince George's County, MD	Green	12,178	3.2%
7	Pentagon City	Arlington County, VA	Blue, Yellow	12,060	3.2%
8	Greenbelt	Prince George's County, MD	Green, Yellow	10,741	2.8%
9	Silver Spring	Montgomery County, MD	Red	10,022	2.6%
10	Dupont Circle	Northwest, DC	Red	9,930	2.6%

Source: WMATA (2014c)

The top three origins for AM peak exits at Gallery Place are Union Station, Columbia Heights, and Pentagon. Union Station represents 7 percent of AM peak exits, while Columbia Heights and Pentagon each represent 4 percent of AM peak exits. Four of the top 10 AM peak exit stations are located in Maryland: two are in Prince George's County and two are in Montgomery County. Three stations are located in Virginia: two are in Arlington County and one is in Fairfax County. Three stations are located in Washington, D.C: two are in Northwest and one is in Northeast.

Gallery Place is served by the Green, Yellow, and Red lines. The top three origin stations are served by the Red, Yellow, Green, and Blue lines. Five of the top 10 AM peak exit stations are served by the Yellow line, four are served by the Red line, three are served by the Green line, and two are served by the Blue line. No top 10 AM peak exit stations serve the Orange or Silver lines.

3.4.1.7 Metrorail Station Capacity Analysis

A capacity analysis was conducted for the vertical elements which includes escalators and stairs, faregate aisles, fare vending machines, and platform areas at Archives-Navy Memorial and Federal Triangle Metro Stations, as

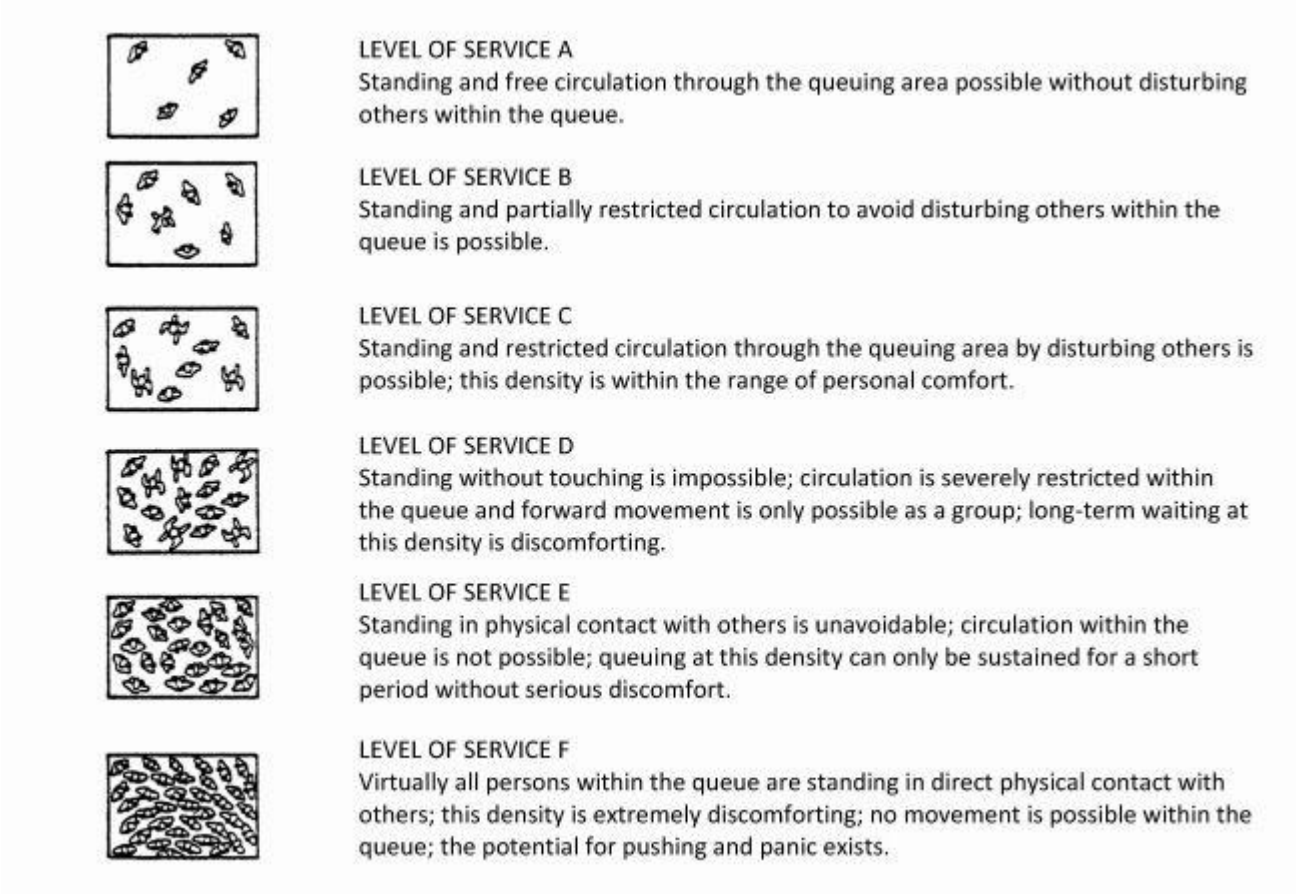
well as the south and east entrances to Metro Center and the east and west entrances at Gallery Place-Chinatown. The platform area analysis and fare vending analysis used projected ridership from the peak entering period at the station – the time period when the most passengers would likely use fare vending machines and the highest number of passengers would be waiting on the platform. The remaining analyses, the vertical elements and faregate aisles, used the peak 15-minute period of ridership (entries and exits) at each station. March 2014 faregate data provided by WMATA was used for all of the capacity analyses (WMATA 2014c). (March or October data are commonly used by transit agencies for analysis because these are considered stable months that are affected less by tourism, weather, and holidays when compared to other months.) Volume-to-capacity (v/c) ratios were calculated for the vertical elements and fare elements, and pedestrian level of service (LOS) was calculated for platform areas. Figure 3-9 illustrates the range of pedestrian level of service conditions.

Overall, vertical elements and faregate aisles at each station are currently operating below a v/c of 0.7, which is considered capacity. Fare vending machines are operating above capacity at the east and west entrances to Gallery Place-Chinatown, and the south entrance to Metro Center (highlight in light blue in table 3-27).

Platform peak pedestrian LOS (based on the available spacing between passengers) on the busiest platform sections are at the acceptable level of B at Archives-Navy Memorial, Federal Triangle, on the Green/Yellow platform at Gallery Place-Chinatown, and on the Blue/Orange/Silver platform at Metro Center. The Red-Glenmont and Red-Shady Grove platforms at Gallery Place-Chinatown and Metro Center, however, are currently at pedestrian LOS C or D on the busiest platform sections.

Table 3-27 summarizes the results of the station capacity analysis, with complete station capacity analysis details included in Appendix B4.

Figure 3-9: Pedestrian Level of Service Illustration



Source: TRB 2013

Table 3-27: Metro Station Capacity Analysis Summary

Element		Archives-Navy Memorial	Federal Triangle	Gallery Place East	Gallery Place West	Metro Center East	Metro Center South
Street/ Mezzanine v/c	Entry escalators	0.02	0.01	0.09	0.01	0.04	0.02
	Exit escalators	0.24	0.21	0.14	0.29	0.21	0.20
	Stairs	-	-	0.11	-	-	-
Mezzanine/ Platform 1 [a] v/c	Entry escalators	0.02	0.01	0.10	0.01	0.02	-
	Exit escalators	0.47	0.21	0.24	0.14	0.25	-
	Stairs	-	-	-	-	-	-
Mezzanine/ Platform 2 [a] v/c	Entry escalators	-	-	0.14	0.01	0.02	-
	Exit escalators	-	-	0.18	0.15	0.17	-
	Stairs	-	-	-	-	-	-
Lower Platform/ Glenmont Platform v/c	Entry escalators	-	-	0.28	-	-	0.29
	Exit escalators	-	-	0.15	-	-	0.45
	Stairs	-	-	0.46	-	-	0.12
Faregate Aisles		0.22	0.20	0.13	0.19	0.19	0.18
Fare Vending		0.66	0.46	**0.91**	**1.15**	0.63	**0.83**
Glenmont Platform Peak LOS		-	-	C		C	
Shady Grove Platform Peak LOS		-	-	D		C	
Green/Yellow Platform Peak LOS		-	B	B		-	
Blue/Orange/Silver Platform Peak LOS		B	-	-		B	

[a] For Gallery Place and Metro Center, Platform 1 = Glenmont, Platform 2 = Shady Grove
Note: v/c = volume-to-capacity ratio, LOS = Level of Service
Source: WMATA (2014c)

3.4.1.8 NFPA 130 Emergency Evacuation Analysis

An emergency evacuation analysis was conducted to compare evacuation capacity of each station to standards set by the National Fire Protection Association (NFPA) 130 code. NFPA 130 requires that station platforms be able to be fully evacuated with 4 minutes and that all passengers reach a point of safety within 6 minutes (TRB 2013). WMATA Metrorail stations, however, are not required to meet these criteria. Details on the assumptions and calculations necessitated in NFPA 130 are found in Appendix B5, and a summary of the emergency evaluation analyses is included in the following section and table 3-28.

Archives-Navy Memorial Station

Using the peak 15-minute ridership period and NFPA 130 assumptions and guidelines, the platform at Archives-Navy Memorial Station could be evacuated in 31.2 minutes, and the entire station could be evacuated to a point of safety within 34.5 minutes. The long evacuation time at this station is a function of the fact that there are only two platform-to-mezzanine escalators.

Federal Triangle Station

Using the peak 15-minute ridership period and NFPA 130 assumptions and guidelines, the platform at Federal Triangle Station could be evacuated in 14.0 minutes, and the entire station could be evacuated to a point of safety within 17.7 minutes.

Metro Center East Entrance

Using the peak 15-minute ridership period and NFPA 130 assumptions and guidelines, the Red line platforms at the Metro Center east entrance could be evacuated in 6.5 minutes, and the entire station entrance could be evacuated to a point of safety within 9.7 minutes.

Metro Center South Entrance

Using the peak 15-minute ridership period and NFPA 130 assumptions and guidelines, the Blue/Orange/Silver and Red line platforms at the Metro Center south entrance could be evacuated in 3.1 minutes, and the entire station could be evacuated to a point of safety within 15.7 minutes.

Gallery Place-Chinatown East Entrance

Using the peak 15-minute ridership period and NFPA 130 assumptions and guidelines, the Green/Yellow and Red-Glenmont platforms at the Gallery Place-Chinatown east entrance could be evacuated in 27.8 minutes, and the entire station entrance could be evacuated to a point of safety within 31.4 minutes. The long platform evacuation time is a result of the fact that there are only two platform-to-mezzanine escalators at this station entrance.

Gallery Place-Chinatown West Entrance

Using the peak 15-minute ridership period and NFPA 130 assumptions and guidelines, the two Red line platforms at the Gallery Place-Chinatown west entrance could be evacuated in 8.1 minutes, and the entire station entrance could be evacuated to a point of safety within 11.7 minutes.

Table 3-28: NFPA 130 Existing Condition Summary

Station/Entrance	Platform Evacuation Time (Minutes)	Total Station Evacuation Time (Minutes)
Archives-Navy Memorial	31.2	34.5
Federal Triangle	14.0	17.7
Metro Center East	6.5	9.7
Metro Center South	3.1	15.7
Gallery Place East	27.8	31.4
Gallery Place West	8.1	11.7

Source: TRB (2013); WMATA (2014c)

3.4.2 Bus: Local Metrobus

There are 35 Metrobus routes that serve the JEH parcel study area on weekdays. While the majority of these routes only serve neighborhoods within the District, several also serve areas outside the District including: Silver Spring, Maryland; Prince George's County, Maryland; Arlington County, Virginia; Fairfax County, Virginia; and Alexandria, Virginia. Within the District, nearly every neighborhood has Metrobus service to the study area with the exception of the Connecticut Avenue NW corridor (west of Rock Creek), Langdon and Fort Lincoln (Northeast), and Benning Ridge (between East Capitol Street and Pennsylvania Avenue SE). In addition to the 35

routes that serve the study area on weekdays, 2 routes serve the study area on weekends only. These routes include Route 13Y (Arlington to Union Station) and Route V8 (Minnesota Avenue – M Street). Figure 3-9 illustrates the Metrobus routes that serve the study area and their service areas within 0.25 mile.

The majority of routes in the study area have stops at intersections along Pennsylvania Avenue that provide close access to the JEH parcel. Sixteen routes have stops at 10th Street NW and Pennsylvania Avenue NW, while an additional six routes have stops at other intersections along Pennsylvania Avenue NW. Table 3-29 summarizes the Metrobus routes that serve the study area along with their major destinations served and their stops closest to the JEH parcel. Figure 3-10 illustrates Metrobus routes that serve the study area.

Table 3-29: Metrobus Routes Serving the Study Area

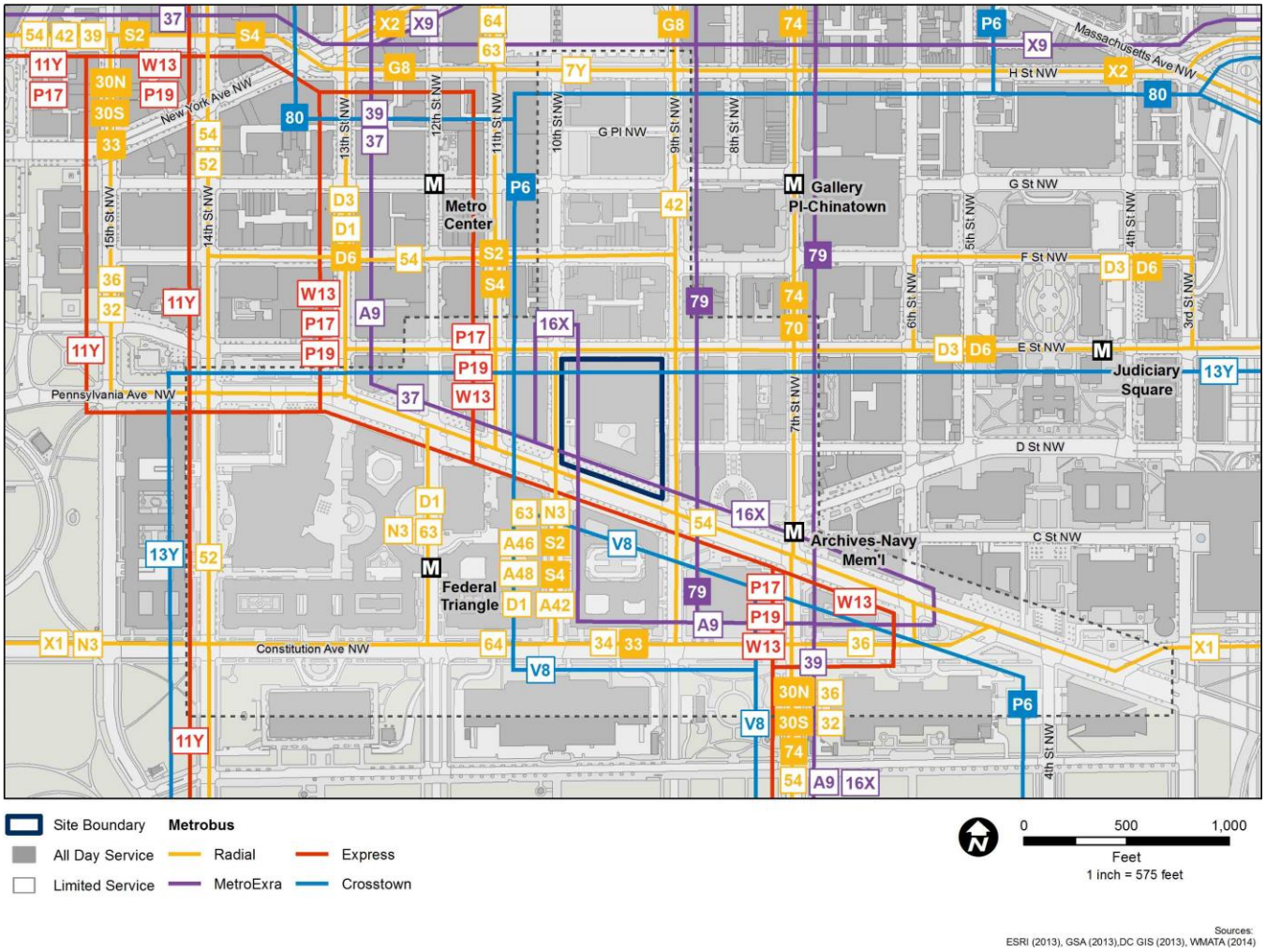
Route	Description	Stop Serving JEH Parcel	Major Destinations
District of Columbia			
32	Pennsylvania Avenue Line	10th/Pennsylvania	Foggy Bottom, Pennsylvania Ave NW/SE, Southern Ave
34	Naylor Road Line	10th/Pennsylvania	Archives, Naylor Road
36	Pennsylvania Avenue Line	10th/Pennsylvania	Foggy Bottom, Pennsylvania Ave NW/SE, Naylor Rd
37	Wisconsin Avenue Limited Line	10th/Pennsylvania	Friendship Heights, Wisconsin Ave NW, Archives
39	Pennsylvania Avenue Limited Line	7th/Pennsylvania	Foggy Bottom, Pennsylvania Ave SE, Naylor Rd
42	Mount Pleasant Line	9th/F	Mt Pleasant, Connecticut Ave NW, Downtown
52	14th Street Line	14th/D	Takoma, 14th St NW, L'Enfant Plaza
54	14th Street Line	10th/Pennsylvania	Takoma, 14th St NW, L'Enfant Plaza
63	Takoma - Petworth Line	11th/E	Takoma, Petworth, Federal Triangle
64	Fort Totten - Petworth Line	11th/E	Fort Totten, 11th St NW, Federal Triangle
74	Convention Center - Southwest Waterfront Line	7th/Pennsylvania	Waterfront, 7th St SW/NW, Convention Center
80	North Capitol Street Line	9th/H	Fort Totten, Brookland, Union Station, Metro Center, Foggy Bottom
A42	Anacostia - Congress Heights Line	10th/Pennsylvania	Southern Ave, Anacostia, M St SE, Archives
A46	Anacostia - Congress Heights Line	10th/Pennsylvania	Southern Ave, Anacostia, M St SE, Archives
A48	Anacostia - Congress Heights Line	10th/Pennsylvania	Congress Heights, Anacostia, M St SE, Archives
A9	M.L. King Jr. Avenue Limited Line	12th/Pennsylvania	Livingston, MLK Jr Ave SE, M St SE, McPherson Square
D1	Glover Park - Federal Triangle Line	10th/Pennsylvania	Glover Park, Dupont Circle, Federal Triangle
D3	Ivy City - Dupont Circle Line	10th/E	Georgetown, Dupont Circle, Downtown, Ivy City
D6	Sibley Hospital - Stadium-Armory Line	10th/E	Sibley Hospital, Georgetown, Dupont Circle, Downtown, Stadium-Armory
G8	Rhode Island Avenue Line	9th/H	Brookland, Rhode Island Ave NE, Farragut Square
N3	Massachusetts Avenue Line	10th/Pennsylvania	Friendship Heights, Massachusetts Ave NW, Dupont Circle, Federal Triangle

Table 3-29: Metrobus Routes Serving the Study Area (continued)

Route	Description	Stop Serving JEH parcel	Major Destinations
P6	Anacostia - Eckington Line	10th/Pennsylvania	Anacostia, M St SE, Archives, Eckington
V8	Minnesota Ave – M Street Line	7th/Pennsylvania	Deanwood, Minnesota Ave NE/SE, M Street SE, Smithsonian, Archives
X1	Benning Road Line	10th/Constitution	Minnesota Ave, Union Station, Federal Triangle, Foggy Bottom
X2	Benning Road - H Street Line	9th/H	Minnesota Ave, Benning Rd/H St NE, McPherson Square
X9	Benning Road - H Street Express Line	9th/H	Capitol Heights, Minnesota Ave, Benning Rd/H St NE, Metro Center
District of Columbia & Silver Spring, Maryland			
70	Georgia Avenue - 7th Street Line	7th/Pennsylvania	Silver Spring, Georgia Ave NW, Archives
79	Georgia Avenue Metro Extra Line	7th/Pennsylvania	Silver Spring, Georgia Ave NW, Archives
S2	16th Street Line	11th/E	Silver Spring, 16th St NW, Federal Triangle
S4	16th Street Line	11th/E	Silver Spring, 16th St NW, Federal Triangle
Prince George's County, Maryland			
W13	Bock Road Line	10th/Pennsylvania	Fort Washington, South Capitol St, Farragut Square
P17	Oxon Hill - Fort Washington Line	10th/Pennsylvania	Fort Washington, Oxon Hill, Farragut Square
P19	Oxon Hill - Fort Washington Line	10th/Pennsylvania	Fort Washington, Oxon Hill, Farragut Square
Virginia			
11Y	Mt Vernon Express Line	14th/Pennsylvania	Mt Vernon, Alexandria, Downtown
13Y	Arlington – Union Station	10th/E	Reagan National Airport, Downtown, Union Station
16X	Columbia Pike - Federal Triangle Line	10th/Pennsylvania	Columbia Pike (Arlington), Federal Triangle
7Y	Lincolnia - North Fairlington Line	10th/Pennsylvania	Lincolnia, North Fairlington, Federal Triangle

Source: WMATA (2014d)

Figure 3-10: Metrobus Routes Serving the Study Area



In addition to the 35 routes that serve the study area on weekdays, three routes serve the study area on weekends only. These routes include Route 13Y (Arlington to Union Station), Route A11 (Martin Luther King Junior Highway), and Route V8 (Minnesota Avenue – M Street).

WMATA recently restructured the 30s line in August 2014 and added two routes to the Pennsylvania Avenue corridor within the study area: routes 30N and 30S. Route 30N will operate between Naylor Road and Friendship Heights, Route 30S will operate between Southern Avenue and Friendship Heights. Route 33 will operate between Friendship Heights and Archives. Although routes 32 and 36 will continue to operate on Pennsylvania Avenue, both will only travel as far west as Foggy Bottom. Because these routes primarily serve local travel within the District and the overall 30s line will follow the same route through the study area, the service changes would likely not be significant to the outcomes of this analysis. WMATA continually makes minor adjustments to local bus services to better serve demand.

3.4.2.1 Bus Stop Inventory

In fall 2014, the study area had 61 bus stops; however, WMATA has since removed three stops. An inventory of elements at the 58 remaining stops was collected, including stop amenities and the presence of ADA-compliant loading areas and sidewalk connections. ADA standards require a 5-foot by 8-foot unobstructed, hard-surfaced loading area at bus stops and an unobstructed, hard-surfaced 4-foot-wide path to the stop and within the stop

area, connecting to the loading area. Of the 58 stops included in this analysis, 49 stops have an ADA-compliant loading area, and 25 have shelters. Due to security measures, a variety of the buildings in the study area are surrounded by security planters. These planters restrict the required 4-foot-wide clearance to access 7 of the 58 bus stops in the JEH study area. Table 3-30 summarizes ADA elements and shelters at stops in the study area, and Appendix B6 provides further details on ADA compliance and specific stop amenities.

Table 3-30: Bus Stop Element Summary

Element	Number	Percent of Total (58)
ADA 5-foot by 8-foot Loading Area	49	84%
ADA 4-foot Accessible Path	51	88%
Shelter	25	43%

Source: Site Visit (February 12, 2015)

3.4.2.2 Bus Service Characteristics and Frequency of Service

The 35 Metrobus routes that serve the study area have varying service characteristics and LOS on weekdays. Bus route LOS generally consists of two measures: headways, or the time between buses during certain periods, and span of service, or the start and end time of each route. Major service characteristics include service during peak periods only, late night service, late night/early morning only service to replace Metrorail service, limited stop MetroExtra service, and high frequency service. Overall, 15 routes have peak-only service, 16 have late-night service, 3 have late-night/early-morning only service, 6 are limited-stop MetroExtra routes, and 21 have high frequencies of 15 minutes or less at some point on weekdays. Table 3-31 summarizes the major service characteristics of Metrobus routes that serve the study area.

Table 3-31: Major Service Characteristics of Metrobus Routes Serving the Study Area

Service Characteristic	Routes
Peak Only Service	11Y, 16X, 37, 39, 63, 7Y, A9, D1, D3, N3, P17, P19, W13, X1, X9
Late Night Service	32, 34, 36, 42, 52, 54, 64, 70, 74, 80, D6, G8, P6, S2, S4, X2
Late Night/Early AM Only Service	A42, A46, A48
Limited Stop (MetroExtra)	16X, 37, 39, 79, A9, X9
High Frequency (Peak =< 15 minutes)	32, 36, 39, 42, 52, 54, 63, 64, 70, 74, 79, 7Y, 80, A9, D1, D6, G8, P6, S2, S4, X2

Source: WMATA (2014d)

The routes serving the study area also have varying service frequencies on weekdays. As was previously mentioned in table 3-31, some routes provide frequent service at 15-minute frequencies or less. Overall, Routes X2 and 79 provide the most frequent service, with frequencies of 10 minutes or less in both directions during peak periods. Route X2 operates along the H Street NW corridor in the study area, while Route 79 provides limited stop service to the 7th Street NW corridor, ending at Archives Station. Of the routes that directly serve the JEH parcel at the Pennsylvania Avenue NW/10th Street NW intersection, Routes 32, 36, 54, D1, P6, and 7Y all have peak frequencies in peak directions of 15 minutes or less.

Table 3-32 shows the bus frequencies by time period for the Metrobus routes in the study area. Peak periods (6:00 AM to 9:00 AM and 3:00 PM to 7:00 PM) are highlighted. The Early AM period falls between 4:00 AM and 6:00 AM, the Midday period between 9:00 AM and 3:00 PM, the Evening period between 7:00 PM and 11:00 PM, and the Late Night period between 11:00 PM and 4:00 AM.

Table 3-32: Metrobus Route Frequencies

Route & Direction	Headways (Minutes)						Number of Weekday Trips	Span of Service
	Early AM	AM Peak	Midday	PM Peak	Evening	Late Night		
11Y North	-	**26**	-	**-**	-	-	7	6:34 AM TO 9:03 AM
11Y South	-	**-**	-	**40**	-	-	6	4:10 PM TO 7:25 PM
16X East	-	**18**	-	**27**	-	-	10	5:45 AM TO 9:37 AM; 3:00 PM TO 6:55 PM
16X West	-	**23**	-	**27**	-	-	9	5:30 AM TO 9:22 AM; 3:36 PM TO 7:28 PM
32 East	30	**13**	28	**15**	30	75	59	4:15 AM TO 2:39 AM
32 West	15	**9**	24	**13**	34	75	71	4:04 AM TO 3:42 AM
34 East	40	**23**	28	**18**	40	150	45	5:10 AM TO 1:26 AM
34 West	24	**20**	30	**20**	48	150	45	4:33 AM TO 12:55 AM
36 East	30	**23**	28	**17**	30	100	50	4:28 AM TO 2:08 AM
36 West	24	**15**	30	**24**	30	75	51	4:37 AM TO 3:12 AM
37 North	-	**-**	-	**20**	-	-	12	4:00 PM TO 7:42 PM
37 South	-	**18**	120	**-**	-	-	13	6:30 AM TO 10:09 AM
39 East	-	**-**	-	**20**	-	-	12	3:30 PM TO 7:33 PM
39 West	-	**15**	-	**-**	-	-	12	6:00 AM TO 9:46 AM
42 North	40	**15**	12	**10**	10	25	108	4:44 AM TO 3:19 AM
42 South	24	**11**	12	**10**	13	30	102	4:20 AM TO 2:45 AM
52 North	60	**16**	23	**15**	27	50	60	5:06 AM TO 3:05 AM
52 South	20	**16**	23	**22**	30	60	57	4:10 AM TO 2:29 AM
54 North	40	**20**	23	**16**	30	43	58	4:46 AM TO 3:35 AM
54 South	24	**15**	24	**20**	30	60	57	4:20 AM TO 3:00 AM
63 North	60	**15**	1 trip	**12**	-	-	35	5:17 AM TO 9:31 AM; 2:58 PM TO 7:22 PM

Table 3-32: Metrobus Route Frequencies (continued)

Route & Direction	Headways (Minutes)						Number of Weekday Trips	Span of Service
	Early AM	AM Peak	Midday	PM Peak	Evening	Late Night		
63 South	30	11	-	18	-	-	34	4:30 AM TO 9:46 AM; 3:12 PM TO 6:27 PM
64 North	40	15	20	15	22	33	69	5:34 AM TO 1:25 AM
64 South	40	14	20	16	24	60	64	5:09 AM TO 12:50 AM
70 North	17	13	12	12	12	23	105	4:00 AM TO 3:40 AM
70 South	12	12	12	13	13	30	103	4:00 AM TO 2:59 AM
74 North	40	13	15	15	24	60	72	5:03 AM TO 12:59 AM
74 South	30	13	15	15	24	75	72	4:45 AM TO 12:42 AM
79 North	-	9	12	9	2 trips	-	77	6:03 AM TO 7:50 PM
79 South	-	8	12	10	2 trips	-	79	6:00 AM TO 7:45 PM
7Y North	40	12	-	30	-	-	26	5:09 AM TO 9:35 AM; 3:18 PM TO 6:40 PM
7Y South	1 trip	36	1 trip	15	-	-	23	5:57 AM TO 9:16 AM; 3:12 PM TO 7:13 PM
80 North	40	14	16	10	24	60	78	5:07 AM TO 2:16 AM
80 South	17	9	15	12	30	100	82	4:29 AM TO 1:20 AM
A42 North	60	-	-	-	-	-	2	4:14 AM TO 5:23 AM
A42 South	60	-	-	-	-	300	3	4:48 AM TO 6:01 AM; 12:33 AM TO 1:08 AM
A46 North	60	-	-	-	-	50	8	4:00 AM TO 5:14 AM; 12:18 AM TO 3:12 AM
A46 South	1 trip	-	-	-	-	-	1	5:12 AM TO 5:47 AM
A48 North	60	-	-	-	-	300	3	4:26 AM TO 5:33 AM; 12:11 AM TO 12:40 AM
A48 South	40	-	-	-	-	50	9	4:21 AM TO 6:07 AM; 1:10 AM TO 3:52 AM
A9 North	1 trip	15	-	-	-	-	13	5:55 AM TO 9:44 AM
A9 South	-	-	-	18	-	-	13	3:35 PM TO 7:38 PM
D1 East	-	15	1 trip	-	-	-	13	7:10 AM TO 9:49 AM
D1 West	-	-	-	48	2 trips	-	6	4:30 PM TO 7:43 PM
D3 East	-	-	-	34	-	-	7	3:02 PM TO 6:45 PM
D3 West	-	23	1 trip	-	-	-	9	6:05 AM TO 10:03 AM
D6 East	60	18	21	13	30	50	62	5:15 AM TO 2:37 AM
D6 West	24	11	21	16	30	75	66	4:10 AM TO 1:45 AM

Table 3-32: Metrobus Route Frequencies (continued)

Route & Direction	Headways (minutes)						Number of Weekday Trips	Span of Service
	Early AM	AM Peak	Midday	PM Peak	Evening	Late Night		
G8 East	60	18	28	13	27	50	58	5:29 AM TO 12:46 AM
G8 West	30	9	30	15	30	100	62	4:40 AM TO 11:56 AM
N3 East	-	36	-	-	-	-	5	6:45 AM TO 9:24 AM
N3 West	-	-	-	60	-	-	4	4:48 PM TO 6:58 PM
P17 North	30	20	-	-	-	-	13	4:47 AM TO 9:53 AM
P17 South	-	-	1 trip	17	-	-	15	2:57 PM TO 8:06 PM
P19 North	60	23	-	-	-	-	10	5:35 AM TO 9:06 AM
P19 South	-	-	-	24	-	-	10	3:42 PM TO 7:07 PM
P6 North	30	15	20	17	30	50	62	5:00 AM TO 1:04 AM
P6 South	40	18	19	18	30	43	60	5:05 AM TO 1:04 AM
S2 North	30	18	14	7	13	30	104	4:42 AM TO 3:39 AM
S2 South	15	5	13	12	34	43	107	4:09 AM TO 2:56 AM
S4 North	30	18	17	12	20	75	71	4:58 AM TO 1:09 AM
S4 South	20	15	16	15	30	150	66	4:26A M TO 12:26 AM
W13 North	24	23	-	-	-	-	13	4:52A M TO 9:02 AM
W13 South	-	-	-	22	-	-	11	3:35 PM TO 7:53 PM
X1 East	-	-	-	30	-	-	8	3:38 PM TO 6:49 PM
X1 West	-	16	-	-	-	-	11	6:06 AM TO 9:23 AM
X2 East	17	9	8	6	14	23	142	4:04 AM TO 3:20 AM
X2 West	13	8	8	8	14	30	135	4:15 AM TO 2:52 AM
X9 East	-	18	-	18	-	-	23	6:30 AM TO 9:29 AM; 3:30 PM TO 7:14 PM
X9 West	-	16	1 trip	22	-	-	23	6:15 AM TO 9:41 AM; 3:43 PM TO 6:55 PM

Source: WMATA (2014d)

3.4.2.3 Ridership by Route

Several routes that serve the study area have some of the highest ridership in the Metrobus system overall, including Routes X2, 70, and 32. These routes also have the highest ridership within the study area. The top three routes for ridership among the routes directly serving the JEH parcel are Route 32 with 9,997 average weekday riders, Route 36 with 6,663 average weekday riders, and Route 54 with 6,347 average weekday riders. Table 3-33 shows the weekday ridership for the Metrobus routes in the study area.

Table 3-33: Metrobus Average Weekday Ridership by Route

Route	Description	Average Weekday Ridership
X2	Benning Road - H Street	17,404
70	Georgia Avenue - 7th Street	15,506
32	Pennsylvania Avenue Line	9,997
80	North Capitol Street Line	9,727
S2	16th Street Line	9,535
79	Georgia Avenue Metro Extra	9,164
36	Pennsylvania Avenue	6,663
42	Mount Pleasant	6,655
S4	16th Street	6,419
54	14th Street	6,347
D6	Sibley Hospital - Stadium-Armory	6,102
52	14th Street	5,949
64	Fort Totten - Petworth	5,880
P6	Anacostia - Eckington	5,790
G8	Rhode Island Avenue	5,618
63	Takoma - Petworth	3,613
34	Naylor Road	3,117
X9	Benning Road - H Street Express	2,492
74	Convention Center - Southwest Waterfront	2,323
7Y	Lincolnia - North Fairlington	1,426
39	Pennsylvania Avenue Limited	1,071
X1	Benning Road	980
A9	M.L. King Jr Avenue Limited	855
16X	Columbia Pike - Federal Triangle	838
37	Wisconsin Avenue Limited	782
P17	Oxon Hill - Fort Washington	766
D1	Glover Park - Federal Triangle	665
W13	Bock Road	641
P19	Oxon Hill - Fort Washington	575
D3	Ivy City - Dupont Circle	547
11Y	Mt Vernon Express	475
N3	Massachusetts Avenue	280
A48	Anacostia - Congress Heights	227
A42	Anacostia - Congress Heights	138
A46	Anacostia - Congress Heights	133

Source: WMATA (2014e)

3.4.2.4 Ridership by Route and Direction

Metrobus weekday ridership by route, direction, and time period is summarized in table 3-34. Overall, the midday period is the busiest period on most routes, followed by the PM peak period and the AM peak period. The highest ridership per trip occurs during the midday period on Route 32, which sees 103 boardings per trip on an average weekday in each direction. Routes 36 and 70 also have high ridership during the midday period, each having more than 84 boardings per trip in each direction.

During the PM peak period, Route 70 has the highest ridership per trip, with 101 boardings in the northbound direction and 93 in the southbound direction. Route 32 has the second highest, with 92 boardings in the northbound direction and 71 in the southbound direction. Other routes and directions with more than 70 boardings per trip during the PM peak period include Routes 36 eastbound, 52 northbound, 54 northbound, and X2 eastbound.

During the AM peak period, Route 70 has the highest ridership per trip, with 75 boardings in the northbound direction and 83 boardings in the southbound direction. Route 36 has the second highest ridership per trip, with 75 boardings in each direction. Other routes and directions with 70 or more boardings per trip include Routes 32 (both directions), 54 southbound, 80 (both directions), G8 westbound, and X2 westbound. Table 3-34 summarizes average weekday ridership per trip by route and direction, and highlights those routes and directions with 70 or more boardings per trip by route and direction.

Table 3-34: Average Metrobus Weekday Ridership per Trip by Route and Direction

Route/Direction	Ridership per Trip					
	AM Early	AM Peak	Midday	PM Peak	Early Night	Late Night
11Y North	-	38	-	-	-	-
11Y South	-	-	-	35	-	-
16X East	-	43	-	-	-	-
16X West	-	-	-	45	-	-
32 East	34	**76**	**103**	**92**	67	28
32 West	53	**88**	**103**	**71**	52	15
34 East	10	27	40	55	28	10
34 West	18	43	38	33	19	8
36 East	25	**75**	**93**	**76**	51	21
36 West	45	**75**	**86**	65	43	15
37 North	-	-	-	32	-	-
37 South	-	34	21	-	-	-
39 East	-	-	-	43	-	-
39 West	-	46	-	-	-	-
42 North	6	19	30	52	40	17
42 South	17	45	35	34	16	6
52 North	27	41	50	**70**	57	25
52 South	33	69	61	59	28	9
54 North	30	55	60	**75**	61	32

Table 3-34: Average Metrobus Weekday Ridership per Trip by Route and Direction (continued)

Route/Direction	Ridership per Trip					
	AM Early	AM Peak	Midday	PM Peak	Early Night	Late Night
54 South	31	72	59	60	36	11
63 North	13	50	55	54	-	-
63 South	33	64	-	48	-	-
64 North	11	41	38	60	47	26
64 South	41	69	46	52	29	10
70 North	43	75	84	101	74	39
70 South	56	83	87	93	60	25
74 North	12	28	15	16	6	4
74 South	8	13	15	29	14	6
79 North	-	52	57	67	43	-
79 South	-	66	56	56	38	-
7Y North	5	46	-	6	-	-
7Y South	3	3	3	41	-	-
80 North	34	73	71	68	54	18
80 South	51	72	67	53	35	15
A42 North	36	-	-	-	-	-
A42 South	20	-	-	-	-	24
A46 North	34	-	-	-	-	8
A46 South	14	-	-	-	-	-
A48 North	33	-	-	-	-	5
A48 South	20	-	-	-	-	16
A9 North	43	38	-	-	-	-
A9 South	-	-	-	28	-	-
D1 East	-	40	30	-	-	-
D1 West	-	-	-	28	13	-
D3 East	-	-	-	36	-	-
D3 West	-	34	21	-	-	-
D6 East	19	56	52	60	43	13
D6 West	36	63	50	43	32	10
G8 East	15	38	42	63	44	28
G8 West	35	71	52	41	23	6
N3 East	-	34	-	-	-	-
N3 West	-	-	-	27	-	-
P17 North	24	28	-	-	-	-
P17 South	-	-	25	28	-	-

Table 3-34: Average Metrobus Weekday Ridership per Trip by Route and Direction (continued)

Route/Direction	Ridership per Trip					
	AM Early	AM Peak	Midday	PM Peak	Early Night	Late Night
P19 North	24	30	-	-	-	-
P19 South	-	-	-	29	-	-
P6 North	24	56	59	56	34	9
P6 South	32	56	57	56	40	10
S2 North	30	33	43	55	50	33
S2 South	43	49	51	43	36	11
S4 North	31	37	38	59	55	46
S4 South	46	64	45	47	34	18
W13 North	28	26	-	-	-	-
W13 South	-	-	-	27	-	-
X1 East	-	-	-	51	-	-
X1 West	-	52	-	-	-	-
X2 East	19	52	72	**70**	74	31
X2 West	47	**73**	76	63	51	20
X9 East	-	41	-	62	-	-
X9 West	-	67	46	45	-	-

Source: WMATA (2014e)

Maximum passenger loads on routes serving the study area indicate the potential for overcrowding on the majority of routes. Typical capacity is between 41 and 79 passengers, depending on vehicles assigned to each route and the load standard put in place by WMATA. Overall, routes 11Y, 16X, 32, 34, 36, 39, 42, 52, 54, 63, 64, 79, 80, D1, D6, S2, S4, and X2 all experience passenger loads in excess of their capacity per trip. The highest passenger loads are experienced on Route X2, where loads during the AM peak (westbound) and Early Night (eastbound) periods are around 80 passengers. Table 3-35 summarizes maximum passenger loads by route, direction, and time period, and highlights loads in excess of peak capacity per trip.

Table 3-35: Metrobus Maximum Passenger Loads by Route and Direction

Route/ Direction	Maximum Passenger Loads						Peak Capacity/ Trip
	AM Early	AM Peak	Midday	PM Peak	Early Night	Late Night	
11Y North	-	**45**	-	-	-	-	43
11Y South	-	-	-	**49**	-	-	43
16X East	-	37	-	-	-	-	41
16X West	-	-	-	**43**	-	-	41
32 East	30	**56**	**58**	**57**	42	26	49
32 West	43	**59**	**56**	**56**	37	19	49
34 East	14	35	36	**52**	29	14	47
34 West	21	44	29	27	17	11	47

Table 3-35: Metrobus Maximum Passenger Loads by Route and Direction (continued)

Route/ Direction	Maximum Passenger Loads						Peak Capacity/ Trip
	AM Early	AM Peak	Midday	PM Peak	Early Night	Late Night	
36 East	20	**58**	**51**	**53**	38	25	48
36 West	42	49	**53**	**50**	44	19	49
37 North	-	-	-	34	-	-	47
37 South	-	41	24	-	-	-	47
39 East	-	-	-	40	-	-	48
39 West	-	**50**	-	-	-	-	48
42 North	11	20	41	**55**	48	44	49
42 South	21	**50**	46	36	19	13	49
52 North	24	43	**52**	**53**	**58**	45	48
52 South	34	**55**	**50**	**48**	25	15	48
54 North	26	**48**	**51**	**53**	**55**	**51**	48
54 South	29	**57**	45	**52**	31	19	48
63 North	16	**53**	33	**51**	-	-	47
63 South	29	**50**	-	44	-	-	47
64 North	19	44	45	**52**	42	**52**	48
64 South	38	**54**	47	45	28	15	48
70 North	36	54	55	60	62	54	79
70 South	56	57	56	58	52	28	79
74 North	15	33	19	20	7	7	48
74 South	7	13	15	25	18	7	48
79 North	-	49	**55**	**61**	34	-	48
79 South	-	**60**	47	**54**	28	-	48
7Y North	7	45	-	7	-	-	41
7Y South	3	7	4	39	-	-	41
80 North	20	39	**49**	**46**	38	22	44
80 South	43	**47**	36	35	23	13	44
A42 North	37	-	-	-	-	-	47
A42 South	17	-	-	-	-	23	47
A46 North	30	-	-	-	-	12	47
A46 South	10	-	-	-	-	-	47
A48 North	38	-	-	-	-	8	47
A48 South	14	-	-	-	-	23	47
A9 North	40	41	-	-	-	-	47
A9 South	-	-	-	36	-	-	47
D1 East	-	**53**	25	-	-	-	48
D1 West	-	-	-	30	11	-	50

Table 3-35: Metrobus Maximum Passenger Loads by Route and Direction (continued)

Route/ Direction	Maximum Passenger Loads						Peak Capacity/ Trip
	AM Early	AM Peak	Midday	PM Peak	Early Night	Late Night	
D3 East	-	-	-	24	-	-	41
D3 West	-	28	13	-	-	-	48
D6 East	12	47	42	45	28	22	49
D6 West	26	**48**	38	37	27	8	48
G8 East	16	38	35	43	32	38	48
G8 West	31	52	36	40	17	7	48
N3 East	-	40	-	-	-	-	48
N3 West	-	-	-	23	-	-	50
P17 North	29	31	-	-	-	-	47
P17 South	-	-	22	36	-	-	47
P19 North	25	32	-	-	-	-	47
P19 South	-	-	-	32	-	-	47
P6 North	25	40	41	44	28	17	47
P6 South	26	41	44	42	33	22	47
S2 North	32	34	44	56	57	48	58
S2 South	**53**	**61**	**54**	46	35	17	52
S4 North	35	39	52	**56**	**57**	55	56
S4 South	**58**	**60**	49	45	36	19	52
W13 North	35	35	-	-	-	-	47
W13 South	-	-	-	39	-	-	47
X1 East	-	-	-	38	-	-	48
X1 West	-	43	-	-	-	-	50
X2 East	17	49	72	69	**80**	44	73
X2 West	47	**77**	63	58	43	28	73
X9 East	-	42	-	51	-	-	48
X9 West	-	54	36	39	-	-	48

Source: WMATA (2014e)

The overall occurrence of weekday trips with maximum passenger loads in excess of capacity is summarized in Table 3-36. Routes X9, 79, 11Y, 54, and S4 all have the highest percentage of overcrowded weekday trips. Routes 79, 54, and S4 all have more than 15 overcrowded trips per weekday.

Table 3-36: Total Number of Overcrowded Trips per Weekday

Route/ Direction	Over-crowded Trips	Percent Overcrowded Trips	Total Trips
X9 West	7	30%	23
79 South	23	29%	79
11Y North	2	29%	7
54 North	15	26%	58
S4 South	15	23%	66
16X West	2	22%	9
79 North	17	22%	77
X9 East	5	22%	23
32 East	12	20%	59
32 West	14	20%	71
11Y South	1	17%	6
54 South	9	16%	57
S4 North	11	15%	71
D1 East	2	15%	13
52 South	8	14%	57
36 East	7	14%	50
S2 North	14	13%	104
52 North	8	13%	60
S2 South	13	12%	107
63 South	4	12%	34
64 South	7	11%	64
36 West	5	10%	51
64 North	6	9%	69
39 West	1	8%	12
7Y North	2	8%	26
42 North	7	6%	108
63 North	2	6%	35
G8 West	3	5%	62
34 East	2	4%	45
70 North	4	4%	105
X2 East	4	3%	142
80 North	2	3%	78
42 South	2	2%	102
X2 West	2	1%	135
80 South	1	1%	82
70 South	1	1%	103

Source: WMATA (2014e)

3.4.2.5 Stop Level Ridership

Metrobus ridership at the stop level highlights locations in the study area with high boarding (getting on) and alighting (getting off) activity. The three stops with the highest activity are at the 7th Street NW/Pennsylvania Avenue NW intersection in the eastbound, northbound, and westbound directions, respectively. An additional stop at this intersection in the southbound direction has the 7th highest ridership activity in the study area. Combined, these stops have more than 5,000 daily combined boarding and alightings. Some of the busiest routes in the study area use these stops, including Routes 32, 36, 54, 70, and 79.

The intersection of H Street NW and 9th Street NW is the second busiest in the study area. The eastbound stop at this intersection has the fourth highest ridership activity in the study area, while the southbound stop and the westbound stop have the fifth and twelfth highest, respectively. Eastbound and westbound stops are served by Route X2, the busiest route in the study area, while the southbound stop is served by Route 79, the sixth busiest route in the study area.

The Pennsylvania Avenue NW/10th Street NW intersection is the closest to the front entrance of the JEH parcel, and has six stops, including two in the northbound direction, two in the southbound direction, one in the eastbound direction, and one in the westbound direction. The eastbound stop is the busiest of the six (ranking eighth in the study area) and is served by some of the busiest routes in the study area, including Routes 32, 36, and 54. The southern northbound stop is the fifteenth busiest in the study area, and is served by Routes 32, 34, and 37. Combined, northbound stops have 486 boardings and alightings on an average weekday, and southbound stops have 121, while the eastbound stop has 610, and the westbound stop has 243.

Average weekday ridership at the stop level in the study area is summarized in table 3-37. The stops are ordered from highest weekday ridership to lowest weekday ridership.

Table 3-37: Weekday Stop-Level Ridership in Study Area

Stop	Stop ID	Routes	Average Weekday		
			Boardings	Alightings	Total Activity
Pennsylvania Ave NW/7th St NW	1003033	32 34 36 37 39 54 79 A42 A46 A48	831	1,177	2,008
7th St/Pennsylvania Ave	1000930	70 74 79	1,299	234	1,533
Pennsylvania Ave NW/7th St NW	1003398	16X 32 36 39 54 P17 P19 P6 W13	532	478	1,010
H St NW/9th St NW	1001103	42 80 P6 X2 X9	724	214	938
9th St NW/H St NW	1001134	79 G8	50	883	933
11th St NW/E St NW	1000991	16X 54 63 64 P17 P19 P6 S2 S4 W13	716	138	854
7th St/Pennsylvania Ave	1000928	70 74	162	499	661
Pennsylvania Ave/10th St NW	1000944	16X 32 36 54 P17 P19 P6 W13	435	175	610
9th St NW/G St NW	1001084	42	211	274	485
7th St/Constitution Ave NW	1000880	32 34 36 54 70 74 A42 A46 A48 P17 P19 W13	267	198	465

Table 3-37: Weekday Stop-Level Ridership in Study Area (Continued)

Stop	Stop ID	Routes	Average Weekday		
			Boardings	Alightings	Total Activity
11th St NW/E St NW	1001018	54 63 64 P6 S2 S4	51	403	454
H St NW/9th St NW	1003727	80 P6 X2	123	324	447
10th St/Constitution Ave (S2 S4 Only)	1003432	S2 S4	165	266	431
9th St/Constitution Ave	1000886	70 79	258	151	408
10th St NW/Pennsylvania Ave NW	1003288	32 34 37	189	210	399
10th St/Constitution Ave (63 & 64 Only)	1003570	63 64	136	258	394
7th St NW/Constitution Ave NW	1000846	16X 32 36 54 74 P17 P19 W13	53	336	389
Pennsylvania Ave NW/13th St NW	1000976	32 36 37 39 A9 D1 P17 P19 W13	241	85	326
7th St/E St	1001019	70 74	69	236	306
Pennsylvania Ave NW/12th St NW	1000981	32 36 37 39 A9 D1	129	172	302
Pennsylvania Ave NW/6th St NW	1003284	16X 32 36 54 P17 P19 P6 W13	36	231	267
Constitution Ave/14th St	1000859	7Y N3 X1	14	252	266
Pennsylvania Ave/10th St NW	1000948	16X 32 36 54 P17 P19 P6 W13	90	153	243
7th St/E St	1000995	70 74	152	71	223
E St NW/7th St NW	1001011	D3 D6	61	123	184
Pennsylvania Ave between 7th & 9th Sts NW	1003763	16X A9 P17 P19 P6 W13	168	10	178
E St NW/8th St NW	1000997	D3 D6	116	36	152
E St NW/7th St NW	1001003	D3 D6	96	54	150
Pennsylvania Ave NW/14th St NW	1000985	11Y 32 36	102	47	149
Pennsylvania Ave NW/11th St NW	1000958	32 36 7Y D1 N3 P17 P19 W13	68	64	132
E St NW/9th St NW	1001014	D3 D6	30	97	127
Constitution Ave NW/9th St NW	1003265	34 A42 A46 A48 A9 P6 X1	7	107	114
E St NW/10th St NW	1001004	16X D3 D6	96	17	114
E St NW/11th St NW	1001005	D3 D6	77	34	111
Pennsylvania Ave NW/14th St NW	1000993	32 36	54	55	108
10th St/Constitution Ave	1000910	7Y	64	33	97
E St NW/11th St NW	1003203	D3 D6	23	64	87
10th St/Pennsylvania Ave NW	1003287	A42 A46 A48 P6	29	58	87
Pennsylvania Ave/Constitution Ave	1003283	P6	7	73	80
14th St/Constitution Ave	1000885	11Y 52	46	33	79

Table 3-37: Weekday Stop-Level Ridership in Study Area (Continued)

Stop	Stop ID	Routes	Average Weekday		
			Boardings	Alightings	Total Activity
14th St/D St	1000956	11Y 52	7	62	69
14th St NW/D St NW	1002973	11Y 52	54	9	63
14th St/Constitution Ave NW	1000878	11Y 52	21	38	59
E St NW/10th St NW	1001012	D3 D6	12	44	55
9th St NW/F St NW	1001055	42	48	5	52
12th St/Constitution Ave	1000901	63 64 7Y D1 N3 S2 S4	5	34	40
Constitution Ave NW/12th St NW	1003263	7Y X1	18	18	36
Pennsylvania Ave NW/6th St NW	1000889	P6	30	5	36
Pennsylvania Ave/Constitution Ave	1000879	P6	29	4	33
Constitution Ave NW/7th St NW	1000867	X1	18	11	29
10th St NW/Pennsylvania Ave NW	1003691	D1 N3	5	19	24
Constitution Ave NW/10th St NW	1003262	X1	1	15	16
Constitution Ave NW/7th St NW	1000850	X1	9	7	15
Constitution Ave NW/12th St NW	1000857	X1	14	1	15
Constitution Ave/6th St	1000866	X1	4	10	14
Constitution Ave NW/9th St NW	1000853	X1	3	11	13
Constitution Ave/3rd St	1000849	X1	8	1	9
Constitution Ave/3rd St	1000863	X1	0	7	7
12th St/Constitution Ave	1003571	N3	5	0	5
Constitution Ave/10th St	1000854	X1	3	1	4
Constitution Ave/6th St	1003264	X1	2	0	2

Source: WMATA (2014e)

Maximum passenger loads at the stop level are a measure of how many passengers are aboard a bus at a given location. They are not necessarily indicative of high activity at that stop, but rather how crowded the bus is at that location. Passenger loads greater than 35 are summarized in table 3-38 because most 40-foot buses have a seated capacity of 35 to 40 passengers. Routes included in this table would be potential candidates for mitigation if redevelopment of the JEH parcel resulted in more bus passenger trips.

Overall, the X2 (H Street-Benning Road), the 32 West (Pennsylvania Avenue), 32 East (Pennsylvania Avenue), 11Y South and 36 East (Pennsylvania Avenue) have the highest passenger loads. The stop with the highest passenger loads, H Street NW at 9th Street NW, is far removed from the JEH parcel yet is the closest stop to the building on the Route X2, one of the busiest lines in the system. Route G8 westbound also has high passenger loads at this intersection. The stops with the second and third highest passenger loads, 7th Street NW at Constitution Avenue NW and Pennsylvania Avenue NW at 12th Street NW, are both closer in proximity to the JEH parcel and are served by Route 32. 7th Street NW at Constitution Avenue NW also has high passenger loads on Route X1 in the westbound direction. Three stops at the corner of Pennsylvania and 10th Street at the JEH parcel (32 West, 32 East, and 36 East) each carry at least 40 passengers. Table 3-38 summarizes the highest passenger load locations in the study area.

Table 3-38: Bus Stops with Highest Passenger Loads by Route and Direction

Route/ Direction	Stop ID	Stop Name	Weekday Maximum Passenger Load
X2 West	1003727	H St NW/9th St NW	48
32 East	1000880	7th St/Constitution Ave NW	45
32 West	1000981	Pennsylvania Ave NW/12th St NW	45
32 West	1000993	Pennsylvania Ave NW/14th St NW	45
32 West	1000948	Pennsylvania Ave/10th St NW	44
32 West	1003398	Pennsylvania Ave NW/7th St NW	44
32 East	1003033	Pennsylvania Ave NW/7th St NW	44
11Y South	1000878	14th St/Constitution Ave NW	43
32 West	1000846	7th St NW/Constitution Ave NW	42
32 West	1003284	Pennsylvania Ave NW/6th St NW	42
G8 West	1001134	9th St NW/H St NW	40
32 East	1000944	Pennsylvania Ave/10th St NW	40
11Y South	1000956	14th St/D St	40
36 East	1000944	Pennsylvania Ave/10th St NW	40
36 East	1000958	Pennsylvania Ave NW/11th St NW	39
36 East	1000880	7th St/Constitution Ave NW	39
11Y South	1000985	Pennsylvania Ave NW/14th St NW	39
36 East	1000976	Pennsylvania Ave NW/13th St NW	39
36 East	1003033	Pennsylvania Ave NW/7th St NW	39
32 East	1000958	Pennsylvania Ave NW/11th St NW	39
32 East	1000985	Pennsylvania Ave NW/14th St NW	38
X2 East	1001103	H St NW/9th St NW	37
36 West	1000846	7th St NW/Constitution Ave NW	37
80 South	1003727	H St NW/9th St NW	37
36 West	1003284	Pennsylvania Ave NW/6th St NW	37
D6 East	1001003	E St NW/7th St NW	36
36 West	1003398	Pennsylvania Ave NW/7th St NW	36
36 West	1000948	Pennsylvania Ave/10th St NW	36
P6 North	1003283	Pennsylvania Ave/Constitution Ave	36
11Y North	1000885	14th St/Constitution Ave	36
36 East	1000985	Pennsylvania Ave NW/14th St NW	35
32 East	1000976	Pennsylvania Ave NW/13th St NW	35
39 West	1003398	Pennsylvania Ave NW/7th St NW	35
P6 South	1000879	Pennsylvania Ave/Constitution Ave	35
36 West	1000981	Pennsylvania Ave NW/12th St NW	35

Table 3-38: Bus Stops with Highest Passenger Loads by Route and Direction (continued)

Route/ Direction	Stop ID	Stop Name	Weekday Maximum Passenger Load
D6 East	1000997	E St NW/8th St NW	35
X1 West	1000867	Constitution Ave NW/7th St NW	35
X1 West	1003265	Constitution Ave NW/9th St NW	35

Source: WMATA (2014e)

3.4.2.6 Metrobus Capacity Analysis

In order to determine if there is sufficient capacity in the Metrobus system in the study area, the total volume of Metrobus passengers in the study area was compared to the total capacity of the Metrobus system in the study area. Peak bus volumes were calculated by averaging existing maximum weekday passenger loads for each route and direction at stops within the study area by stop, and then multiplying this figure by the number of AM peak hour and PM peak hour trips to calculate ridership per peak hour by route and direction. These totals were then summed to calculate a total ridership per peak hour for the study area. To calculate the AM peak hour and PM peak hour capacity of bus services within the study area, the capacity per trip of each Metrobus route during each peak hour was multiplied by the number of trips scheduled in each peak hour. Capacities per trip for each Metrobus route were based on the typical number of seats available on each trip and the WMATA load standard (WMATA 2013b).

Total 2014 existing AM peak hour bus ridership in the study area was calculated at just over 4,300 passengers, while PM peak hour bus ridership was calculated at approximately 3,950 passengers. Both peak hour volumes are well below the capacity of bus services within the study area, which is approximately 11,400 passengers during the AM peak hour and 10,700 passengers during the PM peak hour. Table 3-39 summarizes current and projected bus ridership in the study area.

Table 3-39: Existing Bus Capacity Analysis

Peak Hour	Volume	Capacity	Volume to Capacity (V/C) Ratio
AM Peak Hour	4,315	11,425	0.38
PM Peak Hour	3,952	10,698	0.37

Source: WMATA (2014e)

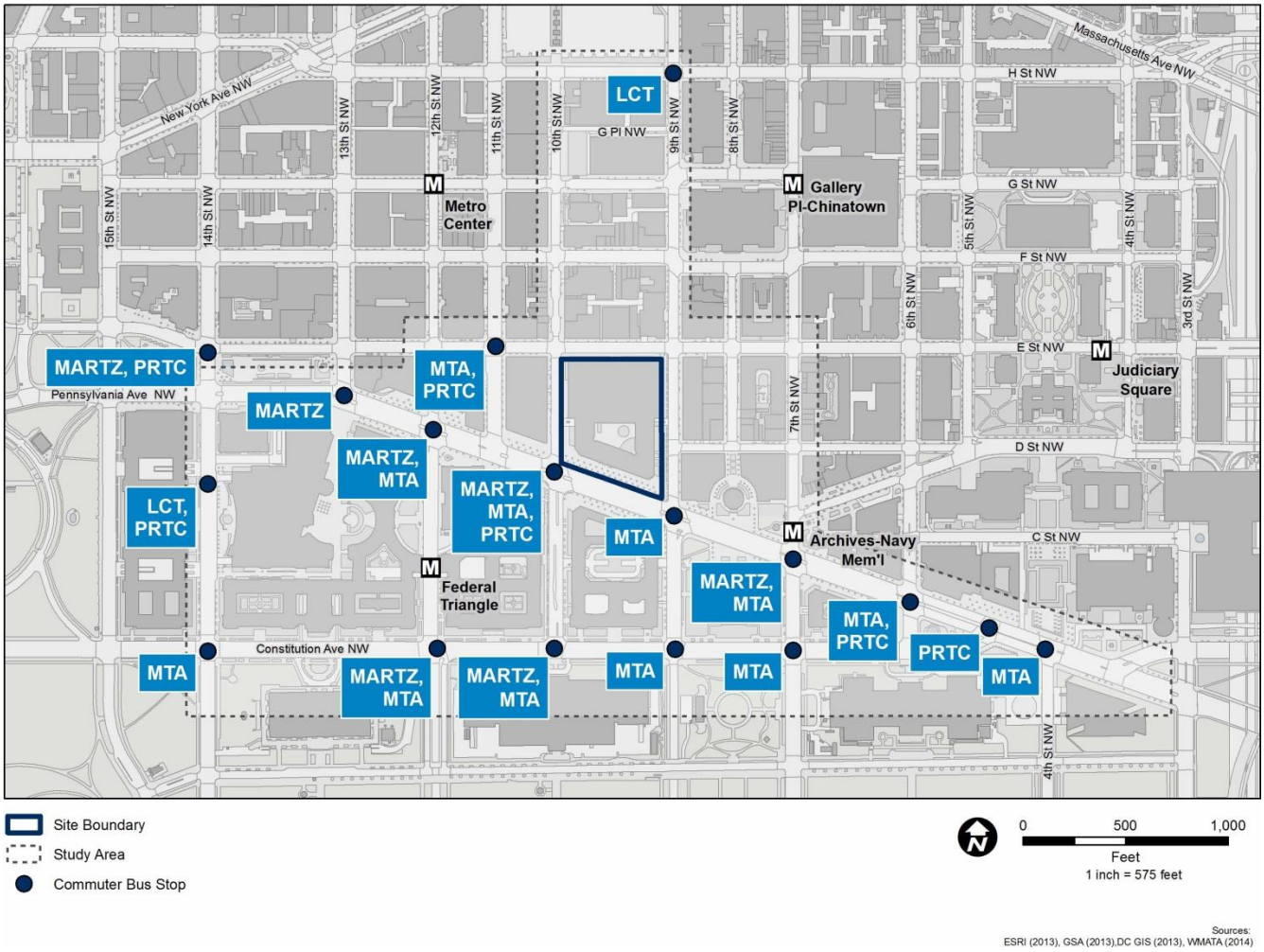
Further details on the bus capacity analysis by Metrobus route can be found in Appendix B7.

3.4.3 Bus: Commuter

Commuter bus service to the study area is provided by four different transit agencies: Maryland Transit Administration (MTA), MARTZ, Potomac-Rappahannock Transit Commission (PRTC), and Loudoun County Transit (LCT). The majority of these commuter routes serve either the 14th Street NW corridor or the Pennsylvania Avenue NW corridor. Thirty-nine commuter bus routes serve the study area via 17 bus stops in the study area; bus stops for different service providers are often co-located. MTA has 12 stops serving 13 routes, MARTZ has six stops serving 12 routes, PRTC has six stops serving six routes, and LCT has two stops serving

eight routes. MTA provides service from several areas of Charles, Prince George's, Anne Arundel, and Howard Counties. MARTZ primarily provides service from Fredericksburg, Virginia, and Stafford, Virginia. PRTC provides service from Prince William County, and LCT provides service from Leesburg, Virginia; Purcellville, Virginia; and the area surrounding Dulles Airport in Loudoun County, Virginia. Figure 3-11 illustrates the 17 commuter bus stop locations within the study area, while table 3-40 summarizes the 39 commuter bus routes that serve the study area.

Figure 3-11: Commuter Bus Stops within Study Area



Source: Maryland Transit Administration (2014); MARTZ (2014); Loudoun County Transit; PRTC (2014)

Table 3-40: Commuter Bus Routes within Study Area

Agency	Route	From	JEH Study Area Stops
Maryland Transit Administration (MTA) ***(serving Maryland)***	610	Waldorf	7th/Pennsylvania; 9th/Pennsylvania; 10th/Pennsylvania
	620	Waldorf	7th/Pennsylvania; 9th/Pennsylvania; 10th/Pennsylvania
	630	La Plata/Waldorf	14th/Constitution
	640	Waldorf/Accokeek	7th/Pennsylvania; 9th/Pennsylvania; 10th/Pennsylvania
	650	La Plata/Waldorf/Accokeek	7th/Pennsylvania; 9th/Pennsylvania; 10th/Pennsylvania
	902	St Leonard/Prince Frederick	7th/Pennsylvania; 9th/Pennsylvania; 10th/Pennsylvania; 11th/E
	904	North Beach/Pindell	7th/Pennsylvania; 9th/Pennsylvania; 10th/Pennsylvania; 11th/E
	905	California /Charlotte Hall/Waldorf	7th/Pennsylvania; 9th/Pennsylvania; 10th/Pennsylvania
	909	California/Charlotte Hall	12th/Constitution; 14th/Constitution
	915	Columbia/Silver Spring	7th/Constitution; 9th/Constitution; 10th/Constitution; 12th/Pennsylvania
	922	Kent Island/Annapolis	4th/Pennsylvania; 6th/Pennsylvania; 9th/Pennsylvania; 12th/Pennsylvania
	929	Columbia/Silver Spring	7th/Constitution; 9th/Constitution; 10th/Constitution; 14th/Constitution
	995	Clarksville/Ellicott City/Columbia	7th/Constitution; 9th/Constitution; 10th/Constitution; 14th/Constitution
MARTZ ***(serving Virginia)***	DC2	Fredericksburg	7th/Pennsylvania; 10th/Pennsylvania; 13th/Pennsylvania
	DC3	Stafford	7th/Pennsylvania; 10th/Pennsylvania; 13th/Pennsylvania
	DC4	Fredericksburg	7th/Pennsylvania; 10th/Pennsylvania; 13th/Pennsylvania
	DC6	Fredericksburg	7th/Pennsylvania; 10th/Pennsylvania; 13th/Pennsylvania
	DC7	Fredericksburg	7th/Pennsylvania; 10th/Pennsylvania; 13th/Pennsylvania
	DC8	Fredericksburg	7th/Pennsylvania; 10th/Pennsylvania; 13th/Pennsylvania
	DC9	Fredericksburg	7th/Pennsylvania; 10th/Pennsylvania; 13th/Pennsylvania
	DC12	Fredericksburg	7th/Pennsylvania; 10th/Pennsylvania; 13th/Pennsylvania
	DC1	Fredericksburg	10th/Constitution; 12th/Constitution; 14th/E
	DC5	Fredericksburg	12th/Constitution; 12th/Pennsylvania
	DC11	Fredericksburg	12th/Constitution; 12th/Pennsylvania
	PE	Fredericksburg	7th/Pennsylvania; 10th/Pennsylvania; 13th/Pennsylvania
Potomac-Rappahannock Transit (PRTC) or OmniRide – ***(serving Virginia)***	MC-R	Montclair	14th/Reagan Bldg; 11th/E; 10th/Pennsylvania; 6th/Pennsylvania; Constitution/ Pennsylvania
	R1-R	Woodbridge/Dumfries	14th/Reagan Bldg; 11th/E; 10th/Pennsylvania; 6th/Pennsylvania; Constitution/ Pennsylvania
	LR-R	Lake Ridge	14th/Reagan Bldg; 14th/E
	DC-R	Dale City	14th/Reagan Bldg; 14th/E
	MN-R	Manassas	14th/Reagan Bldg; 14th/E
	GV-R	Gainesville	14th/Reagan Bldg; 14th/E

Table 3-40: Commuter Bus Routes within Study Area (continued)

Agency	Route	From	JEH Study Area Stops
Loudon County Transit (LCT) ***(serving Virginia)***	-	Purcelville	14th/Reagan Bldg; 9th/H
	-	Harmony	14th/Reagan Bldg; 9th/H
	-	Leesburg	14th/Reagan Bldg; 9th/H
	-	Dulles South	14th/Reagan Bldg; 9th/H
	-	Dulles North	14th/Reagan Bldg; 9th/H
	-	Brambleton	14th/Reagan Bldg; 9th/H
	-	Ashburn	14th/Reagan Bldg
	-	Christian Fellowship Church	14th/Reagan Bldg

Source: Maryland Transit Administration (2014); MARTZ (2014); Loudoun County Transit; PRTC (2014)

3.4.4 Ridesharing/Slugging

Slugging, or casual carpooling, serves commuters traveling to Washington, D.C. from Springfield, Virginia; Woodbridge, Virginia; Stafford, Virginia; and Fredericksburg, Virginia; Alexandria, Virginia; and Arlington, Virginia. There are two locations for slugging located within the JEH parcel study area: 14th Street NW at Constitution Avenue NW and 14th Street NW at D Street NW (www.slug-lines.com).

The best time for afternoon pick-ups (returning to Virginia) at both locations is between 4:00 PM and 5:00 PM (www.slug-lines.com). Slugging is a demand-based, informal system that changes over time based on user needs and trip patterns; therefore, new slug lines emerge and existing slug lines disband as needed.

The 14th Street NW/Constitution Avenue NW location is served by two lines, both operating to and from Springfield, Virginia. One line serves a park-and-ride lot “Bob’s,” located just west of I-95, near the intersection of Old Keene Mill Road and Bland Street. The other line serves “Rolling Valley,” located at the commuter lot near the intersection of 9300 Old Keene Mill Road and Shiplett Boulevard.

The 14th Street NW/D Street NW location is located at a Metrobus stop and is served by three lines, one operating to and from the Lake Ridge area of Woodbridge, Virginia, and two operating to and from Dale City, Virginia. The Lake Ridge line serves “Old Hechinger’s,” located at 1310 Old Bridge Road, Woodbridge, Virginia. The Dale City line serves two locations: Potomac Mills and Horner Road. Potomac Mills is located on the south side of the Potomac Mills Shopping Center at 14362 Gideon Drive, Dale City, Virginia. Horner Road is located near the intersection of Prince William Parkway and Horner Road.

3.4.5 Carsharing

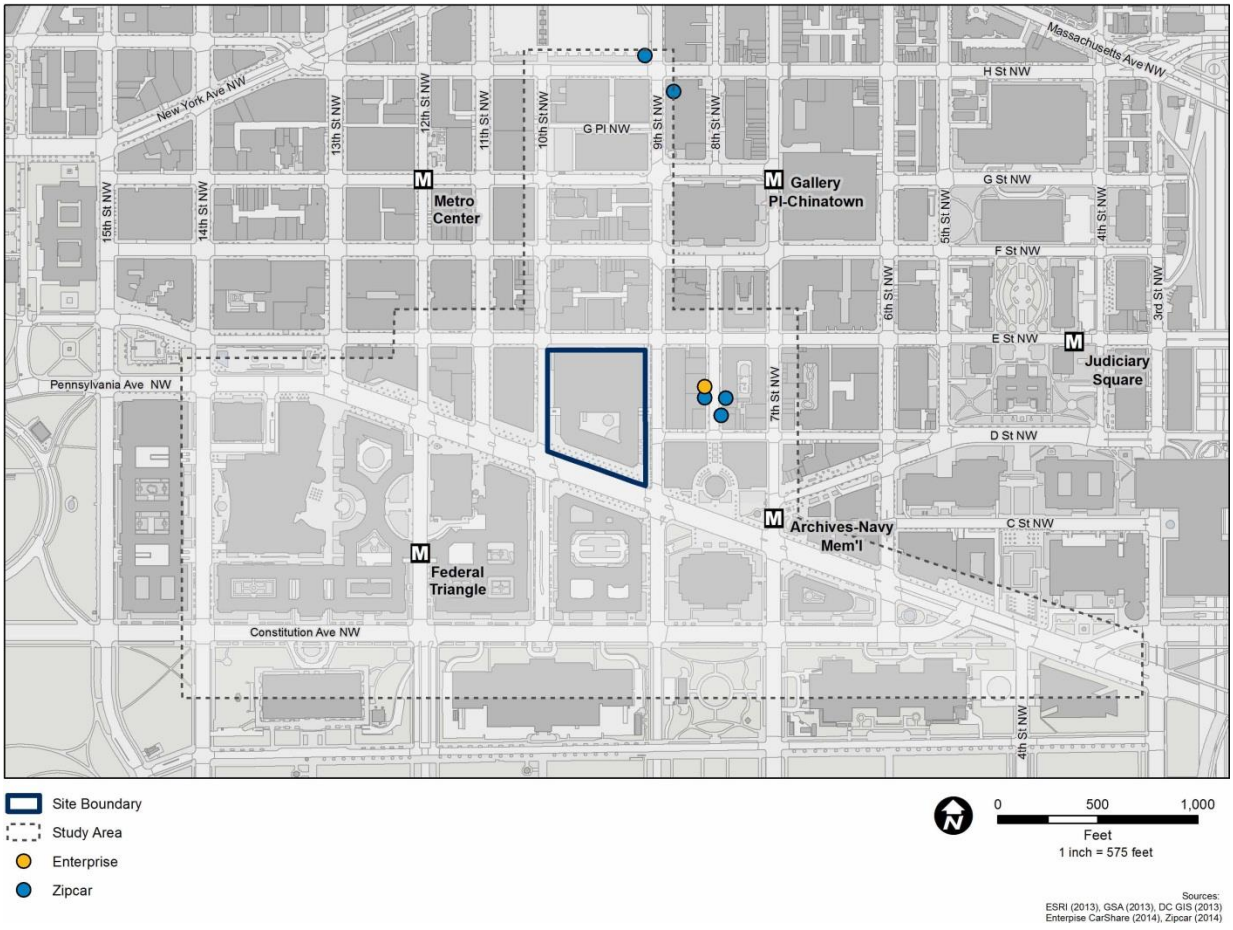
There are currently three companies that offer car sharing in the District: Zipcar, Enterprise, and Car2Go. Zipcar and Enterprise have designated pick-up/drop-off locations, while Car2Go allows users to park anywhere within the District, with the exception of the National Mall, Tidal Basin, and Hains Point area. Enterprise currently has one carshare location within the study area, while Zipcar has five. These locations are clustered in two locations: 8th Street NW between D and E Streets NW, and at the 9th Street NW/H Street NW intersection. Five of the six carshare locations are in parking garages, and one is on the street. Table 3-41 and figure 3-12 summarizes these locations.

Table 3-41: Existing Carshare Locations within the Study Area

Company	Location	Type
Enterprise	875 D Street NW	Garage
Zipcar	Archives Metro Station	On-street
Zipcar	425 8th Street NW	Garage
Zipcar	875 D Street NW	Garage
Zipcar	8th/H Street NW	Garage
Zipcar	870 9th Street NW (CityCenterDC)	Garage

Source: Enterprise CarShare (2014); Zipcar (2014)

Figure 3-12: Car Share Locations within the Study Area



3.4.6 Shuttles

There are a number of shuttles serving the study area that are operated by various federal government agencies (GSA 2010). The exact beginning and ending locations of these shuttles is not public information. The following federal agencies operate shuttles within the study area:

- Department of Homeland Security,
- Department of Defense,

- Department of Education,
- Department of Interior,
- Department of Justice,
- Department of Transportation,
- Environmental Protection Agency,
- Federal Communications Commission,
- General Services Administration, and
- Nuclear Regulatory Commission.

3.5 Parking

Parking near the sites includes limited metered and otherwise restricted on-street parking, as shown in figure 3-13, and structured below-grade parking accessible to the public as shown in figure 3-14. Information about on-street parking in the area was gathered through site visits carried out on July 16 and 17, 2014. Besides the public parking garage in the Ronald Regan Building and International Trade Center, all other nearby garage parking is north of Pennsylvania Avenue NW.

A review of the on-street parking map (figure 3-13) reveals that there is no on-street parking allowed on the JEH parcel block, along several sections of Pennsylvania Avenue NW including between 9th and 10th Streets NW, along 9th and 10th Streets NW between Pennsylvania and Constitution Avenues NW, and on the north side of Constitution Avenue NW between 9th and 10th Streets. Beyond the areas of “no on-street parking” in the immediate vicinity of the JEH parcel, on-street parking is generally metered and time constrained (typically a 2-hour time limit) with the closest on-street parking located to the north, east, and west of the JEH parcel. On-street parking is limited to non-peak hours along Pennsylvania Avenue NW; H Street NW; 7th, 12th, and 14th Streets NW; and Constitution Avenue NW, as well as one side of the street on 13th, 11th, and 6th Streets NW in the study area. Reserved parking for government or Smithsonian officials and specific zone permit holders is concentrated along Pennsylvania Avenue NW and one block of E Street NW between 12th and 15th Streets NW, on two sections of12th Street NW, on a small portion of 14th Street near Pennsylvania Avenue NW, on a small portion of 7th Street NW near Constitution Avenue NW, and on a small portion of Pennsylvania Avenue NW east of its intersection with Constitution Avenue NW. Food vendor on-street parking is also available along the south side of Constitution Avenue NW. Some sections of the study area have different AM and PM on-street parking situations, as shown in figure 3-13.

In addition to the on-street parking areas discussed above, areas along 10th Street NW (west side) and 9th Street NW (east side) between Pennsylvania Avenue NW were reserved for Metro bus parking and tour bus parking, respectively. The east side of 14th Street in front of the Ronald Reagan building was also designated as a bus stop area with no street parking. Shuttle pick-up and drop-off was observed on July 16, 2014, on the north side of Constitution Avenue NW between 9th and 10th Streets NW. A few loading zones were also demarcated in the study area, including one along the east side of 10th Street NW between E and F Streets NW.

Figure 3-13: On-street Parking in the Study Area

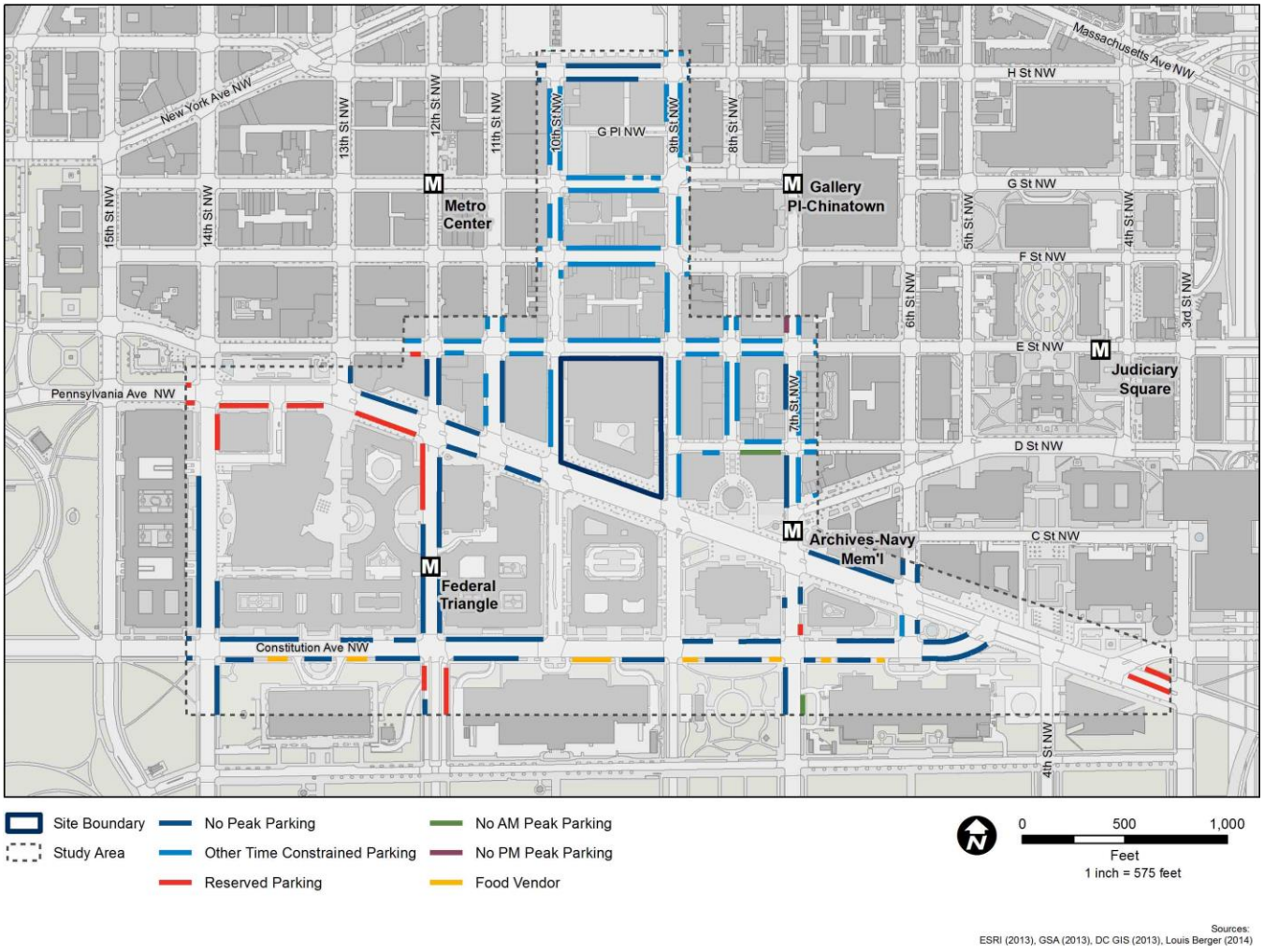
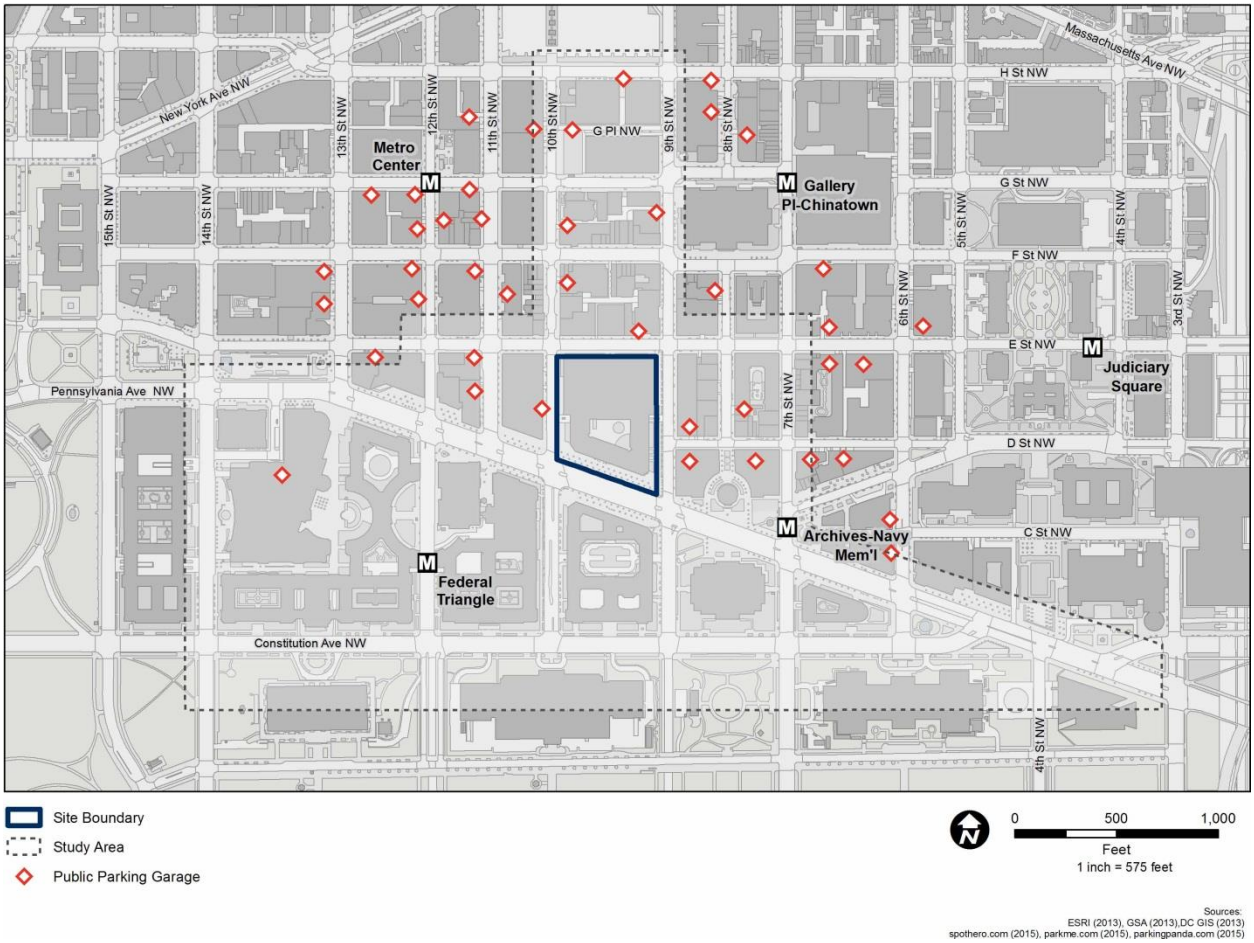


Figure 3-14: Garage Parking in the Study Area



3.6 Truck Access

Currently, trucks accessing the JEH parcel enter through the same entrance as vehicles on 10th Street NW. Trucks seeking to be admitted access to the building are examined more thoroughly than the standard personal vehicle.

3.7 Traffic Analysis

This section explains the tools, concepts, and definitions for analyzing traffic operations; the process used to analyze the study area intersections; and the traffic analysis results.

3.7.1 Analysis Tools

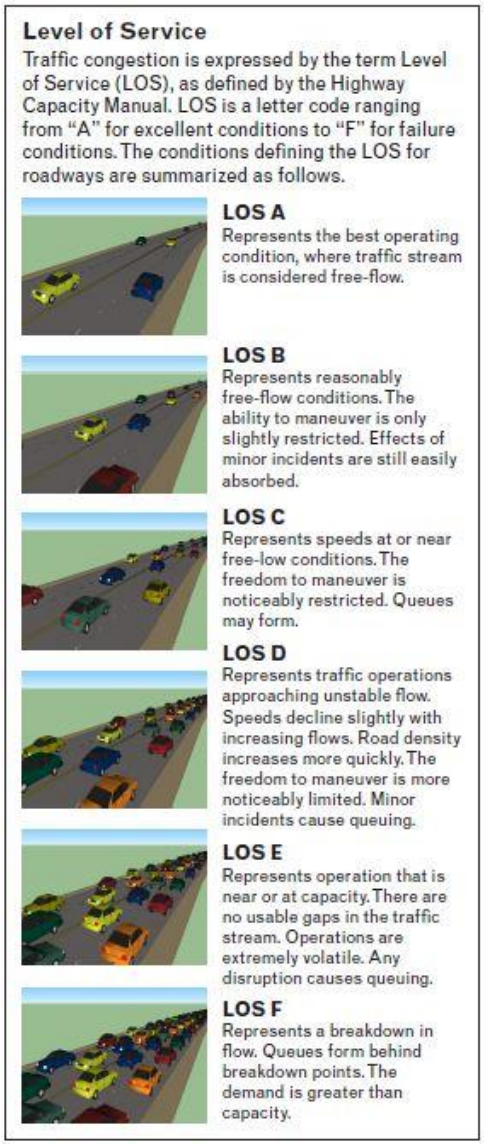
The study analyzed the study area intersections using Synchro™ Traffic Signal Coordination Software Version 8.0 (Build 805, Revision 878) and SimTraffic™ Version 8.0 (Build 805, Revision 878). Two main analyses are performed for traffic, an intersection capacity analysis and an intersection queueing analysis. The intersection capacity analysis uses the Synchro™ software tool and various input values as described in the following sections to determine the LOS, or driver perception of an intersection's operation. The intersection capacity analysis results are presented in Section 3.7.4. The intersection queuing analysis uses both the Synchro™ and SimTraffic™ tools to determine different levels of queuing, or the length that vehicles may back up at an intersection. SimTraffic was used in addition to the standard Synchro tool to analyze queueing because it

provides a more robust analysis of 95th percentile queuing than Synchro. The intersection queuing analysis process is described more in Section 3.7.3, while the study area results of the queuing analysis are presented in Section 3.7.5.

3.7.2 Intersection Operations Analysis Method

LOS is the primary measure of traffic operations for both signalized and unsignalized intersections. It is a standard performance measure developed by the transportation profession to quantify driver perception for such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles. LOS provides a scale that is intended to match motorists' perception of how a transportation facility operates, and to provide a scale to compare different facilities. Detailed LOS descriptions are presented in figure 3-15.

Figure 3-15: Level of Service Diagram



Source: TRB (2000)

3.7.2.1 Signalized Intersection Level of Service

The LOS for signalized intersections as agreed in the DDOT Scoping Form is based on the Synchro method that is similar to the Highway Capacity Manual (HCM) 2000 method and requires the same inputs to determine an accurate LOS (TRB 2000). Primary inputs include:

- vehicular volumes,
- pedestrian volumes,
- traffic signal timings,
- roadway geometry,
- speed limits,
- truck percentages, and
- peak hour factor (measure of vehicle 15-minute flow rate)

The average vehicle control delay, measured in seconds per vehicle, is calculated using these parameters with the Synchro procedures. This represents the average extra delay in seconds per vehicle caused by the presence of a traffic control device or traffic signal and includes the time required to decelerate, stop, and accelerate. LOS can be characterized for the entire intersection, each intersection approach, and each lane group. Control delay is used to characterize LOS for the entire intersection or an approach. Control delay and v/c ratio are used to characterize LOS for a lane group. Delay quantifies the increase in travel time due to a traffic signal control. It is also a surrogate measure for driver discomfort and fuel consumption (TRB 2010). Signalized intersections or approaches that exceed a delay of 50 seconds have LOS E and 80 seconds have LOS F. Table 3-42 shows the average control delay and corresponding LOS for signalized intersections. Using the Synchro method, LOS E and LOS F constitute failing operations.

Table 3-42: Signalized Intersection Control Delay and LOS Thresholds – Synchro Method

LOS	Average Control Delay (seconds/vehicle)	Description
A	Less than or equal to 10	Stable conditions
B	>10-20	
C	>20-35	
D	>35-55	
E	>55-80	Unstable conditions
F	More than 80	Above capacity and unstable conditions

Source: TRB (2000)

To determine the LOS of an intersection, the critical input values were entered into the analysis software (Synchro™), and the average vehicle delay (seconds per vehicle) was calculated. Based on the average vehicle delay, the LOS was determined for all movements (left, through, and right), approaches, and the intersection as a whole. The 32 existing conditions intersections analyzed consisted of 31 signalized intersections and 1 unsignalized intersection.

3.7.2.2 Unsignalized Intersection Levels of Service

The LOS for unsignalized intersections (STOP-Controlled intersections) is based on HCM 2000 method and requires several inputs, including:

- vehicular volumes;
- pedestrian volumes;
- roadway geometry;
- speed limits;
- truck percentages; and
- peak hour factor.

The average vehicle control delay, in seconds per vehicle, is calculated using these parameters with the HCM 2000 procedures (TRB 2000). This represents the average delay caused by the presence of a stop sign or roundabout, and includes the time required to decelerate, stop, and accelerate.

LOS for a two-way STOP-Controlled (TWSC) intersection (i.e., unsignalized intersection) is determined for each minor-street movement or shared movement as well as the major-street left turns. LOS F is assigned to the movement if the v/c ratio for the movement exceeds 1.0 or if the movement's control delay exceeds 50 seconds. The LOS for TWSC intersections are different from the criteria used for signalized intersections primarily because user perceptions differ among transportation facility types. The expectation is that a signalized intersection is designed to carry higher traffic volumes and will present greater delay than an unsignalized intersection. Unsignalized intersections are also associated with more uncertainty for users, as delays are less predictable than at signals, which can reduce user's delay tolerance. LOS is not defined for the TWSC intersection as a whole or for major-street approaches for three primary reasons: (a) major-street through vehicles are assumed to experience zero delay; (b) the disproportionate number of major-street through vehicles at a typical TWSC intersection skews the weighted average of all movements, resulting in a very low overall average delay for all vehicles; and (c) the resulting low delay can mask important LOS deficiencies for minor movements (TRB 2010).

The capacity of the controlled intersection legs is based primarily on three factors: the conflicting volume, the critical gap time defined as the number of seconds between vehicles passing the same point along the major street approach, and the follow up time defined as the number of seconds between the departure of the first and second vehicle in queue along the minor street approach. The HCM-based capacity analysis procedure assumes that drivers are both consistent and homogeneous and assumes consistency for their critical gap time. Critical gap times are based on many factors including delay experienced by drivers on the approaches controlled by STOP signs. As delay increases, drivers become less patient and will accept shorter gaps which results in higher capacities for unsignalized intersections that are operating at LOS D or worse. The unsignalized intersection procedure uses fixed critical gap times. Unless the critical gap times are adjusted, the procedure will have a tendency to overestimate the delay at unsignalized intersections that are operating at LOS D or worse. Also, poor operations at an unsignalized intersection will encourage some drivers to turn right and make a U-turn on the mainline or accept shorter critical gaps (safety issue) rather than attempt a turn left (TRB 2010).

Table 3-43 shows the average control delay and corresponding LOS for unsignalized intersections. It should be noted that the worst LOS at one-way and two-way STOP-Controlled intersections represents the delay for the minor approach only. Using the HCM 2000 Method, LOS E and LOS F constitute failing operations.

Table 3-43: Unsignalized Intersection Control Delay and LOS Thresholds – HCM 2000 Method

LOS	Average Control Delay (seconds/vehicle)	Description
A	Less than or equal to 10	Stable conditions
B	>10-15	
C	>15-25	
D	>25-35	
E	>35-50	Unstable conditions
F	More than 50	Above capacity and unstable conditions

Source: TRB (2000)

3.7.3 Intersection Queuing Analysis Method

In addition to analyzing the vehicle delay, the vehicle queue lengths were calculated for each approach. The 50th percentile queue length is average queue length, calculated as the queue expected during 50 percent of the analysis period. The 95th percentile queue length is the worst-case scenario, calculated as the queue that has a 5 percent probability of being exceeded. A failing queue length is determined by a queue length exceeding the intersection approach storage capacity. As the available storage for each intersection approach differs, these values reflect whether the existing storage provides enough space for vehicles waiting to pass through the intersection without blocking another lane or another intersection. Because failing queues might occur along the same approach as a failing LOS, these values are calculated independently and might result in one approach receiving a failing LOS score, while another approach has a failing queue length. The study used Synchro™ to calculate both the 50th and 95th percentile queue lengths and SimTraffic™ to calculate 95th percentile queue lengths for the 31 signalized intersections, and only the 95th percentile queue lengths in SimTraffic™ for the one unsignalized intersection (50th percentile not reported in SimTraffic or Synchro for unsignalized intersections). The following paragraph describes why each of these analysis tools were used for the 95th percentile queue analysis.

To be consistent with the traffic analysis for all sites, SimTraffic was used to model the 95th percentile queue lengths for all JEH study area intersections. This involved calibrating the model, ensuring the model runs for the appropriate amount of time, and determining the number of simulation runs to be statistically within a plus or minus 5 percent error. The model was calibrated by adjusting link speeds, turning speeds, and vehicle positioning decision points (distance prior to decision point when vehicles position themselves in the correct lane for upcoming moves). The goal was to adjust the model to resemble a simulation closely representing the existing conditions. Unfortunately, SimTraffic was not able to accurately simulate traffic conditions through this downtown study area because it is unable to correctly model the effects of turning vehicles waiting for gaps in heavy pedestrian flows. SimTraffic holds the turning vehicle at the intersection stop line until a gap appears, rather than at the threshold for the crosswalk. This leads to fewer vehicles able to complete turns than was observed and thus longer queues than would actually occur. These issues were magnified for all Pennsylvania Avenue intersections because of the large amount of space not being used by SimTraffic to hold the waiting left-turning vehicles between the intersection stop line and pedestrian crosswalks. This results in SimTraffic producing gridlock conditions along most cross streets, which were not observed in the field on multiple occasions. Therefore, the 95th percentile values were also reported using Synchro. SimTraffic was still reported because DDOT requests this analysis for any intersection with failing queues, but results should not be used to measure

the actual or forecasted queue lengths. Because of the inaccuracy of the SimTraffic results, only one SimTraffic simulation run was performed for each condition analyzed.

3.7.4 Existing Condition Intersection Operations Analysis

Synchro™ was used to calculate the vehicle delay and LOS operation based on the Synchro method for each study area intersection. Based on the signalized intersection analysis, all of the study intersections operate at overall acceptable conditions during the morning and afternoon peak hours.

A total of 10 signalized intersection lane groups or intersection approaches operate under unacceptable conditions (LOS E or LOS F) during the peak hours. The lane group within the approach that is operating under unacceptable conditions is noted in parentheses; when “overall” is noted, the overall approach movements operate under unacceptable conditions.

- 9th Street NW and G Street NW (Intersection #4)
  - Eastbound G Street (overall) during the PM peak hour
- 13th Street NW and Pennsylvania Avenue NW (Intersection #17)
  - Eastbound Pennsylvania Avenue (overall) during the AM peak hour
- 11th Street NW and Pennsylvania Avenue NW (Intersection #19)
  - Eastbound Pennsylvania Avenue (left turns) and westbound Pennsylvania Avenue (right turns) during the AM peak hour
  - Eastbound Pennsylvania Avenue (left turns) and southbound 11th Street (overall) during the PM peak hour
  - Southbound 11th Street (left turns) during the PM peak hour
- 10th Street NW and Pennsylvania Avenue NW (Intersection #20)
  - Northbound 10th Street (overall) during the AM peak hour
  - Northbound 10th Street (left turns) during the AM peak hour
- 7th Street NW and Pennsylvania Avenue NW (Intersection #22)
  - Eastbound Pennsylvania Avenue (left turns) and northbound 7th Street (left turns) during both the AM and PM peak hours
- 6th Street NW and Pennsylvania Avenue NW (Intersection #23)
  - Eastbound Pennsylvania Avenue (left turns) during the AM peak hour, and southbound 6th Street (overall) during the PM peak hour
- Constitution Avenue NW and Pennsylvania Avenue NW (Intersection #24)
  - Westbound Pennsylvania Avenue (left turns) during the PM peak hour
- 14th Street NW and Constitution Avenue NW (Intersection #27)
  - Southbound 14th Street (overall) during the PM peak hour
- 12th Street NW and Constitution Avenue NW (Intersection #28)
  - Northbound 12th Street (overall) during both the AM and PM peak hours
- 6th Street NW and Constitution Avenue NW (Intersection #32)
  - Eastbound Constitution Avenue (left turns) during the AM peak hour

Based on the unsignalized intersection analysis, the one unsignalized intersection in the study area (8th Street NW and D Street NW) operates at an acceptable LOS during the AM and PM peak hours.

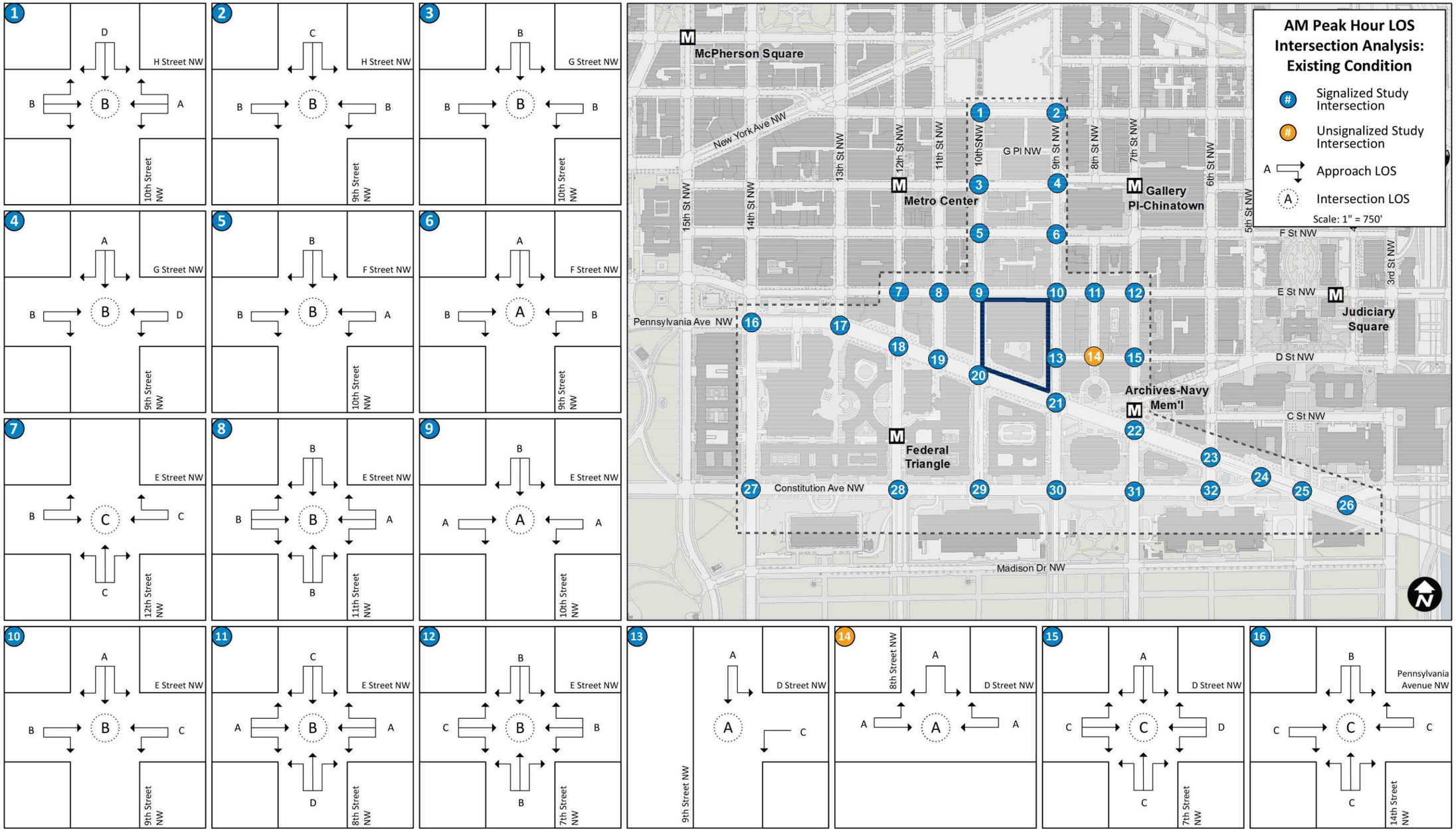
Complete Intersection Operations Analysis

The average LOS for the various approaches to the intersection and the overall intersection LOS grade are depicted in figure 3-16 and figure 3-17 for AM and PM peak hours, respectively. Table 3-44 shows the results of

the LOS capacity analysis and the intersection vehicle delay for the Existing Condition during the AM and PM peak hours.

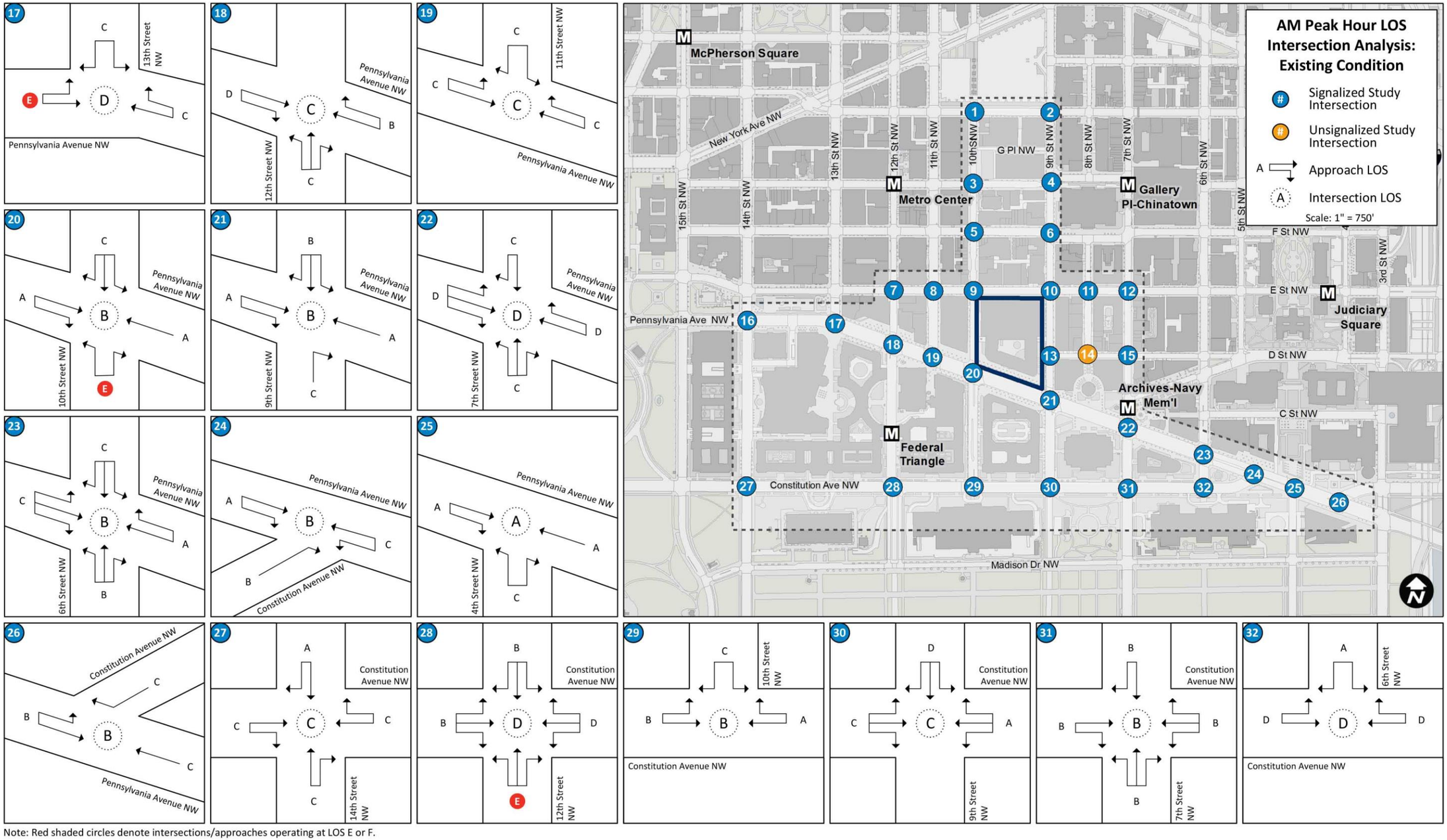
(This page intentionally left blank.)

Figure 3-16: Existing Condition Intersection LOS for AM Peak Hour



Note: Red shaded circles denote intersections/approaches operating at LOS E or F.

Figure 3-16: Existing Condition Intersection LOS for AM Peak Hour (continued)



Note: Red shaded circles denote intersections/approaches operating at LOS E or F.